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## ONLINE SUPPLEMENTARY INFORMATION

*Hipparium phlegrae* sp. nov. (Mammalia, Perissodactyla): A new species from the Turolian locality of Kryopigi (Kassandra, Chalkidiki, Greece)

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## METHODS

For the study and comparisons of the Kryopigi hipparium material, linear measurements were taken. Univariate analysis included box-plots and estimations of the following statistical parameters: variance, standard deviation (for n-1), coefficient of variation, mean and the range. For testing the mean values among different species, t-tests and non-parametrical Kolmogorov-Smirnov tests were used, as well as scatter diagrams for bi-variate comparisons. For multivariate analysis, cluster and principal component analysis were used. Multivariate test of mean was performed with MANOVA (Multivariate ANalysis Of VAriance) and Mahalanobis distance. The above statistics and techniques have been described in Simpson and Roe (1939) and Hammer and Harper (2006). Simpson diagrams (log-differences) were also used for metapodial comparisons (Simpson, 1941). Paleontological Statistics (PAST) software was used for analyses and statistics (Hammer et al., 2001).

Measurements follow Eisenmann et al. (1988), excluding measurements of carpal and tarsal bones that follow Bernor et al. (1997), while additional measurements were taken by the authors (e.g. for fifth metacarpal). Morphology and nomenclature of dental material was also described according to the recommendations of Eisenmann et al. (1988). Since shape and size of hipparium teeth vary greatly with wear, Gromova (1952) recommended the distinction of four stages of wear (e.g. Alberdi, 1974; Eisenmann et al., 1988). Thus the KRY dental material was separated into four wear stages by dividing the maximum height of unworn specimens per tooth (e.g. P2, P3, P4, P3,4 etc) by four. The first wear stage (1<sup>st</sup> w.s.) includes the less worn teeth and the last one (4<sup>th</sup> w.s.) the most worn teeth. Middle worn teeth when referred include teeth of the second and third wear stages. The wear stage of the in situ teeth is estimated.

The enamel formula was calculated by counting the anterior and posterior plications of the pre- and post-fossette and the number of plis caballins for either in situ or isolated dental material. In addition the total number of plications per specimen was estimated. The mean total number of plications was estimated for the entire sample (all categories of tooth and wear stages) and especially for the middle worn teeth (2<sup>nd</sup> and 3<sup>rd</sup> w.s.) The latter is the most representative for the plication number of each tooth category, because in the first wear stage the occlusal surface is not always representative and in the last wear stage the plication

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number is significantly decreased. Thus the mean total number of plications is commonly lower in the entire sample than that of the middle worn teeth.

Several ratios (or indexes), mainly given in the descriptions of the material, were used either for the measurements taken on the skull (crania and mandibles) or for the lengths of the postcranial skeleton. The former are useful for comparisons in morphology excluding allometrical differences and they are discussed in the comparisons, whereas the latter are useful in describing the limbs and they are also related to the locomotive pattern. Each ratio, mostly expressed as a percentage, is calculated as a fraction of two linear measurements.

The attribution of postcranial elements to skull morphologies is in general a challenging process in hipparion studies. Size groups (Sondaar, 1971; Koufos and Vlachou, 2005) combined or not with linear regressions among skulls and metapodials (Forsten and Garevski, 1989) and similarities with previously studied species are the most common methods used in hipparion studies. Different size-groups of postcranial material can be identified with multivariate analysis, such as the Principal Component Analysis and also from scatter diagrams (Lazaridis, 2010 for Kryopigi hipparions). Nevertheless histograms are also applicable and useful to check also similar size groups among various skeleton elements. On the histogram for the third metatarsal length of Kryopigi *Hipparium* s.l., three size-groups can be identified (Fig. 2S, part A.) that represent three different species in Kryopigi material.

Regarding the third metacarpal, four species have been identified. It must be noted that one species is represented by a single distal part. Thus, a histogram for the breadth at the protuberances used to display the size-groups (Fig. 2S, part B); a significant overlapping is noticeable between the two smaller in size groups. Few measurements are commonly well preserved in the skull and the mandible, such as the length of the cheek teeth, which used for identification of size-groups. However, these measurements vary ontogenetically among individuals of the same species (in young individuals the cheek teeth length is longer than in older ones due to attrition). Two size-groups are recognized among the skulls (Fig. 2S, part C) and three among the mandibles (Fig. 2S, part D) (this is also consistent with their morphology). Thus, the size-group A, comprising the smallest postcranial elements, is correlated to the smallest skulls and mandibles, and due to the skull morphology is attributed to *Cremohipparium matthewi/nikosi*. The largest size-group D, comprising the most robust metapodials, is correlated to the largest mandibles, and is it attributed to *Hippotherium cf. brachypus* due to metapodial morphology. The size-group B is slightly larger than size-group A, concerning the postcranial material (Fig. 1S parts A,B). The cranial material referred as size-group B, includes the adult skull KRY 2800, the sub-adult skull KRY 3041 (M3 not fully erupted), and a maxilla fragment (KRY 7272) (Fig. 2S, part C), it is also closely related to the size-group A. The size-group B of the mandibles is slightly larger than size-group A following the correlation of the postcrania and skulls (Fig. 2S, part D). This group includes the material attributed to the *H. phlegrae* sp. nov. The fourth species, referred as *Hipparium* sp., is represented by fragmentary postcranial material, similar in size to *H. phlegrae* sp. nov. but with differences in morphology and in some measurements, which are significantly larger (level of significance is 0.05).

Apart from the attribution of the metapodials to skulls and mandibles there are also several postcranial elements that commonly are difficult to be distinguished in various species-related groups (e.g. carpal and tarsals). For this kind of discrimination, the morphological differences, the articulated specimens found in situ as well as the size groups mentioned above were used.

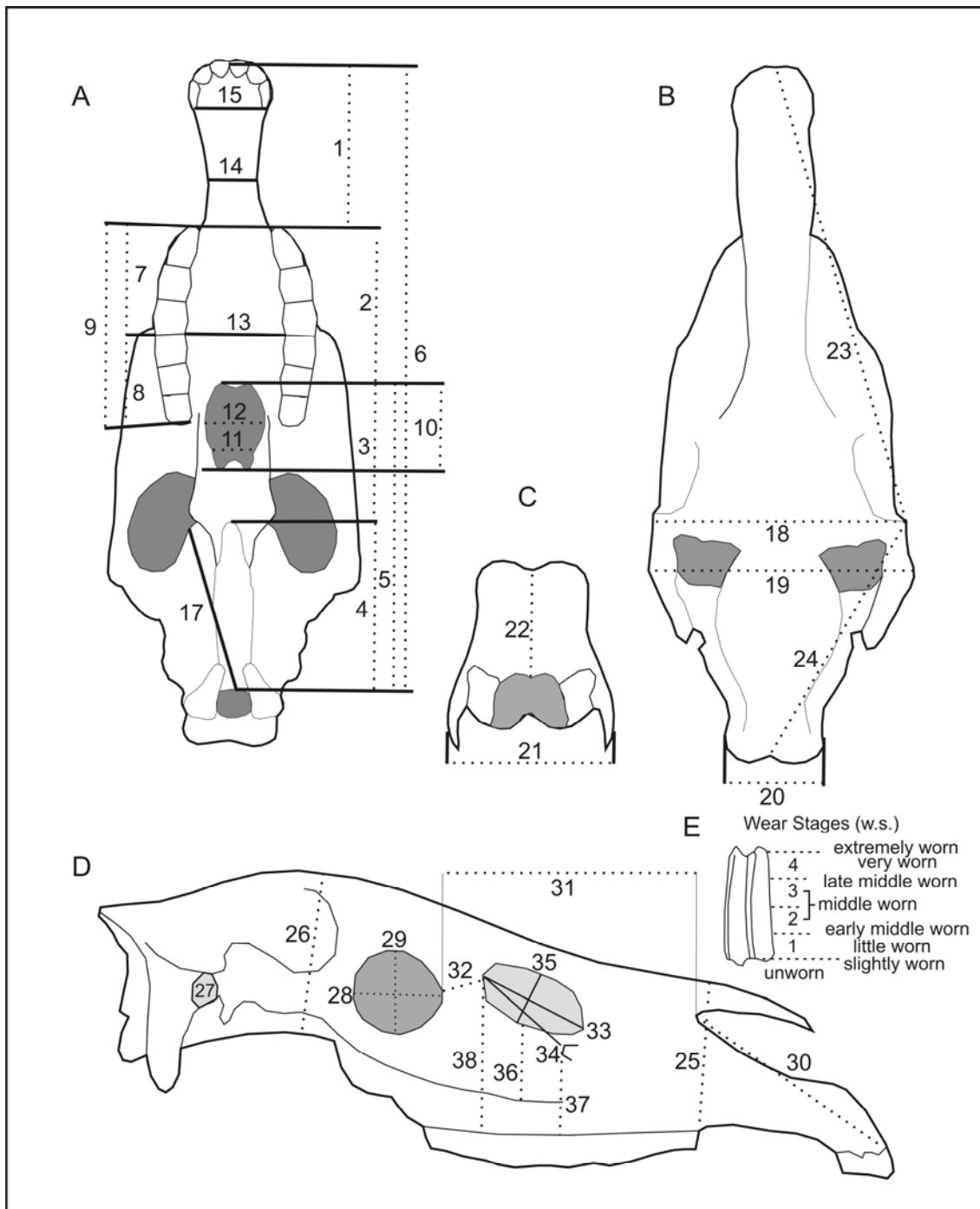


Fig. S1. Measurements taken on the skulls: 1. muzzle length; 2. palatal length; 3. vomerine length; 4. post-vomerine length; 5. post-palatal length; 6. basilar length; 7. premolar length; 8. molar length; 9. upper cheek teeth length; 10. choanal length; 11. minimal breadth of the choanae; 12. maximal breadth of the choanae; 13. palatal breadth; 14. minimal muzzle breadth; 15. muzzle breadth; 16. length of fossa temporalis; 17. length between basion and the foramen ethmoidalis; 18. frontal breadth; 19. bizygomatic breadth; 20. occipital breadth; 21. basioccipital breadth; 22. occipital height. 23. anterior acular line; 24. posterior acular line; 25. facial height if front of  $P^2$ ; 26. cranial height at the level of the posterior margin of the orbital process; 27. exterior height of the meatus auditivus externus; 28. antero-posterior orbital diameter; 29. orbital diameter perpendicular to 28; 30. length of the naso-incisival

notch; 31. cheek length; 32. distance between the orbit and the preorbital fossa; 33. Length of the preorbital fossa; 34. Distance between the back of the preorbital fossa and the foramen infra-orbitale; 35. height of the preorbital fossa; 36. distance of the preorbital fossa and the facial crest; 37. height of back of the foramen infra-orbitale above the alveolar border; 38. height of the back of the preorbital fossa above the alveolar border (based on Eisenmann *et al.*, 1988). **A**, ventral view; **B**, dorsal view; **C**, occipital view; **D**, right lateral view; **E**, upper cheek tooth with the four wear stages, buccal view.

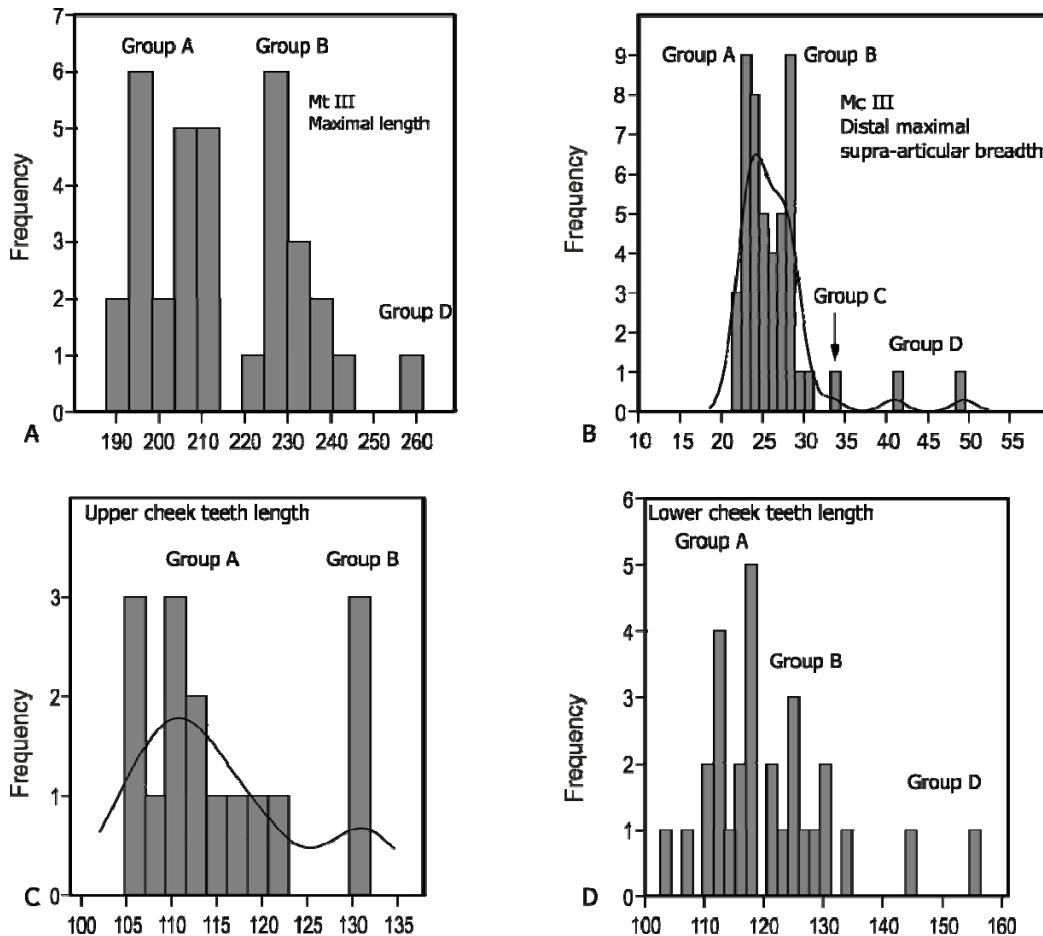


Fig. S2. *Hipparrison* s.l. from the Kryopigi locality. **A**, Histogram of the length of the third metatarsal (m1); **B**, Histogram of the breadth of the third metacarpal distal maximal supra-articular breadth (m10); **C**, Histogram of the upper cheek teeth length (m9); **D**, Histogram of the lower cheek teeth length (m5).

#### REFERRED SPECIMENS

Skull: KRY 2800, 3041, 2810, 4578 (maxilla with M1-M2), P<sup>2</sup>: KRY 2672, 1923, 2136, 3470, 7107, 7212, 3751, 3203, 3041, 3205, 260, 2620, 3041, 2803, 2803, 1590, 2634, 1024, 1902, 2137, 1630, 5525, 2800, 7216, 2623, 7009, 3202, 2631, 2800, 2901, 3038, 2635, 279, 7272, 4026, 3208, 2022, 2069, 2063, 1031, 5124, 3207, 1121, 5761, 6767, P<sup>3,4</sup>: KRY 4528, 2659, 7075, 3751, 7235, 7156, 7069, 5987, 3947, 3947, 2803, 2517, 2803, 1909, 6560, 3751,

7155, 5948, 1156, 7009, 2605, 2651, 1606, 2096, 2803, 3234, 2595, 1910, 3217, 1924, 5768, 1156, 2118, 2517, 3854, 3854, 2086, 5948, 3230, 4015, 3232, 2126, 2110, 2665, 2803, 2591, 7009, 2640, 4031, 7090, 3237, 1909, 7097, 5520, 3041, 5770, 4030, 2801, 2093, 2801, 2800, 3251, 2639, 4089, 273, 2807, 2587, 7147, 2063, 2089, 1932, 2809, 6414, 4001, 4521, 2593, 5520, 2800, 3235, 2805, 3041, 2809, 4038, 282, 2807, 3037, 4013, 2653, 7272, 2585, 2811, 7272, 2063, 2086, 3038, 2811, 2097, 2800, 2883, 2602, 7126, 291, 602, 1616, 2590, 1601, 2083, 2805, 3038, 1126, 268, 2594, 2800, 2641, 1617, 2064,  $M^{1,2}$ : KRY 1585, 2064, 2801, 287, 7272, 2801, 3041, 6755, 2600, 2811, 2064, 2607, 3041, 1618, 2664, 3037, 2588, 2807, 2883, 2805, 5764, 3947, 4057, 2609, 5103, 7076, 2082, 2647, 2803, 3038, 1910, 3036, 1585, 1909, 2801, 1125, 2063, 2800, 2800, 2883, 2809, 2803, 3140, 1584, 2958, 5459, 2892, 2643, 3267, 3751, 2805, 1156, 7009, 2599, 3228, 3947, 2800, 2801, 5520, 5948, 2807, 3214, 2811, 7272, 3036, 2800, 2812, 3134, 1120, 3854, 1175, 3037, 3936, 2517, 2075, 3038, 262, 2072, 5948, 2809, 2661, 4016, 1156, 5520, 3041, 7070, 2087, 1910, 7222, 2079, 3041, 7124, 7009, 3854, 2812, 3145, 2669, 2803, 1909, 2803, 2073, 2584, 7213, 2517, 3751, 3135, 4039, 2077, 6572, 2092, 7936,  $M^3$ : KRY 1910, 2578, 7044, 263, 2626, 5948, 1156, 2807, 278, 277, 2685, 5224, 2153, 4015, 6814, 2682, 3243, 7460, 4234, 7272, 2652, 5126, 3241, 2583, 2811, 2812, 2809, 2064, 2800, 2800, 20, 1585, 2801, 2803, 2801, 2517,  $dp^2$ : KRY 7357, 6526, 3327, 1632, 2138, 2671, 7350, 1631, 4351, 5405, 7113, 2676, 7352, 7356, 1633, 7054, 7354, 1933, 2678, 5225, 2633, 7053, 2674, 5686a, 5686a, 1139, 1911, 2810, 2810,  $dp^{3,4}$ : KRY 6526, 6526, 3331, 7072, 4063, 7371, 7369, 4351, 7374, 7111, 2119, 4074, 2120, 1651, 4562, 1639, 1643, 2128, 3324, 7366, 1653, 2114, 7059, 7135, 2642, 5163, 7065, 7096, 2122, 7364, 7370, 1729, 2117, 1615, 301, 5772, 2666, 1730, 7071, 3924, 2890, 2810, 1139, 5686a, 2810, 2067, 2815, 5686a, 7103, 2068, 5686a, 2810, 2068, 2810, 5686a, 3041, 2815, 1911, 1650, 3325, 2671, 1652, 7362, 6961, 7112, 3328, 318, 2098, 1645, 2103, 1641, KRY 3029 mandible (Md) with p2-m3; KRY 2876a Md left and symphysis with i2,i3, c, p2-m3; KRY 3042 Md left with p2-m3, c and i2,i3 right; KRY 3053 Md left with P<sub>2</sub> and symphysis with i1-i3 left+right; KRY 5995Md with i1-m3 left+right; KRY 3029 and KRY 5002 Md left with p2-m3; KRY 1155 Md left with p3-m3; KRY 3946 and 2050 Md right with p2-m3; KRY 2877(a,b) Md left+right with p2-m3; KRY 2052 and 3043 Md right with p3-m2; KRY 4330 Md right with p2-p4; KRY 3129 and 3124 Md left with p2-p4; KRY 6749 Md left with p2-p3; KRY 2886 Md right with p4-m3, KRY 6951 Md left with p4-m3; KRY 4097 Md right with m1-m3; KRY 1574 Md left with p2-m2; KRY 191 Md left with p2-m1; KRY 1570 Md with left p2,d3-d4,m1-m2 and right p2-p3,d4,m1-m2; KRY 2513Md right with p2-p3,d4,m1-m2; P<sub>2</sub>: KRY 3130, 2182, 2181, 1160, 1941, 1655, 1163, 1579, 7348, 191, 204, 3029, 3307, 3750, 3946, 3124, 3124, 5102, 5694, 3306, 1656, 4042, 252, 2876a, 5408, 6573, 7145, 1657,

2736, 6031, 248, 2876b, 3129, 2877sin, 5995sin, 3853, 5995dex, 3042dex, 1574, 2050, 6749, 2576, 1687, 3042sin, 4330, 2877dex, 6760, 5002, 2060, 3053, P<sub>3,4</sub>: KRY 3042dex, 1574, 209, 4579, 3946, 3296, 3316, 1574, 2050, 210, 5299, 7441, 7442, 216, 2877sin, 2876b, 2052, 1572, 2696, 3053, 2183, 5002, 4330, 6749, 207, 4330, 7158, 3129, 3124, 2179, 191, 5002, 7437, 5995dex, 1155, 2877dex, 3043, 5995sin, 5995dex, 231, 2876a, 191, 7440, 1575, 3029, 3029, 3853, 3124, 2052, 6424, 6656, 3750, 3124, 2060, 7438, 7440, 227, 2689, 2566, 3130, 3288, 2706, 2698, 7443, 2877dex, 2877sin, 3042sin, 4071, 4358, 3280, 2157, 2709, 3051, 3273, 3058, 7447, 6557, 2721, 2704, 4049, 2892, 4188, 2712, 2886, 2060, 2169, 2727, 1579, 27, 727, 3315, 2714, 3051, 1946, 1155, 7445, 2876a, 2164, 3853, 7232, 205, 5220, 7484, 7014, 1943, 3043, 3042sin, 3059, 3285, 3946, 3053, 1141, 2876b, 3750, 4098, 3314, 7439, 2700, 5771, 6951, 2053, 2050, 7348, 1936, 3042dex, 2697, 4033, 3124, 6892, 238, 4067, 1572, 1161, 3279, M<sub>1,2</sub>: KRY 2188, 26, 3272, 4563, 7014, 2877sin, 6829, 1937, 4050, 1673, 191, 2720, 1572, 1155, 2514, 2516sin, 1155, 3059, 2894, 3764, 6300, 4547, 6756, 3270, 7458, 3029, 3125, 2516dex, 2203, 1575, 2694, 2050, 5002, 1674, 2876b, 2716, 1663, 4019, 2877sin, 3029, 3277, 2184, 5995dex, 3283, 5995dex, 3042sin, 7180, 7159, 213, 208, 7415, 2724, 218, 1671, 230, 3760sin, 3946, 3042dex, 3274, 2050, 3760dex, 7452, 4058, 3043, 1574, 4254, 199, 7181, 3042dex, 3043, 3053, 6951, 2876a, 214, 6951, 3059, 2057, 2060, 3271, 2060, 3056, 3946, 1572, 2168, 3853, 2052, 2180, 219, 2717, 1576, 222, 3053, 2177, 4051, 5002, 734, 5995sin, 3282, 2690, 2516sin, 7450, 5995sin, 5247, 2516dex, 7186, 2897, 3042sin, 4075, 4052, 2719, 1574, 2877dex, 3853, 4098, 2877dex, 6726, 2718, 3318, 6657, 3317, 2876b, 226, 3760dex, 2876a, 2178, 6757, 2514, 2052, 4098, 5098, 2728, 3760sin, 2729, 4061, 7163, 3735, 3336, M<sub>3</sub>: KRY 4070, 4249, 4085, 2746, 2754, 7185, 7420, 2747, 5696, 2745, 2740, 5221, 2749, 7418, 2743, 3313, 2750, 2198, 25, 2196, 2742, 2737, 4077, 4076, 24, 2754, 7419, 2754, 6289, 2876b, 2876a, 4098, 3029, 5002, 1155, 2514, 2060, 3946, 6951, 3059, 5995sin, 3042sin, 5995dex, 3042dex, 2877dex, 2877sin, 2050, 2061, 3853, 1572, Sc right: 5343, 1382, Sc left: 7492, Hu left: 7712, Hu dist left: KRY1171, 3729, 4302, 2526, 6831, 3178, 3062, 3179, 3824, Hu dist right: KRY 3063, 3072, 3180, 6832, 2232, 7522, Hu prox right: KRY 6939, Hu frag: KRY 1904, 4307, 5998, Ra dia right: KRY 605 (young individual), Ra+Ul right: KRY 3120, 6003 (distal epiphysis missing-young individual), Ra+Ul left: KRY 3121 (+2819 olecranon), 1907(young individual), 4299+4291(young individual), 2225(young individual), 7712(young individual), Ra right: KRY 1906, Ra prox left: KRY 3941 (fragment-no measurements), Ra+Ul prox left: KRY 4303, Ra dist right: KRY 1586, 2234, 3122, 5751(distal epiphysis; young individual), Ra dist left: KRY 6508, Ul prox right: KRY 611, Olecranon right: KRY 611, Pi left: KRY-3801, 2850, 6733, 2224a, 3826, 7712 (fragment), Pi right: KRY-6710, 5997, 1770, 3797, Py left: KRY 2224b, 3826,

5402, 6168, Py right: KRY 1784, 6167, 2342, 2856, Lm left: KRY 3819, 3818, 3826, 7712, 4266, 2794(fragment), 2224 (fragment), Lm right: KRY 2851, 2325, 5996, 1781, 5959 (fragment), Scaph left: KRY 4177, 2853, 3813, 1988, 3826, 2224, 4173, 7712 (fragment), Scaph right: KRY 4317, 5753, 7852, 2852 (fragment), 2327 (fragment), Un left: KRY 3767, 7712, 3769, 2224, 3770, 1850, 3826, 3771, Un right: KRY 2344, 2857, Ma left: KRY 3809 (fragment), 2795 (fragment), 2855, 4532, 3875, 3826, 7712, Ma right: KRY 3643, 3872, 4176, 3805, 4174, 6664, 7761, 7760, 1989 (fragment), 2854 (fragment), 2224c, 7760, 7761, Td left: KRY 7712, 3826, 6274, 2224, Td right: KRY 6272, 2009, 2858, Tr right: KRY 3826, McV left: KRY 2224, 3826, McIII left: KRY 1861, 5661, 5065, 53, 2868, 3091, 3093, 1896, 5059, McIII right+McII: KRY 3714, 3995a-b, McIII left prox: KRY 3089, 3098, 7541, McIII right prox: KRY 614, 5854, 2912, McIII left prox+dia: KRY 3096, McIII right prox+dia: KRY 3101, 3102, 3095, McIII left+McII prox+McIV prox (deformed): KRY 1899, McIII left+McII dia (epiphysis missing)+McIV (young individual): KRY 4281, McIII right+McII dist+dia+McIV dia: 2888, McIII left: KRY 3827+McII(KRY 3829)+McIV(KRY 3828), McIII left+McII: KRY 6503, McIII right+McII+McIV: KRY 2240, McIII left McII+McIV: KRY 3726a-c, McIII+McII+McIV right dist+sesMcII: KRY 4304 (young individual), 6833, McIII left+McII prox+dia+McIV prox+dia: KRY 3765a-c, KRY 5088a- with Ph1, Ph2, Ph3, Mp lateral dist. Ph1-McII, Ph1-McIV, 2Ses, Ph2 lateral, Ses-Ph3 KRY 7712, McII left: KRY 3829, 3765b, McII left prox: KRY 1899, 1061, 5553a, 2266, 3695, 2004, 7034, 7035, 7037, 6503a, 3693, McII right: KRY 3995b, 3714, McII right prox: KRY 2912, 2240, 7038, 5962, 3694, McII left dist: KRY 7712, McII right dist: KRY 2888, 7709distal (young), 4281 McII dist, McIV left prox: KRY 6549, 7033, 2000, 7015, 3691, 3689, 1899, McIV left: KRY 7712, 3828, 3726b, 3765c (distal epiphysis missing), McIV right: KRY 2240, McIV right prox: KRY 3922, 70, 5213, 3688, 3692, 3690, McV right: KRY 1841, Ph1 (manus)→McIII: KRY 7547, 665, 7712, 4287, 666, 3726d, 2561, 5053, 2553, 2547, 5088b, 7709 (*νεαρό*), 3831, 1054, 3573, 3151, 2552, 3932, Ph1 (pes)→MtIII: KRY 2287, 3787, 54, 3152, 1055, 5032d, 7713, 3896, 2285, 700, 6589, 3185a, 4398, 1793, 3153, 6591, Ph1 →MpIII: KRY 6817, 3891, 2550, 3697, 2562, 4263, 1805, 3889, 3478, 5857, 1055, 7071, Ses→Mc3: KRY 6115, 6138, 7712 (adaxial+abaxial), 6116, 5514, 6154, 3830, 6155, 6592, 6111, 5088i, 5088j, 6104, 5042, 708, 3553, 6131, 6135, 6136, 6117, 1834, 6348, 6127, 6103, 6110, 1836, 707, 5250, 7709 (adaxial+abaxial, young individual), Ses→Mt3: KRY 6913, 4485, 6140, 1838, 3476, 6102, 6237, 6673, 1837, 1831, 6123, 6236, 1839, 7549, 5043, 6844, 6128, 1830, 6130, 1833, 6137, 1840, 7713 (adaxial+abaxial), Ph2 (manus)→McIII: KRY 2536, 3939, 3580, 7543, 7712, 3163, 3935, 5175, 3162, 2537, 5088c, 3726e, 3832, 6824, 3578, 2534, 2543, 2531, 3592, 7709 (*νεαρό*), Ph2 (pes)→MtIII: KRY 3165, 1800, 7542, 2528, 2540, 2541, 5032e,

2532, 2297, 2542, 7713, 3185b, 3885, 2908b, 4396, 3934, 3579, 6968, 7544, 3584, 3170, 3788, 1802, 3890, 4117, 671, 1059, 2295, 4288, Ph2 → MpIII: KRY 6965, 6975, Ph3 manus: KRY 3833, 7712, 5088d, 7709, 3500, 2558, 1810, Ph3 pes: KRY 3789, 4397, 3562, 5034, 1809, 2301, 3185c, 7713, Ph3: KRY 1069, 738, 5754, 3892, 3894, Ses→Ph3: KRY 6347, 1842, 1843, 7269, 4139, 4218, 4141, 6146, Ses→Ph3 (*manus*): KRY 3834, 5088e, Ses→Ph3 (*pes*): KRY 7713, 4391, Ses→Ph3 (*manus*): KRY 7709 (young), Ph1 lateral *pes*: KRY 6221, 3699b, 1815, 3790(MtII), 5033(MtIV), 6234, 638, 6182, 3605, 640, 5795, 1814, 639, 704, 2277, 5032(MtII), 4129, 7712(MtIV), 637, 6233, 636, 1813, 7713(MtII), 5345(Mt), 6245, 4392(MtIV), Ph1 lateral *manus*: KRY 3613, 7261, 3836(McII), 5088f(McII), 7712(McII), 7709(McII-νεαρό), 3835(McIV), 5088g(McIV), 7709(McIV-νεαρό), 6177, 3602, 635, 3601, 6171, 6181, 6183, 634, 6178, 7796, 7257, 6187, 7259, 7256, 7258, Ph1 lateral: KRY 4125(νεαρό), 4124(νεαρό), Ses-McIV left: KRY 3826, Ses-McII left: KRY 3826, Ses-McII right: KRY 4304 (young), Ph2 lateral *pes*: KRY 7021, 6246, 5032i(MtIV), 6202, 6336, 2005, 2282, 5516, 702, 1820, 4393(MtIV), 5804, 6258, 3792(MtIV), 7713(MtII), 3621, 5756, 3793(MtII), 705, 7559, 6337, 6253, 5153, 646, 6257, 7560, 6235, 1823, 2283, 7712(MtIV), 7713, 1821, 3900, 5032h(MtII), Ph2 lateral *manus*: KRY 4133, 5472, 1819, 3837(Mc), 5088k(McIV), 3901, 7709(McIV), 7709(McII), 6254, 7712(McII), 7262, 5757, 3902, 3838(Mc), 3619, 6251, 6260, 4269, Ph3 lateral: KRY 3839(Mc), 6214, 7713(MtII), 7712(Mc), 5032g(MtIV), 5251, 4394, 6215, 5032(MtIV), 6210, 6343, 3791, 6239, 6211, 4483, 5749, 7268, 4395, 6209, 1826, 1828, 6240, 6247(Mt), 3840(Mc), 7709(McIV-νεαρό), 7709(McII-νεαρό), Fe right: KRY 3983, Fe right dia: KRY 5294, Fe prox+dia right: KRY 5652 (deformed-no measurements), Fe left: KRY 3113, Fe dia left: KRY 1905, Fe caput right: 1377, 4382, Fe caput left: 4210, 2824, Fe frag.: KRY 3705, 6527, KRYno-number, Ti right: KRY 5675, 6745, 7713, Ti left: KRY 1165, 5670, 3199, 4361, Ti dist left: KRY 2227, 5702, 3197, 3972, 5999, 3726, 6529, 3201 (damaged), 6835, Ti dist right: KRY 3177, 3117, 3974, 3969, 3069, Ti right dist epiphysis: 2231, Ti dia right: KRY 5664, Ti dist left (young individual): KRY 5441, Ti prox left, As left: KRY 3193, 3533, 2306, 1170, 3536, 1051, 6516, 6678, 6586, 6822, 655 (fragment), 2519, As right: KRY 1755, 2845, 2309, 5421, 4170, 5006, 6514, 5501, 2846, 3538, 7713, 5237, 651, 3537, 1756, 3186, 6515, 6263(fragment), 5432(fragment), As right+Cal+Ti: KRY 6745, As: KRY 3949e, 6992, 3700, 3702, 5432, Cal right: KRY 6746 (+6745As+6744Ti), 3555, 2837, 5705, 1753, 2835, 1977, 2834, 4167, 4169, 2321 (young individual), 3906 (young individual), 648(young individual), 5706 (young individual), 7713, Cal left: KRY 5005, 2832, 3556, 3907, 3937(young individual), 2831 (young individual), 1750, 3568, 2519, Cal: KRY 2818, 3754, 3949d, Na left: KRY 2862, 3864, 3649, 3638, 3949f, 2519, 1986, Na right: KRY 3652, 6828, 3865, 4217, 6303, 5979,

3653, 1772, 1768, 6342, 3658, 7713, 3655 (fragment), 3656 (fragment), 3657 (fragment), Cu left: KRY 6440, 1777, 1984, 2864, 3949f, Cu right: KRY 2335, 1782, 2324, 3846, 3847, 6304, 2865, 1775, 7713, Cun 1+2 left: KRY 3778, 2007, 3777, 1993, 3949i, Cun3 left : KRY 2767, 2870, 3870, 1766, 1854, 1853, 1767, 3949g, 3667, Cun3 right: KRY 712, 3663, 3869, 3633, 3634, 6582, 7713, MtIII: KRY 4346, 3872, 4305, 7713, 2870, 1860, 3985a, 3719, 4312, 3699a, 5032a, 4166, 3105, 2871, 1872, 1900, 3949a, 4477, 6548, 5988, 2244, 658, 3087, 699, 3784, 4280, MtII prox right: KRY 3683, 619, 6918, 7043, 1062, 3687, MtII prox left: KRY 6436, 3685, 6840, 3889, 3684, MtIV prox left: KRY 7013, 3675, 5887, 6834, 696, 3679, 6997, 3678, 1882, MtIV prox right: KRY 3112, 3676, 2258, 7002, 3674, 1880, 6530

## TOOTH MORPHOLOGY

TABLE S1. *H. phlegrae* sp. nov.: morphology of upper premolars. 1. hypsodonty index ( $L1*100/H$ ); 2. total plication number in all wear stages (w.s.); 3. total plication number in intermediate w.s.; 4. confluent fossettes; 5. confluent fossettes per w.s.; 6. prefossette anteriorly open; 7. postfossette posteriorly open; 8. narrow fossettes to labial-lingual axis; 9. protocone shape; 10. palatal side of protocone; 11. presence of protoconal spur; 12. protocone united to protoloph; 13. protocone index ( $Lp*100/Lo$ ); 14. pli caballin; 15. hypocone; 16. hypoconal groove; 17. hypoconal constriction; 18. parastyle; 19. mesostyle; 20. metastyle

	P2	P3 (in situ)	P4 (in situ)	P3,4 (incl. P3 and P4 in situ)
1	64.02 (KRY 3751) 76.14 (KRY 2672)	44.64 (KRY 1909)	37.1 (KRY 1910) 37.02 (KRY 3751)	39.61 (n=5, 37.02- 42.46, s=2.46)
2	3 - 18 (mean=11.95, n=39, s=3.64)	8 - 19 (mean=12.9, n=21, s=2.96)	7 - 19 (mean=12.81, n=21, s=2.84)	5 - 21 (mean=12.82, n=101, s=3.24)
3	8 - 16 (mean=12.5, n=26, s=2.39)	10 - 19 (mean=14.08, n=12, s=2.75)	12 - 19 (mean=14.38, n=13, s=2.02)	5 - 21 (mean=13.38, n=61, s=3.12)
4	22.7 % (n=44) at 16 to 32 mm of height	never	never	never
5	1 <sup>st</sup> w.s.: 25% 2 <sup>nd</sup> w.s.: 30.1% 3 <sup>rd</sup> w.s.: 8%, 4 <sup>th</sup> w.s.: 0%	never	never	never

TABLE S1. (Continued)

6	2,6% (KRY 2634, 2 <sup>nd</sup> w.s.)	never	never	one specimen (KRY 2811, 4 <sup>th</sup> w.s.)
7	5,3% 1 <sup>st</sup> to 3 <sup>rd</sup> w.s.	never	never	never
8	57% with a height less than 13 mm	never	never	never
9	-elliptical -rounded: KRY 6767 (height 3.53 mm)	-elliptical -rounded: KRY 7272 (height 11.04 mm)	-elliptical	-94.2% elliptical -rounded 4.8% (extremely worn) -sub-triangular 1.9% (slightly worn)
10	-convex: 31.6% -straight: 55.3%	-convex: 45% -straight: 55%	-convex: 36.84% -straight: 63.16%	-convex: 26.2% -straight: 73.8%
11	-anterior: 39.5% (height>25 mm) -anterior and posterior: 0.05% (n=38)	-posterior: 30%	-anterior: one specimen -posterior: 42.1%	-posterior: 13.5% -anterior: 1.9% (2 <sup>nd</sup> & 3 <sup>rd</sup> w.s.) -anterior and posterior: 3.8% (height >32mm) (n=104)
12	60% of specimens with a height less than 17.7 mm	at 12.7 mm (KRY 2811)	never higher than 11.5mm-there are no more worn pecimens	30.3% of specimens with a height less than 18.5 mm
13	19.12- 30.00 (mean=23.97, n=42, std. error=0.368045, s=2.44, cv=10.18%, 95% confidence interval 23.206-24.728)	22.81 - 33.59 (mean=27.57, n=23, std. error=0.577394, s=2.94, cv=10.66%, 95% confidence interval 26.294-28.84)	21.24 - 36.29 (mean=30.08, n=21, std. error=0.857981, s=3.93, cv=13.06%, 95% confidence interval 28.29- 31.869)	21.24 - 39.65 (mean=29.57, n=103, std. error=0.386184, s=4.20, cv=14.2% and 95% confidence interval 28.752- 30.391)
14	-single -double at 25.7-32 mm -rudimentary or absent in very worn specimens	-single -rarely double - rudimentary or absent in very worn specimens	-single	-single -frequently double (1 <sup>st</sup> w.s.) -rarely double or triple at 33-36 mm and 22-26 mm - rudimentary or absent in very worn specimens 
15	- elliptical -sub-quadratus below 10 mm	- elliptical	- elliptical, frequently flat in palatinal side	- elliptical

TABLE S1. (Continued)

16	- present, higher than 10mm -strong development higher than 28mm (maybe pointed)	-occur always -strongly developed higher than 37.6mm and gradually weakening lower	-occur always -strongly developed higher than 26mm and gradually weakening lower	-occur always -at slightly worn teeth display wrinkling enamel -maybe absent lower than 15 mm of height
17	-occur at 18.4% and higher than 28mm excl. KRY 3207 (height: 12.81mm)	-strongly developed higher than 37.6mm -intermediate development higher than 15.3mm -absence below 15.3 mm	-occur at 46.7% of specimens higher than 14.7mm -absence at 4 <sup>th</sup> w.s.	-occur at 19% mainly at first and second w.s. -absence below 14.7mm
18	Weak and obtuse, rarely more pointed higher than 29mm	-sub-quadratae and posteriorly more pronounced - rarer pointed at 1 <sup>st</sup> w.s.	-sub-quadratae and posteriorly more pronounced	<i>Idem</i> P <sup>3</sup> & P <sup>4</sup>
19	>25 mm: obtuse and intensively developed -lower more quadratae and broad -more developed than parastyle	-well developed and obtuse: 1 <sup>st</sup> -2 <sup>nd</sup> w.s. -sub-quadratae and broad: 2 <sup>nd</sup> -3 <sup>rd</sup> w.s. -maybe pointed at 4 <sup>th</sup> w.s. -more or equally developed than parastyle	- variably obtuse or sharp shape and development -more or equally developed than parastyle	<i>Idem</i> P <sup>3</sup> & P <sup>4</sup>
20	weakly developed higher than 26mm (~50%)	weakly developed higher than 37mm (~50%)	weak	<i>Idem</i> P <sup>3</sup> & P <sup>4</sup>

TABLE S2. *H. phlegrae* sp. nov.: morphology of upper molars. 1. hypsodonty index ( $L1*100/H$ ); 2. total plication number in all wear stages (w.s.); 3. total plication number in intermediate w.s.; 4. confluent fossettes; 5. confluent fossettes per w.s.; 6. prefossette anteriorly open; 7. postfossette posteriorly open; 8. narrow fossettes to labial-lingual axis; 9. protocone shape; 10. palatal side of protocone; 11. presence of protoconal spur; 12. protocone united to protoloph; 13. protocone index ( $Lp*100/Lo$ ); 14. pli caballin; 15. hypocone; 16. hypoconal groove; 17. hypoconal constriction; 18. parastyle; 19. mesostyle; 20. metastyle

	M1 (in situ)	M2 (in situ)	M3	M1,2 (incl. M1 and M2 in situ)
1	34.7 (KRY 1910) 29.44 (KRY 3751)	33.41(KRY 1910) 40.48 (KRY 7044)	41.7 (KRY 1910)	31.99 (KRY 2092) 34.07 (KRY 7936)
2	7 - 21 (mean=12.45, n=31, s=3.25)	5 - 17 (mean=10.93, n=30, s=3.10)	6 - 14 (mean=10.37, n=27, s=2.00)	0 - 21 (mean=11.47, n=104, s=3.40)
3	7 - 21 (mean=12.92, n=14, s=3.79)	10 - 17 (mean=13.08, n=13, s=2.02)	7 - 14 (mean=10.85, n=20, s=1.57)	7 - 21 (mean=12.58, n=48, s=2.80)
4	never	never	never	- never apart from slightly worn specimens (2%)
6	never	never	never	never
7	never	never	never	- never apart from slightly worn specimens (3%)
8	frequently at 4th w.s.	never	below <10mm	Never
9	-elliptical	-elliptical	-elliptical 93.1% -triangular 6.9% (slightly worn specimens)	-elliptical 95.2% -triangular 4.8% (slightly worn specimens)
10	-convex: 29% -flat: 71% (n=31)	-convex: 11.5% -flat: 88.5% (n=26)	-convex: 13.8% -flat: 86.2% (n=29)	-convex: 20.4% -flat: 79.6% (n=103)
11	-posterior: 19.4%	-posterior: 11.5%	-posterior: 13.8% (2 <sup>nd</sup> & 3 <sup>rd</sup> w.s.) -anterior and posterior: one specimen with higher than ~27mm	-posterior: 9.7% -anterior: 1.9%

TABLE S2. (Continued)

12	50% of specimens with a height <11mm	never above 10 mm (no specimens below 10 mm)	frequently below 10.38mm	idem M <sup>1</sup> & M <sup>2</sup>
13	25.93 - 45.02 (mean=33.16, n=32, std. error=0.903881, s=5.11, cv=15.4%, 95% confidence interval 31.319- 35.006)	22.92 - 41.52 (mean=31.65, n=30, std. error=0.688054, s=3.77, cv=11.91%, 95% confidence interval 30.24-33.055)	27.27 - 36.66 (mean=32.18, n=30, std. error=0.519043, s=2.94, cv=9.14%, 95% confidence interval 31.085-33.278)	22.92 - 45.02 (mean=31.76, n=107, std. error=0.424696, s=4.39, cv=13.82%, 95% confidence interval 30.914- 32.598)
14	-single -double at 3.2% (1st w.s.) -rudimentary or absent at very worn teeth	-single - rudimentary and gradually absent at very worn teeth below 14mm	-single - rudimentary at very worn teeth	1 <sup>st</sup> w.s.: in general single, at 2.3% double and absent at 4.7% 2 <sup>nd</sup> w.s.: in general single, rarely rudimentary or absent 3 <sup>rd</sup> w.s.: single, rudimentary or absent below 19- 22mm 4 <sup>th</sup> w.s.: <14mm rudimentary or absent
15	- elliptical	- elliptical - in very worn teeth frequently the palatinal side is flat	- elliptical -frequently rounded and isolated at 44.4% of total specimens (68.8% of specimens between 38.6 and 14 mm of height)	- elliptical - in very worn teeth frequently the palatinal side is flat
16	-always present -well developed >45mm and less developed lower	always present with decreasing development with attrition	always present with increasing development with attrition	almost always present and gradually less developed and may be absent below 11mm of height

TABLE S2. (Continued)

17	-present at 25% -at 1 <sup>st</sup> w.s. -at 15.4% of all specimens	-well developed at 15.4% -absent at 4 <sup>th</sup> w.s.	-present at 17.65%, n=102 -better developed at 1 <sup>st</sup> w.s.
18	pointed  -quadrate with two points towards the labial side; the posterior one is more developed -gradually less quadrate with attrition	pointed and either sharp or obtuse	idem M <sup>1</sup> & M <sup>2</sup>
19	-narrow and pointed and gradually obtuser with attrition -more developed than the parastyle especially in very worn teeth	pointed and well developed	pointed and well developed idem M <sup>1</sup> & M <sup>2</sup>
20	weak development	weak development	weak development idem M <sup>1</sup> & M <sup>2</sup>

TABLE S3. *H. phlegrae* sp. nov.: Morphology of lower premolars. 1. Hypsodonty index (L1\*100/H); 2. linguaflexid; 3. ectoflexid; 4. pli caballinid/ antecaballinid; 5. metaconid; 6. metastylid; 7. protostylid; 8. ectostylid; 9. hypostylid; 10. entoconid; 11. hypoconulid; 12. Pre- and post-flexid morphology; 13. plications

	p2	p3	p4
1	61.18 (KRY 3129) 67.31 (KRY 3130)	46.90 (KRY 3129) 48.41 (KRY 3130)	48.50 (KRY 3129) 44.50 (KRY 3130)
2	-shallow and U-shaped -plications may be present in slightly worn teeth -in very worn teeth more pointed (metaconid) or may be anteriorly flat when it is in contact with paraconid; may be very shallow	-shallow and U-shaped (especially at the upper half of the teeth) -at 3 <sup>rd</sup> w.s. may be anteriorly pointed (metaconid) or flat when it is in contact with parastylid -plications at 12% (1 <sup>st</sup> w.s. at 34-49.5mm)	- shallow and U-shaped - may be anteriorly pointed (metaconid) or flat when it is in contact with parastylid -plications uncertain

TABLE S3. (Continued)

3	-in general shallow -at 25% reaches the isthmus	56.3% intermediately placed in relation to the isthmus (mainly at 1 <sup>st</sup> & 2 <sup>nd</sup> w.s.) 15.6% shallow (mainly at slightly worn teeth) 9.4% deep 18.7% reaches the linguaflexid (mainly in very worn teeth) (n=32)	60% intermediately placed in relation to the isthmus 9.1% shallow (mainly at slightly worn teeth) 30.9% penetrates the isthmus or reaches the linguaflexid (4 <sup>th</sup> w.s.)
4	- 30% presents pli caballinid, mainly at the 1 <sup>st</sup> w.s. (85% with crown higher than 30mm), but never in very worn teeth -in one specimen there is pli antecaballinid	>35mm pli caballinid in some specimens	50% at 1 <sup>st</sup> w.s. present pli caballinid
5	mainly rounded – rarely elliptical; may be pointed (spur) and rarely united to paraconid	idem P <sub>2</sub>	mainly rounded – rarely elliptical; may be pointed (spur) and rarely united to parastylid at 4 <sup>th</sup> w.s.
6	-rounded – elliptical -frequently posteriorly pointed at lingual (65%) and rarely at labial side -sub-quadrata in slightly worn teeth	rounded or elliptical and frequently pointed at the posterior lingual side	rounded or elliptical and almost always pointed at the posterior lingual side
7	absent	-present at 29% -rounded and small; isolated or united to parastylid -height of occurrence varies	-present at 38.7% - rounded and small or elliptical in much worn teeth; united to parastylid; rarely isolated - height of occurrence varies
8	absent	absent	rounded and isolated (1/33)
9	absent	absent	absent
10	mainly elliptical or sub-quadrata and anteriorly pointed at labial side	sub-quadrata and anteriorly pointed at labial side at 1 <sup>st</sup> – 3 <sup>rd</sup> w.s.	idem P <sub>3</sub>

TABLE S3. (Continued)

11	well developed and gradually less developed with attrition	idem P <sub>2</sub>	idem P <sub>2</sub>
12	postflexid longer than preflexid (except excessively worn teeth 1/50) rarely preflexid is closed due to metaconid united to paraconid	- postflexid longer than preflexid -in one specimen preflexid is closed due to metaconid united to parastylid (4 <sup>th</sup> w.s.)	idem P <sub>3</sub>
13	postflexid: 1-3, mainly higher than 26mm preflexid: less plications and mainly at slightly worn teeth	few plications at early w.s. and/or enamel wrinkling up to the 3 <sup>rd</sup> w.s.	few plications at 1 <sup>st</sup> w.s. and/or enamel wrinkling which is gradually decreased with attrition

TABLE S4. *H. phlegrae* sp. nov.: Morphology of lower molars. 1. Hypsodonty index (L1\*100/H); 2. linguaflexid; 3. ectoflexid; 4. pli caballinid/ antecaballinid; 5. metaconid; 6. metastylid; 7. protostylid; 8. ectostylid; 9. hypostylid; 10. entoconid; 11. hypoconulid; 12. Pre- and post-flexid morphology; 13. plications

	m1	m2	m3
1	30.93 (KRY 3056)	-	47.95 (KRY 2743)
2	shallow and U-shaped and frequent flat when contacts ectoflexid	- shallow and U-shaped - after the 2 <sup>nd</sup> w.s. it is mainly flat due to contact with ectoflexid	- shallow and U-shaped - frequently flat due to contact with ectoflexid -rarely present plications (1 <sup>st</sup> w.s.)
3	commonly penetrates isthmus, otherwise it is placed intermediately	commonly penetrates isthmus, otherwise it is placed intermediately at early w.s.	idem m1
4	possibly present in four specimens (n=38)	possibly present only in two specimens	rarely present
5	mainly rounded; less frequently elliptical; united to paraconid at advanced w.s.	rounded	mainly rounded; less frequently elliptical; united to parastylid at advanced w.s.
6	rounded and posteriorly pointed	rounded and posteriorly pointed	rounded and posteriorly pointed; elliptical at advanced w.s.

TABLE S4. (Continued)

	-present at 42% -more frequent at intermediate or advanced w.s. -rounded at 1 <sup>st</sup> w.s. and elliptical and united to parastylid at 3 <sup>rd</sup> and 4 <sup>th</sup> w.s. -rarely double or triple, one of which is united to parastylid	-present at 29.6%; more frequent at intermediate w.s. - frequently united to parastylid at advanced w.s. -mainly rounded	-present at 27.1% and mainly rounded in shape -mainly present below 15mm and rarely higher (one specimen at 33mm) -rarely united to parastylid at 4 <sup>th</sup> w.s.
7	absent	absent	absent
8	absent	absent	absent
9	-posteriorly pointed at slightly worn teeth -well developed towards the lingual side at 2 <sup>nd</sup> and 3 <sup>rd</sup> w.s. -less developed at advanced w.s.	idem M <sub>1</sub>	48.7% generally rounded and concave in one side 23.9% bifid 8.7% rounded 18.7% elliptical – posteriorly pointed
11	postflexid longer than preflexid; rarely preflexid is isolated when metaconid is united to parastylid	postflexid longer than preflexid	idem M <sub>1</sub> & M <sub>2</sub>
12	preflexid: 1-3 postflexid: enamel wrinkling or rarely plications -plications gradually decrease with attrition in number and development	idem M <sub>1</sub>	idem M <sub>1</sub>
13			

TABLE S5. *H. phlegrae* sp. nov.: Morphology of upper deciduous teeth. 1. hypsodonty index (L1\*100/H); 2. plication number in all w.s. (wear stages); 3. confluent fossettes; 4. prefossette anteriorly open; 5. postfossette posteriorly open; 6. protocone shape; 7. lingual side of protocone; 8. presence of protoconal spur; 9. protocone united to protoloph; 10. protocone index (Lp\*100/Lo); 11. pli caballin; 12. hypocone; 13. hypoconal groove; 14. hypoconal constriction; 15. parastyle; 16. mesostyle; 17. metastyle

	dP2	dP3 ( <i>in situ</i> )	dP4 ( <i>in situ</i> )	dP3,4 (incl. dP3 & dP4 <i>in situ</i> )
1	182 (162.2-197.7, n=14, s=11.40)	102-115	100.2-106.2	101.8-133.8 (mean=116.07, n=16, s=10.52)
2	8 - 18 (mean=13.64, n=11, s=2.87)	13 - 16 (mean=14.33, n=6, s=1.03)	6 - 15 (mean=10.86, n=7, s=3.63)	4 - 19 (mean=13.61, n=33, s=3.57)
3	9.1%	never	only in slightly worn teeth	never

4	18.2%	never	never	Never
5	never	never	never	9.7% (n=31)
6	-elliptical -rounded: 50%	-elliptical : 50% -rounded: 50%	-in general elliptical -rarely sub-triangular in slightly worn teeth	- elliptical (68.8%) - rounded (28.1%) -sub-triangular (3.1%) in slightly worn teeth
7	frequently flat and rarely slightly convex	-flat: 50% -concave: 50%	-flat: 50% -concave: 50%	-flat: 68.8% -concave: 13% -convex: 18.2%
8	-anterior: 22.2% (height: 13.2-15.7mm)	-	-	6.3% at 17.4 mm of height
9	75% at teeth less 12 mm of crown height	never	never	at 9 mm
10	17.12 - 23.87 (mean=19.57, n=14, s=2.05)	14.89 - 28.33 (mean=22.29, n=6, s=4.50)	15.73 - 28.76 (mean=23.08, n=9, s=4.06)	14.35 - 32.12 (mean=22.06, n=39, s=4.16)
11	-single 16.7% -double 50% -triple 8.3% -multiple 25%	-in general single -rarely double	-single	- single 63.9% -double 30.5% -triple 2.8% -rudimentary 2.8%
12	- rounded or sub-triangular and isolated at 77.8% - elliptical and palatinal frequently flat	-frequently rounded and isolated - elliptical -rarely sub-triangular	-rounded or sub-triangular and isolated at 57.1% -elliptical and palatinal frequently flat	<i>idem</i> dP <sup>3</sup> & dP4
13	well developed; enamel may be wrinkled	always present and well developed	well developed; a second groove may be labial present	<i>idem</i> dP <sup>3</sup> & dP4
14	always present and well developed	50%	57.1%	<i>idem</i> dP <sup>3</sup> & dP4
15	well developed and broad	Sub-quadratae with a narrow constriction in the middle along the height of the tooth; posteriorly is more pointed and sharp	<i>idem</i> dP <sup>3</sup>	<i>idem</i> dP <sup>3</sup>
16	well and more developed than parastyle	Sub-quadratae or less angular	<i>idem</i> dP <sup>3</sup>	<i>idem</i> dP <sup>3</sup>
17	weak and sub-triangular	weakly developed	<i>idem</i> dP <sup>3</sup>	<i>idem</i> dP <sup>3</sup>

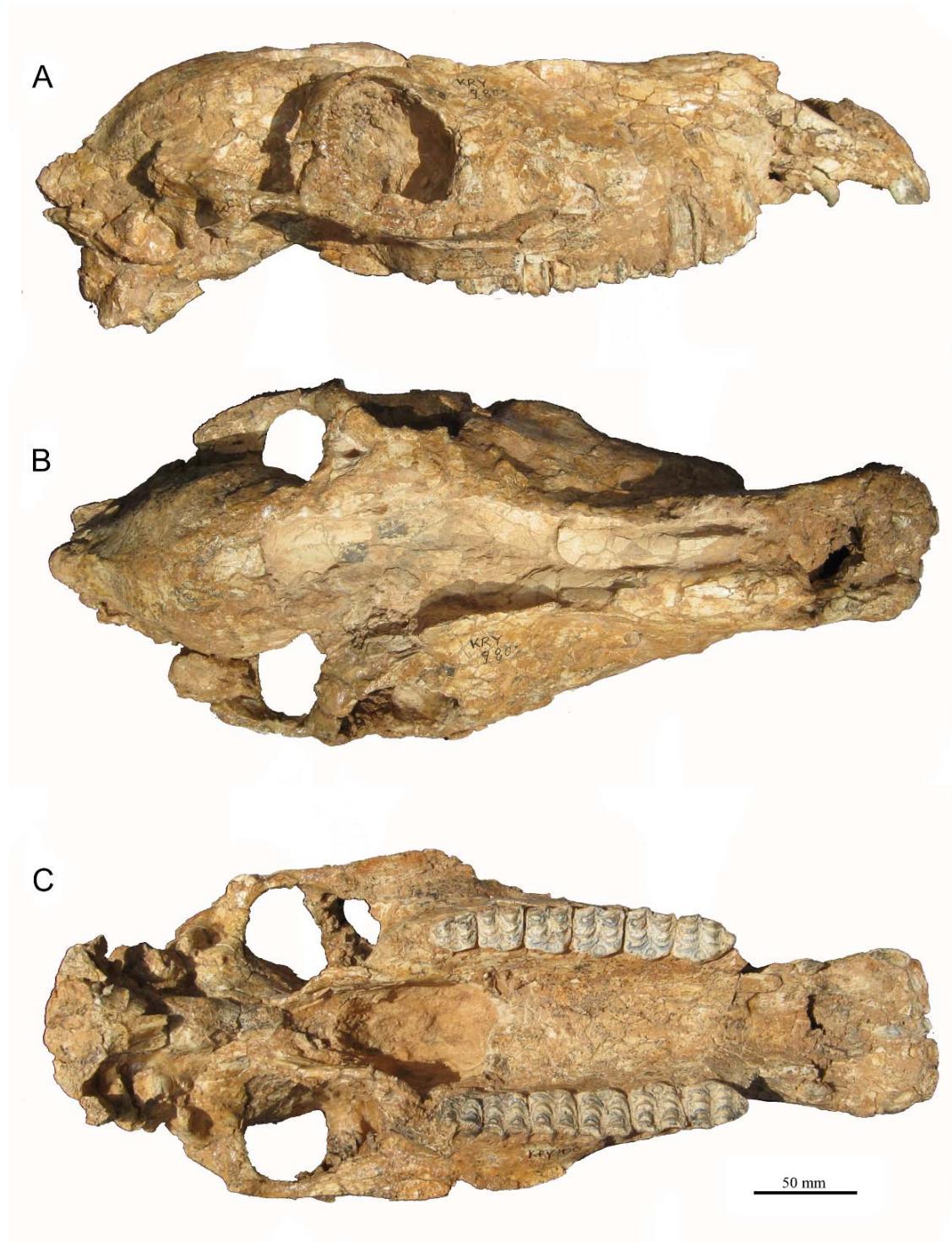


FIGURE S3. *Hipparium phlegrae* sp. nov. cranium KRY 2800 with complete right and left dentition. **A**, Right lateral view; **B**, dorsal view; **C**, basal view.

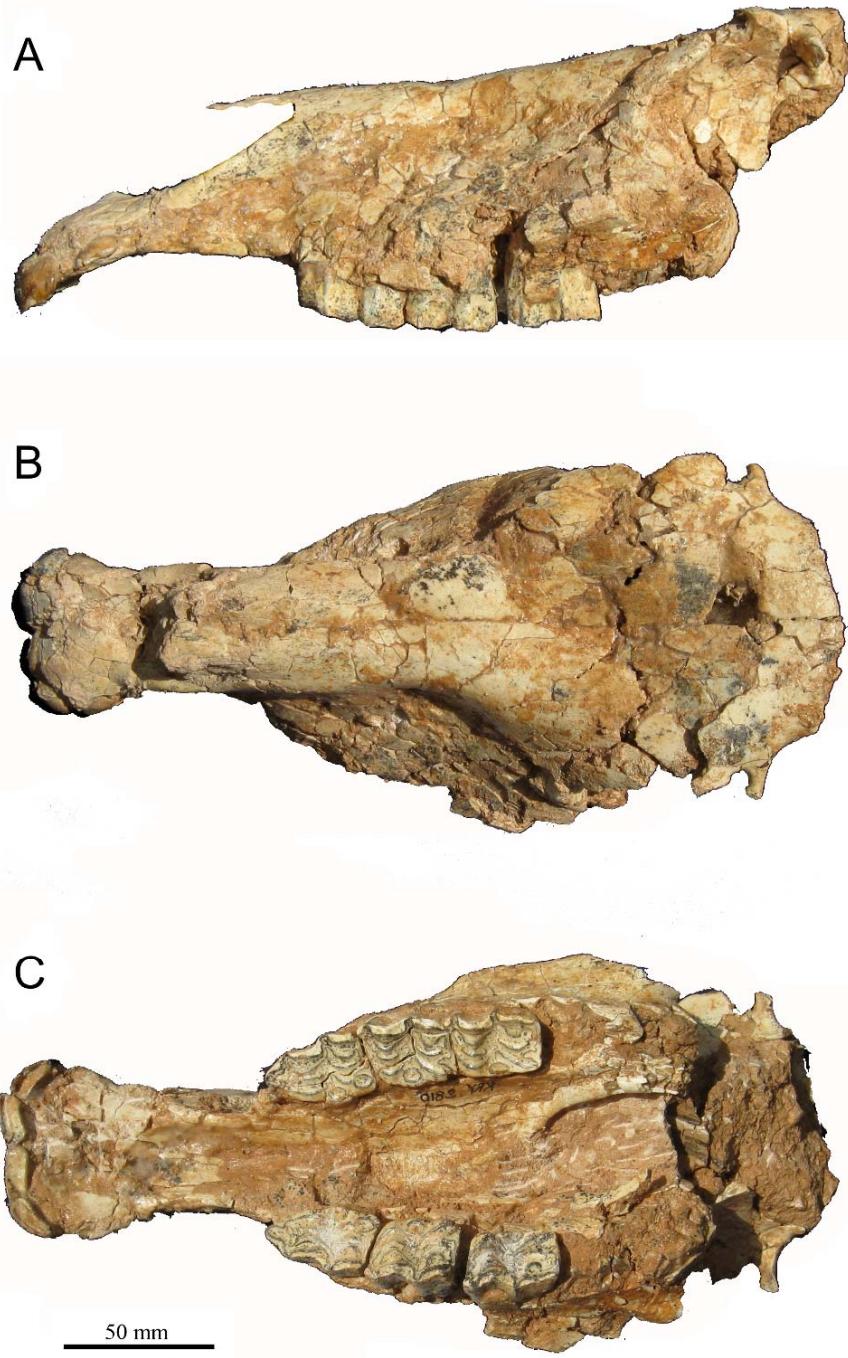


FIGURE S4. *Hipparrison phlegrae* sp. nov. cranium KRY 2810 of a juvenile. Maxilla with right and left dI1, dI2, left D1-D4, right D2-D4. **A**, Left lateral view; **B**, dorsal view; **C**, basal view.

A



B



C



50 mm

FIGURE S5. *Hipparrison phlegrae* sp. nov. A, mandible KRY 3042 with left c, right i1,i2 and complete right and left cheek dentition; left lateral view; B, idem; occlusal view; C, Mandible KRY 3053 with left and right i1-i3, c and p2-m2 left of senile individual; occlusal view.

## TABLES OF MEASUREMENTS

TABLE S6. Measurements of the skull: 1. muzzle length; 2. palatal length; 3. vomerine length; 4. post-vomerine length; 5. post-palatal length; 6. basilar length; 7. premolar length; 8. molar length; 9. upper cheek teeth length; 10. choanal length; 11. minimal breadth of the choanae; 12. maximal breadth of the choanae; 13. palatal breadth; 14. minimal muzzle breadth; 15. muzzle breadth; 16. length of fossa temporalis; 17. length between basion and the foramen ethmoidalis; 18. frontal breadth; 19. bizygomatic breadth; 20. occipital breadth; 21. basioccipital breadth; 22. occipital height. 23. anterior acular line; 24. posterior acular line; 25. facial height if front of P<sup>2</sup>; 26. cranial height at the level of the posterior margin of the orbital process; 27. exterior height of the meatus auditivus externus; 28. antero-posterior orbital diameter; 29. orbital diameter perpendicular to 28; 30. length of the naso-incisival notch; 31. cheek length; 32. distance between the orbit and the preorbital fossa; 33. Length of the preorbital fossa; 34. Distance between the back of the preorbital fossa and the foramen infra-orbitale; 35. height of the preorbital fossa; 36. distance of the preorbital fossa and the facial crest; 37. height of back of the foramen infra-orbitale above the alveolar border; 38. height of the back of the preorbital fossa above the alveolar border (Eisenmann *et al.*, 1988).

measurement	KRY2800	KRY 3041	KRY 1909	KRY 2801	KRY 4578	KRY 7520	KRY 2803	KRY 2810
1	86.02	86.93	-	-	-	-	-	77.42
2	106.8	?	-	-	-	-	-	[75.73]
3	88.84	?	-	-	-	-	-	-
4	77.51	?	-	-	-	-	-	-
5	163.4	?	-	-	-	-	-	-
6	352	?	-	-	-	-	-	-
7	72.03	74.24	-	-	-	-	71.97	78.29
8	60.41	[58.8]	-	60.25	-	-	59.31	-
9	131.92	131	-	-	-	-	[130.57]	-
10	61.39	-	-	-	-	-	-	-
11	24.86	-	-	32.16	-	-	-	-
12	43.53	37.53	-	36.69	[35.5]	-	31.38	26.73
13	61.25	54.62	-	54.65	-	-	57.06	44.51
14	48.04	38.02	-	-	-	-	-	27.58
15	73.62	57.99	-	-	-	64.89	-	44.52
16	63.49	?	-	-	-	-	-	-
17	137	?	-	-	-	-	-	-
18	152.5	?	-	-	-	-	-	-
19	148.9	?	-	-	-	-	-	-
20	55.1	?	-	-	-	-	-	-
21	88.5	?	-	-	-	-	-	-
22	[37]	?	-	-	-	-	-	-
23	273	?	-	-	-	-	-	-
24	[150]	?	-	-	-	-	-	-

TABLE S6. (Continued)

25	66.8	[64.42]	-	-	-	-	-	53.6
26	94.7	?	-	-	-	-	-	-
27	9.96	?	-	-	-	-	-	-
28	52.05	?	-	-	-	-	-	-
29	52.61	44.87	-	-	-	-	-	47
30	88.55	104.25	-	-	-	-	-	89.58
31	138	114.34	-	-	-	-	-	98.27
32	36.5	30.1	-	-	-	-	-	26.86
33	34.33	65.2	-	-	-	-	-	49
34	40.2	47.5	-	-	-	-	-	-
35	34.6	29.4	31	-	-	-	-	42.77
36	39.79	39.88	33.4	-	-	-	-	14.5
37	55.37	48.32	47	-	-	-	-	33.9
38	72	63.16	76	-	-	-	-	49.08
Orbit-P2	137.5	118.1						101.65

	n	Mean	Min	Max	s	cv
7	7	69.41	60.66	74.70	5.21	7.50
8	15	58.11	52.99	60.62	2.49	4.29
9	3	127.85	120.63	131.92	6.27	4.90

TABLE S7. Measurements of mandible: 2. muzzle length; 3. premolar length; 4. molar length; 5. lower cheek teeth length; 6. distance between the back of the alveole of m3 and the posterior edge of the ascending ramus; 7. muzzle breadth; 10. height posterior to m3; 11. height between p4 and m1; 12. Height in front of p2; 13. length of the symphysis; 14. minimal breadth of symphysis (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
2	3	81.00	76.60	85.90	4.67	5.76
3	15	65.13	60.40	73.32	3.20	4.91
4	16	60.15	56.44	64.07	2.16	3.59
5	10	126.82	121.16	134.50	4.06	3.20
6	2	88.64	85.33	91.95	-	-
7	2	56.30	55.59	57.00	-	-
10	1	74.27	-	-	-	-
11	5	60.98	57.31	63.00	2.38	3.90
12	3	44.29	41.53	48.65	3.82	8.63
13	3	59.47	56.60	61.60	2.58	4.34
14	5	36.53	35.00	38.30	1.58	4.32

TABLE S8. Measurements of dP2: H. tooth height; Lo. occlusal length; Lp. Occlusal length of protocone; Wo. occlusal breadth; Wp. occlusal breadth of protocone; L1. tooth length at 1cm above the roots; Lp1. protocone length at 1cm above the roots; W1: tooth breadth at 1cm above the roots; e.f. enamel function (Eisenmann *et al.*, 1988).Unworn and slightly worn teeth

measurement	n	Mean	Min	Max	s	cv
H	14	16.97	15.54	18.85	1.19	7.00
L1	14	30.76	29.80	32.30	0.65	2.12
W1	13	17.99	16.34	19.54	1.00	5.55

TABLE S8. (Continued)

Lp1	14	7.13	6.22	7.53	0.42	5.86
<b>Worn teeth</b>						
measurement	n	Mean	Min	Max	s	cv
H	9	12.16	6.16	15.71	2.95	24.23
Lo	14	30.20	29.09	32.90	1.11	3.66
Wo	14	18.19	15.77	19.37	1.11	6.08
Lp	13	5.77	4.98	6.81	0.58	10.08
Wp	13	3.80	2.45	4.75	0.65	17.07
L1	7	30.21	29.21	32.34	1.15	3.80
W1	7	19.00	17.57	20.42	1.01	5.31
Lp1	7	6.86	5.87	8.90	1.02	14.81
e.f.			<u>3.45 - 4.30 - 2.27 - 1.64</u>			
			2.36			

TABLE S9. Measurements of dP3,4: H. tooth height; Lo. occlusal length; Lp. Occlusal length of protocone; Wo. occlusal breadth; Wp. occlusal breadth of protocone; L1. tooth length at 1cm above the roots; Lp1. protocone length at 1cm above the roots; W1: tooth breadth at 1cm above the roots; e.f. enamel function (Eisenmann *et al.*, 1988).

Unworn and slightly worn teeth

measurement	n	Mean	Min	Max	s	cv
H	30	20.86	15.68	23.99	2.13	10.23
Lo	9	25.16	23.90	26.12	0.67	2.67
Wo	9	15.62	14.10	17.52	1.02	6.55
Lp	6	4.94	3.67	6.05	0.85	17.20
Wp	6	2.82	2.51	3.10	0.24	8.46
L1	31	24.29	23.46	25.18	0.48	1.99
W1	32	18.01	16.00	20.28	1.06	5.91
Lp1	31	6.58	4.58	8.47	0.87	13.25
e.f.	2-4			<u>0.50 - 4.00 - 3.00 - 2.00</u>		
				1.25		

Worn teeth

measurement	n	Mean	Min	Max	s	cv
H	20	15.23	9.00	18.58	2.62	17.18
Lo	33	24.28	22.67	26.27	0.87	3.59
Wo	33	17.28	13.68	20.59	1.59	9.20
Lp	33	5.44	3.82	7.30	0.94	17.28
Wp	33	3.55	2.33	5.70	0.78	21.99
L1	21	23.66	22.34	24.55	0.59	2.49
W1	20	19.07	17.62	20.42	0.70	3.65
Lp1	21	7.22	6.16	8.32	0.54	7.43
e.f.	28-31			<u>2.39 - 6.16 - 2.63 - 1.79</u>		
				1.39		

TABLE S10. Measurements of P2: H. tooth height; Lo. occlusal length; Lp. Occlusal length of protocone; Wo. occlusal breadth; Wp. occlusal breadth of protocone; L1. tooth length at 1cm above the roots; Lp1. protocone length at 1cm above the roots; W1: tooth breadth at 1cm above the roots; e.f. enamel function (Eisenmann *et al.*, 1988).

1 <sup>st</sup> wear stage						
measurement	n	Mean	Min	Max	s	cv
H	12	33.46	30.70	40.24	2.61	7.81
Lo	15	27.19	24.24	28.85	1.26	4.63
Wo	15	18.67	15.80	20.81	1.40	7.51
Lp	15	6.09	4.59	7.48	0.77	12.70
Wp	13	3.58	2.84	4.30	0.46	12.73
L1	12	25.70	24.18	27.06	0.87	3.39
W1	10	19.50	17.78	20.69	0.81	4.14
Lp1	12	7.35	6.37	8.32	0.71	9.66
e.f.	10				<u>3.30 - 3.80 - 2.80 - 1.60</u>	
					1.30	
2 <sup>nd</sup> wear stage						
measurement	n	Mean	Min	Max	s	cv
H	11	26.05	20.11	29.97	3.46	13.28
Lo	12	26.20	25.20	27.76	0.84	3.21
Wo	13	19.52	17.70	20.78	0.86	4.42
Lp	13	6.19	5.76	6.95	0.45	7.21
Wp	13	3.76	3.19	4.36	0.33	8.73
L1	10	24.75	23.32	26.86	1.08	4.37
W1	10	19.18	18.00	20.65	0.82	4.27
Lp1	10	7.40	6.99	8.27	0.43	5.82
e.f.	12-13				<u>3.08 - 4.08 - 3.08 - 1.17</u>	
					1.15	
3 <sup>rd</sup> wear stage						
measurement	n	Mean	Min	Max	s	cv
H	13	14.76	10.00	19.65	3.07	20.81
Lo	13	25.53	23.97	27.30	0.89	3.49
Wo	13	19.21	18.07	20.61	0.81	4.21
Lp	13	6.37	4.99	7.43	0.56	8.79
Wp	13	4.19	3.65	5.04	0.44	10.41
L1	11	25.16	24.02	26.36	0.70	2.77
W1	11	19.16	17.90	20.43	0.71	3.72
Lp1	11	8.03	6.56	8.70	0.56	7.03
e.f.	12-13				<u>2.00 - 4.54 - 4.08 - 1.00</u>	
					1.00	

TABLE S10. (Continued)

4<sup>th</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
H	3	5.69	3.53	7.77	2.12	37.30
Lo	3	24.73	24.13	25.40	0.64	2.58
Wo	3	19.28	18.02	20.09	1.10	5.73
Lp	3	6.77	6.11	7.24	0.59	8.67
Wp	2	-	4.14	4.62		
L1	2	-	24.15	24.95		
W1	2	-	18.75	21.51	-	-
Lp1	-	-	-	-	-	-
e.f.	2-3				<u>0.67 - 1.67 - 1.67 - 0</u>	
					0.50	

TABLE S11. Measurements of P3,4: H. tooth height; Lo. occlusal length; Lp. Occlusal length of protocone; Wo. occlusal breadth; Wp. occlusal breadth of protocone; L1. tooth length at 1cm above the roots; Lp1. protocone length at 1cm above the roots; W1: tooth breadth at 1cm above the roots; e.f. enamel function (Eisenmann *et al.*, 1988).1<sup>st</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
H	18	46.73	42.40	53.30	3.45	7.38
Lo	25	22.47	19.00	24.32	1.39	6.19
Wo	25	19.48	16.70	22.07	1.27	6.50
Lp	21	6.06	4.28	7.73	0.74	12.20
Wp	21	3.79	3.06	4.66	0.47	12.34
L1	20	19.06	17.41	21.80	1.04	5.45
W1	19	20.25	18.64	21.68	0.97	4.81
Lp1	20	7.16	6.35	8.19	0.52	7.25
e.f.	16-17				<u>1.41 - 3.00 - 4.71 - 1.31</u>	
					1.18	

2<sup>nd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
H	23	34.59	27.45	41.23	4.60	13.31
Lo	30	21.27	18.25	23.27	1.25	5.88
Wo	30	20.23	18.69	21.50	0.92	4.55
Lp	29	5.59	4.87	6.02	0.32	5.78
Wp	29	3.92	2.81	4.47	0.36	9.19
L1	16	19.31	17.74	20.84	0.84	4.34
W1	16	20.28	18.98	21.46	0.69	3.42
Lp1	17	7.12	6.24	7.70	0.39	5.44
e.f.	28-30				<u>2.13 - 4.17 - 5.97 - 1.29</u>	
					1.10	

3<sup>rd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
H	39	19.25	14.20	26.50	3.95	20.52
Lo	42	19.50	17.28	21.86	1.18	6.06
Wo	42	20.62	19.35	22.75	0.79	3.85
Lp	41	6.14	4.75	7.09	0.53	8.70
Wp	41	4.34	3.34	5.17	0.43	9.86

TABLE S11. (Continued)

L1	31	18.79	17.42	20.58	0.75	3.98
W1	31	20.87	18.96	22.01	0.78	3.73
Lp1	28	7.38	6.29	8.14	0.46	6.23
e.f.	37-42			<u>0.97 - 4.21 - 5.74 - 0.95</u>		
				1.03		
<b>4<sup>th</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	12	11.76	8.26	13.67	1.63	13.86
Lo	17	19.21	17.83	21.00	0.86	4.47
Wo	17	20.78	19.23	22.46	1.03	4.94
Lp	15	6.37	5.44	7.23	0.47	7.43
Wp	15	4.62	3.92	5.26	0.41	8.90
L1	11	19.06	17.95	20.53	0.83	4.37
W1	12	20.76	18.71	22.64	1.27	6.12
Lp1	10	7.39	6.10	8.56	0.61	8.30
e.f.	12-16			<u>0.93 - 3.38 - 5.06 - 0.92</u>		
				0.92		

TABLE S12. Measurements of M1,2: H. tooth height; Lo. occlusal length; Lp. Occlusal length of protocone; Wo. occlusal breadth; Wp. occlusal breadth of protocone; L1. tooth length at 1cm above the roots; Lp1. protocone length at 1cm above the roots; W1: tooth breadth at 1cm above the roots; e.f. enamel function (Eisenmann *et al.*, 1988).

<b>1<sup>st</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	26	49.57	39.25	60.02	6.32	12.75
Lo	44	20.82	17.09	23.67	1.70	8.17
Wo	44	17.80	14.57	20.35	1.47	8.23
Lp	44	6.15	4.24	7.40	0.65	10.53
Wp	44	3.30	2.60	4.12	0.41	12.34
L1	26	17.51	16.37	18.70	0.61	3.48
W1	24	19.31	18.22	21.05	0.74	3.83
Lp1	25	6.98	6.23	8.20	0.54	7.79
e.f.	41-43			<u>1.44 - 4.83 - 2.95 - 1.07</u>		
				0.98		
<b>2<sup>nd</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	19	34.73	26.61	41.06	4.11	11.85
Lo	25	18.62	17.19	20.36	0.84	4.52
Wo	25	18.47	16.95	20.03	0.93	5.04
Lp	25	5.56	4.87	6.81	0.44	7.93
Wp	25	3.53	2.58	4.00	0.27	7.71
L1	10	17.51	16.72	18.45	0.55	3.16
W1	12	19.20	17.50	21.51	1.25	6.52
Lp1	13	6.94	6.37	7.88	0.38	5.45
e.f.	24-26			<u>1.38 - 6.15 - 3.73 - 1.54</u>		
				0.88		
<b>3<sup>rd</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	16	20.25	14.60	26.80	3.62	17.87

TABLE S12. (Continued)

Lo	21	18.00	16.66	19.12	0.75	4.15
Wo	21	18.70	16.78	21.40	1.17	6.25
Lp	21	6.11	5.16	7.25	0.53	8.63
Wp	21	3.96	3.03	4.90	0.41	10.29
L1	11	18.24	16.97	19.87	0.91	4.97
W1	11	19.35	18.20	21.00	0.87	4.48
Lp1	11	7.04	6.42	7.66	0.45	6.36
e.f.	20-21			<u>0.50 - 5.29 - 3.81 - 1.25</u>		
				0.81		
<b>4<sup>th</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	13	12.21	7.60	18.15	2.67	21.83
Lo	16	17.34	16.45	19.10	0.67	3.88
Wo	16	19.06	16.88	21.74	1.15	6.03
Lp	16	6.48	5.55	7.68	0.55	8.42
Wp	16	4.31	3.43	5.24	0.48	11.13
L1	6	17.62	16.78	18.70	0.68	3.84
W1	6	19.67	19.15	20.18	0.43	2.19
Lp1	6	7.04	6.45	7.68	0.50	7.09
e.f.	13-16			<u>0.62 - 4.44 - 3.13 - 0.75</u>		
				0.31		

TABLE S13. Measurements of M3: H. tooth height; Lo. occlusal length; Lp. Occlusal length of protocone; Wo. occlusal breadth; Wp. occlusal breadth of protocone; L1. tooth length at 1cm above the roots; Lp1. protocone length at 1cm above the roots; W1: tooth breadth at 1cm above the roots; e.f. enamel function (Eisenmann *et al.*, 1988).

<b>1<sup>st</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	10	42.45	35.85	46.00	3.53	8.31
Lo	13	16.79	15.08	18.72	1.09	6.48
Wo	11	13.69	12.30	14.99	0.94	6.89
Lp	8	5.51	4.48	6.45	0.67	12.17
Wp	8	2.59	2.06	2.91	0.27	10.54
L1	8	18.90	17.97	19.94	0.65	3.43
W1	8	16.76	16.17	17.36	0.40	2.36
Lp1	8	6.87	6.47	7.32	0.32	4.72
e.f.	5-7			<u>0.86 - 4.67 - 2.00 - 1.00</u>		
				0.83		
<b>2<sup>nd</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
H	5	27.95	24.03	29.80	2.49	8.91
Lo	7	17.94	16.48	20.07	1.18	6.58
Wo	7	15.13	14.22	16.11	0.87	5.78
Lp	7	5.80	5.30	6.30	0.35	6.04
Wp	7	3.26	3.14	3.48	0.13	4.05
L1	5	19.15	17.44	20.25	1.07	5.57
W1	5	17.13	16.68	17.78	0.52	3.03
Lp1	5	6.84	6.37	7.22	0.37	5.48
e.f.	7			<u>1.14 - 3.71 - 2.57 - 2.00</u>		
				1.00		

TABLE S13. (Continued)

3<sup>rd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
H	11	17.55	13.43	23.87	3.07	17.51
Lo	13	18.65	15.81	20.32	1.13	6.04
Wo	13	15.99	14.40	17.36	0.87	5.43
Lp	13	5.89	4.95	6.90	0.68	11.62
Wp	13	3.38	2.41	4.12	0.51	15.02
L1	9	19.33	18.43	20.00	0.51	2.63
W1	9	17.00	16.37	17.74	0.41	2.40
Lp1	9	7.24	6.31	8.00	0.54	7.48
e.f.	13				0.77 - 5.08 - 3.15 - 1.15	
					1.00	
<hr/>						
4 <sup>th</sup> wear stage						
measurement	n	Mean	Min	Max	s	cv
H	2	8.96	10.38	7.53	-	-
Lo	2	20.18	20.33	20.02	-	-
Wo	2	16.33	16.25	16.4	-	-
Lp	2	6.82	6.34	7.3	-	-
Wp	2	4.65	4.57	4.72	-	-
L1	1	20	-	-	-	-
W1	1	17.26	-	-	-	-
Lp1	-	-	-	-	-	-
e.f.	2				2.00 - 3.50 - 2.00 - 0	
					1.00	

TABLE S14. Measurements of p2: 1. tooth height; 2. occlusal length; 3. length of the preflexid; 4. length of the linguaflexid; 5: length of the postflexid; 6. occlusal breadth; 7. length at 1cm above the roots; 8: tooth breadth at 1cm above the roots (Eisenmann *et al.*, 1988).1<sup>st</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	14	33.26	18.27	41.45	6.34	19.06
2	16	23.26	21.12	24.47	0.81	3.49
3	15	6.43	4.67	7.45	0.85	13.27
4	15	9.37	8.55	10.50	0.57	6.09
5	15	10.25	6.62	11.43	1.20	11.71
6	16	10.39	9.33	11.85	0.70	6.73
7	10	23.48	22.39	24.60	0.63	2.67
8	10	12.04	10.81	14.25	0.92	7.65

2<sup>nd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	4	25.91	20.32	29.79	4.02	15.53
2	8	22.82	21.38	23.80	0.74	3.24
3	8	6.55	5.27	7.53	0.76	11.62
4	8	9.78	8.42	10.87	0.79	8.10
5	8	9.96	8.66	11.91	0.95	9.52
6	8	10.59	9.43	11.76	0.77	7.28
7	3	23.22	22.39	23.92	0.77	3.33
8	3	12.21	11.00	13.39	1.20	9.79

TABLE S14. (Continued)

3<sup>rd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	7	19.02	12.00	24.60	5.76	30.29
2	12	22.62	21.30	24.31	0.87	3.83
3	11	5.50	3.98	7.52	1.16	21.08
4	12	9.94	8.54	10.75	0.53	5.30
5	12	9.72	8.44	11.15	0.84	8.60
6	12	11.13	9.39	12.30	0.89	8.01
7	5	23.02	21.84	24.41	1.04	4.51
8	5	12.11	10.99	12.98	0.71	5.89

4<sup>th</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	8	10.34	8.01	12.80	1.46	14.16
2	13	22.59	21.83	23.70	0.50	2.21
3	12	5.19	3.52	7.12	1.07	20.71
4	13	10.36	9.46	11.78	0.85	8.24
5	12	8.06	4.06	9.95	1.53	19.00
6	13	11.82	9.97	12.58	0.76	6.44
7	9	22.57	22.09	23.06	0.40	1.78
8	9	12.78	11.99	13.99	0.66	5.14

TABLE S15. Measurements of p3,4: 1. tooth height; 2. occlusal length; 3. length of the preflexid; 4. length of the linguaflexid; 5: length of the postflexid; 6. occlusal breadth; 7. length at 1cm above the roots; 8: tooth breadth at 1cm above the roots (Eisenmann *et al.*, 1988).1<sup>st</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	44	40.33	29.80	53.74	5.38	13.35
2	54	21.09	18.78	24.25	1.25	5.94
3	53	6.56	5.67	7.95	0.55	8.35
4	53	11.48	8.31	13.14	0.98	8.56
5	52	9.99	6.81	11.73	0.91	9.08
6	53	10.42	8.17	12.20	0.81	7.76
7	33	19.73	17.30	21.84	1.22	6.17
8	34	11.90	10.50	13.74	0.79	6.61

2<sup>nd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	16	31.97	25.00	41.99	4.20	13.15
2	28	20.70	18.65	22.35	0.81	3.91
3	28	6.41	5.58	7.40	0.52	8.19
4	28	12.36	10.78	13.64	0.75	6.08
5	27	10.03	7.50	11.99	1.17	11.68
6	28	11.20	9.30	12.60	0.84	7.49
7	15	20.21	18.70	22.53	1.19	5.90
8	15	12.04	10.86	13.74	0.67	5.54

3<sup>rd</sup> wear stage

measurement	n	Mean	Min	Max	s	cv
1	10	20.91	16.17	25.45	3.38	16.16

TABLE S15. (Continued)

2	27	20.26	18.70	21.53	0.77	3.81
3	27	6.14	5.39	7.00	0.50	8.17
4	26	12.68	11.29	14.02	0.55	4.35
5	27	9.02	6.52	11.22	1.53	16.94
6	27	12.14	10.54	13.61	0.87	7.13
7	9	20.33	19.38	21.32	0.68	3.36
8	10	13.09	11.86	13.90	0.58	4.44
<b>4<sup>th</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
1	12	9.84	6.39	14.24	2.16	22.00
2	22	19.57	16.19	21.45	1.16	5.95
3	20	5.70	4.40	7.34	0.73	12.73
4	18	12.93	11.87	14.44	0.65	5.04
5	20	6.88	3.52	10.58	1.75	25.46
6	21	13.03	12.49	14.32	0.51	3.90
7	10	19.89	18.71	21.72	0.96	4.81
8	10	13.86	12.93	16.14	0.98	7.09

TABLE S16. Measurements of m1,2: 1. tooth height; 2. occlusal length; 3. length of the preflexid; 4. length of the linguaflexid; 5: length of the postflexid; 6. occlusal breadth; 7. length at 1cm above the roots; 8: tooth breadth at 1cm above the roots (Eisenmann *et al.*, 1988).

<b>1<sup>st</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
1	50	47.02	37.00	57.23	5.32	11.31
2	81	21.39	18.14	24.91	1.56	7.27
3	80	6.24	4.94	8.06	0.59	9.47
4	80	11.11	9.37	13.02	0.90	8.06
5	78	7.84	6.25	10.29	0.78	9.95
6	81	8.94	7.36	10.59	0.68	7.55
7	44	17.71	15.84	19.45	0.99	5.61
8	45	10.38	8.91	12.00	0.70	6.74
<b>2<sup>nd</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
1	13	36.11	28.58	43.06	4.13	11.45
2	24	19.42	17.40	22.10	1.08	5.56
3	24	5.56	4.18	6.61	0.55	9.84
4	24	10.99	9.39	12.35	0.75	6.80
5	24	6.92	5.61	8.97	0.72	10.46
6	24	9.36	8.42	10.16	0.54	5.77
7	11	17.65	15.47	19.70	1.25	7.06
8	11	10.22	9.65	10.94	0.42	4.12
<b>3<sup>rd</sup> wear stage</b>						
measurement	n	Mean	Min	Max	s	cv
1	5	27.62	21.50	34.25	5.20	18.82
2	17	18.35	17.30	19.67	0.80	4.34
3	17	5.03	4.26	6.01	0.50	9.99
4	17	10.72	9.73	12.31	0.71	6.61
5	17	5.82	4.91	8.11	0.82	14.09

TABLE S16. (Continued)

6	17	10.18	8.71	11.60	0.68	6.70
7	6	18.51	17.73	19.28	0.50	2.72
8	5	10.79	9.65	12.09	1.01	9.35

**4<sup>th</sup> wear stage**

measurement	n	Mean	Min	Max	s	cv
1	4	17.94	7.82	24.12	7.36	41.02
2	13	17.83	16.87	19.33	0.68	3.81
3	13	4.33	2.99	5.04	0.56	12.91
4	13	10.83	9.32	11.88	0.67	6.19
5	13	4.75	3.55	5.89	0.71	14.98
6	13	10.82	9.64	12.11	0.65	5.99
7	4	18.08	17.26	19.03	0.74	4.07
8	4	12.13	11.19	13.03	0.75	6.20

TABLE S17. Measurements of m3: 1. tooth height; 2. occlusal length; 3. length of the preflexid; 4. length of the linguaflexid; 5: length of the postflexid; 6. occlusal breadth; 7. length at 1cm above the roots; 8: tooth breadth at 1cm above the roots (Eisenmann *et al.*, 1988).**1<sup>st</sup> wear stage**

measurement	n	Mean	Min	Max	s	cv
1	11	41.28	38.03	45.94	2.36	5.72
2	16	19.82	18.18	21.62	1.05	5.28
3	15	5.50	4.61	6.73	0.61	11.13
4	16	9.04	7.75	10.14	0.85	9.39
5	12	6.04	5.37	6.68	0.45	7.47
6	16	7.79	5.93	9.06	0.80	10.24
7	8	22.48	20.32	23.99	1.33	5.90
8	7	9.27	9.12	9.69	0.20	2.12

**2<sup>nd</sup> wear stage**

measurement	n	Mean	Min	Max	s	cv
1	5	34.84	32.45	40.90	3.51	10.07
2	9	20.59	19.13	22.28	1.18	5.71
3	7	5.38	4.97	5.91	0.36	6.65
4	9	9.28	8.70	10.10	0.41	4.45
5	8	6.23	5.67	6.86	0.46	7.43
6	9	8.39	7.42	9.21	0.70	8.36
7	4	22.23	20.99	24.20	1.39	6.26
8	4	9.36	9.07	9.68	0.25	2.70

**3<sup>rd</sup> wear stage**

measurement	n	Mean	Min	Max	s	cv
1	9	22.32	16.00	25.96	3.39	15.17
2	12	20.94	19.90	22.24	0.83	3.97
3	13	5.02	4.33	5.58	0.43	8.52
4	13	9.29	7.93	10.44	0.74	7.96
5	13	6.03	4.87	8.40	0.99	16.37
6	13	8.80	8.15	9.44	0.42	4.80
7	9	21.66	20.71	23.80	1.04	4.80
8	8	9.49	8.51	10.00	0.50	5.22

TABLE S17. (Continued)

<u>4<sup>th</sup> wear stage</u>	n	Mean	Min	Max	s	cv
1	7	14.55	6.92	18.23	3.95	27.11
2	11	21.50	19.69	24.01	1.51	7.01
3	11	4.58	4.19	4.95	0.28	6.12
4	12	9.52	8.39	10.65	0.74	7.75
5	12	5.16	2.96	7.18	1.16	22.50
6	12	8.94	7.85	9.52	0.46	5.19
7	7	21.05	19.57	22.43	1.10	5.22
8	7	9.72	8.91	10.10	0.47	4.82

TABLE S18. Measurements of the scapula: 3. maximal breadth of the articular process; 4. articular maximal breadth; 5. articular maximal depth; 6. maximal depth of the spina (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
3	1	61.93	-	-	-	-
4	2	39.25	38.94	39.56	-	-
5	2	34.97	33.85	36.09	-	-
6	1	25.97	-	-	-	-

TABLE S19. Measurements of the humerus: 1. maximal length; 2. maximal length from caput; 3. minimal breadth of the diaphysis; 4. diameter perpendicular to 3; 6. proximal depth at the level of the median tubercle; 7. maximal breadth of the trochlea; 8. distal maximal depth; 9. maximal trochlear height; 10. minimal trochlear height; 11. trochlear height at the sagittal crest (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	1	206.50	-	-	-	-
2	1	194.40	-	-	-	-
3	4	23.23	22.22	24.45	1.12	4.82
4	4	29.62	28.16	30.37	0.99	3.34
6	1	68.65	-	-	-	-
7	15	52.57	48.92	54.10	1.44	2.74
8	11	58.29	54.45	62.60	2.78	4.78
9	17	35.52	32.97	38.83	1.55	4.38
10	14	25.64	23.78	27.36	0.88	3.41
11	15	31.67	29.07	33.18	1.15	3.65

TABLE S20. Measurements of the radius: 1. maximal length; 2. medial length; 3. minimal breadth of the diaphysis; 4. depth of the diaphysis at level of 3; 5. proximal articular breadth; 6. proximal articular depth; 7. proximal maximal breadth; 8. distal articular breadth; 9. distal articular depth; 10. distal maximal breadth; 11. breadth of the radial condyle; 12. breadth of the ulnar condyle; 13 lateral length (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	5	248.30	238.50	262.50	9.49	3.82
2	3	235.77	227.80	245.00	8.67	3.68
3	6	29.93	28.17	34.80	2.48	8.29
4	5	18.62	17.24	19.84	1.00	5.35
5	5	47.89	45.73	49.92	1.72	3.59

TABLE S20. (Continued)

6	5	25.74	22.65	27.41	1.99	7.73
7	5	51.97	50.25	54.22	1.60	3.08
8	6	45.21	40.26	49.06	2.98	6.60
9	6	27.48	26.11	28.54	0.98	3.55
10	6	49.77	44.88	53.67	2.94	5.90
11	6	17.06	15.60	18.90	1.28	7.50
12	5	9.82	8.39	10.83	0.97	9.88
13	3	239.00	235.00	246.00	6.08	2.55

TABLE S21. Measurements of the ulna: 1. maximal length; 2. length of the olecranon; 3. maximal articular breadth; 4. minimal depth of the olecranon; 5. depth across the processus anconeus (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	2	-	290.30	315.00	-	-
2	1	57.14	-	-	-	-
3	4	28.90	28.19	29.90	0.85	2.93
4	1	-	35.29	(37)	-	-
5	3	44.20	43.44	44.87	0.72	1.63

TABLE S22. Measurements of the pisiforme: 1. maximal mediolateral distance; 2. maximal proximodistal distance; 3. maximal craniocaudal distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	8	30.48	28.61	33.61	1.80	5.89
2	10	22.22	19.99	25.48	2.17	9.78
3	8	10.05	8.89	11.74	1.01	10.05

TABLE S23. Measurements of the pyramide: 1. maximal proximodistal distance; 2. maximal craniocaudal distance; 3. maximal mediolateral distance; 4. Craniocaudal distance of distal heel (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	7	26.64	25.94	28.75	1.01	3.79
2	8	15.69	13.82	16.57	0.84	5.36
3	8	12.63	10.81	14.17	1.12	8.88
4	8	10.55	9.92	11.31	0.45	4.30

TABLE S24. Measurements of the lunatum: 1. maximal mediolateral distance; 2. maximal craniocaudal distance; 4. maximal proximodistal distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	9	20.53	19.38	22.06	0.86	4.21
2	10	19.93	18.93	21.46	0.82	4.10
4	8	22.36	20.81	24.20	1.04	4.65

TABLE S25. Measurements of the unciforme: 1. maximal proximodistal distance; 2. maximal craniocaudal distance; 3. maximal mediolateral distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	9	17.95	15.88	19.28	1.29	7.19
2	9	13.82	12.63	14.63	0.72	5.24
3	10	18.97	17.54	20.00	0.87	4.58

TABLE S26. Measurements of the scaphoideum: 1. maximal craniocaudal distance; 2. maximal proximodistal distance; 3. maximal mediolateral distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	10	28.12	26.00	30.06	1.39	4.95
2	13	20.36	19.32	21.11	0.54	2.64
3	13	18.86	15.60	20.64	1.48	7.84

TABLE S27. Measurements of the magnum: 1. maximal proximodistal distance; 2. maximal mediolateral distance; 3. maximal craniocaudal distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	18	14.47	12.93	16.02	0.95	6.56
2	16	27.57	26.08	30.20	1.09	3.95
3	15	24.40	21.42	26.93	1.40	5.72

TABLE S28. Measurements of the trapezoideum: 1. maximal proximodistal distance; 2. maximal craniocaudal distance; 3. maximal mediolateral distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	7	13.14	12.39	13.85	0.50	3.77
2	7	13.53	12.47	14.71	0.87	6.46
3	7	9.85	8.92	10.47	0.57	5.80

TABLE S29. Measurements of the third metacarpal: 1. maximal length; 2. medial length; 2'. lateral length; 3. minimal breadth of the diaphysis; 4. depth of the diaphysis at level of 3; 5. proximal articular breadth; 6. proximal articular depth; 7. maximal diameter of the articular facet for the third carpal; 8. diameter of the anterior facet for the fourth carpal; 9. diameter of the articular facet for the second carpal; 10. distal maximal supra-articular breadth; 11. distal maximal articular breadth; 12. distal maximal depth of the keel; 13. distal minimal depth of the lateral condyle; 13'. distal maximal depth of the lateral condyle; 14. distal maximal depth of the medial condyle; 14'. distal minimal depth of the medial condyle (Eisenmann *et al.*, 1988).

Measurement	n	Mean	Min	Max	s	cv
1	15	204.11	197.30	210.80	4.53	2.22
2	16	198.40	192.50	203.00	3.53	1.78
2'	16	203.18	196.20	210.00	4.54	2.23
3	20	21.50	19.06	25.08	1.51	7.01
4	20	19.21	16.91	22.10	1.14	5.93
5	23	31.34	29.78	33.81	1.01	3.24
6	19	21.66	19.98	23.63	0.93	4.32
7	23	27.04	25.24	28.40	0.88	3.27
8	22	8.33	7.18	9.54	0.52	6.30
8'	18	4.72	3.89	5.58	0.46	9.77
10	16	27.86	25.89	30.31	1.19	4.27
11	18	26.88	24.95	28.74	1.10	4.09
12	17	23.57	21.50	25.79	1.07	4.53
13	19	19.79	18.14	21.08	0.80	4.05
13'	17	20.07	18.43	22.04	0.88	4.39
14	17	21.52	19.30	22.85	1.10	5.12
14'	18	20.13	18.05	21.68	0.97	4.83

TABLE S30. Measurements of the fifth metacarpal: 1. maximal length; 2. maximal breadth; 3. maximal depth; 4. maximal breadth of the articular facet; 5. maximal craniocaudal diameter of the articular facet.

measurement	n	Mean	Min	Max	s	cv
1	3	16.32	14.84	18.10	1.65	10.12
2	3	8.06	7.04	8.73	0.90	11.16
3	3	8.81	7.66	9.69	1.04	11.83
4	3	6.67	5.07	7.72	1.41	21.09
5	3	7.57	7.02	7.91	0.48	6.32

TABLE S31. Measurements of the lateral metacarpals: 1. maximal length; 2. minimal breadth of the diaphysis; 3. proximal maximal breadth; 4. proximal maximal depth; 5. distal articular breadth; 6. distal articular depth (Eisenmann *et al.*, 1988).

second metacarpal						
measurement	n	Mean	Min	Max	s	cv
1	4	186.35	182.40	190.00	3.16	1.70
2	6	6.16	4.79	7.51	0.89	14.50
3	19	10.59	9.64	11.77	0.54	5.07
4	19	14.23	12.80	15.97	0.87	6.09
5	7	6.75	6.04	7.58	0.60	8.92
6	7	13.19	11.86	14.05	0.75	5.70
fourth metacarpal						
measurement	n	Mean	Min	Max	s	cv
1	3	189.20	182.00	201.20	10.46	5.53
2	5	5.67	5.09	6.27	0.55	9.78
3	19	11.68	10.00	13.60	1.02	8.75
4	19	13.94	12.79	16.52	0.93	6.66
5	3	7.64	6.86	8.62	0.90	11.76
6	3	13.73	12.76	14.47	0.88	6.39

TABLE S32. Measurements of the first phalanx of the central digit: 1. maximal length; 2. anterior length; 3. minimal breadth; 4. proximal breadth; 5. proximal depth; 6. distal breadth at the tuberosities; 7. distal articular breadth; 8. distal articular depth (Eisenmann *et al.*, 1988).

anterior						
measurement	N	Mean	Min	Max	s	cv
1	17	53.69	51.35	57.54	1.49	2.77
2	18	49.27	46.97	51.89	1.21	2.46
3	18	19.74	18.01	21.58	1.12	5.68
4	17	29.24	27.36	30.71	1.08	3.70
5	18	23.74	21.98	25.33	0.88	3.72
6	18	23.90	22.15	26.46	1.26	5.27
7	17	23.87	22.34	25.56	0.83	3.47
8	18	15.14	13.69	16.09	0.68	4.48
posterior						
measurement	N	Mean	Min	Max	s	cv
1	15	52.27	46.18	55.60	2.23	4.27
2	15	46.79	42.61	50.94	2.24	4.80
3	15	20.36	18.97	21.71	0.81	4.00
4	15	29.78	25.70	32.10	1.77	5.95

TABLE S32. (Continued)

5	15	25.39	23.34	27.08	0.98	3.85
6	15	24.62	22.24	26.17	1.12	4.54
7	15	23.71	21.42	25.60	1.26	5.31
8	15	15.52	14.24	16.75	0.64	4.10

TABLE S33. Measurements of the sesamoidea of the distal third metacarpal: 1. maximal length; 2. maximal depth; 3. maximal breadth.

anterior						
measurement	n	Mean	Min	Max	s	cv
1	29	21.11	19.92	22.66	0.68	3.24
2	28	12.07	10.89	13.08	0.48	4.00
3	29	16.17	15.08	16.92	0.48	2.94
posterior						
measurement	n	Mean	Min	Max	s	cv
1	22	21.28	20.04	23.25	0.83	3.91
2	25	12.33	10.95	13.30	0.56	4.58
3	21	17.53	15.91	18.85	0.63	3.59

TABLE S34. Measurements of the second phalanx of the central digit: 1. maximal length; 2. anterior length; 3. minimal breadth; 4. proximal maximal breadth; 5. proximal maximal depth; 6. distal articular maximal breadth (Eisenmann *et al.*, 1988).

anterior						
measurement	n	Mean	Min	Max	s	cv
1	19	30.57	28.73	33.30	1.12	3.65
2	18	24.42	22.63	26.35	0.86	3.51
3	19	22.73	21.04	24.89	0.99	4.36
4	19	27.63	26.17	30.61	1.04	3.78
5	19	19.84	18.62	21.63	0.84	4.23
6	19	25.48	24.41	28.47	1.02	4.00
posterior						
measurement	n	Mean	Min	Max	s	cv
1	29	31.63	29.37	33.61	1.04	3.27
2	27	24.77	22.57	27.31	1.18	4.76
3	28	21.92	19.32	23.86	1.13	5.17
4	28	27.60	24.55	29.74	1.27	4.59
5	28	20.89	19.51	22.11	0.79	3.77
6	25	23.75	21.26	25.99	1.15	4.84

TABLE S35. Measurements of the third phalanx of the central digit: 1. length from the posterior edge of the articular facet to the tip of the phalanx; 2. anterior length; 3. maximal breadth; 4. articular breadth; 5. articular depth; 6. maximal height; 7'. angle between the sole and the dorsal line estimated in the present paper as  $\sin^{-1}(m6/m2)$  (Eisenmann *et al.*, 1988).

anterior						
measurement	n	Mean	Min	Max	s	cv
1	6	40.59	36.96	44.15	2.73	6.74
2	7	37.74	32.00	42.45	3.53	9.35
3	2	33.51	29.82	37.20	-	-
4	5	26.41	24.87	28.16	1.36	5.16

TABLE S35. (Continued)

5	7	18.19	16.29	19.79	1.19	6.55
6	6	27.29	23.30	29.93	2.56	9.39
7'	6	47.56	46.73	49.06	0.80	1.69

posterior						
measurement	n	Mean	Min	Max	s	cv
1	6	43.20	41.46	47.55	2.25	5.21
2	6	42.72	40.61	47.47	2.52	5.89
3	4	37.25	34.65	39.37	2.04	5.48
4	7	26.62	24.92	28.29	1.13	4.24
5	8	18.97	17.44	20.29	0.87	4.56
6	7	28.52	27.24	30.55	1.13	3.97
7'	6	42.12	40.06	43.38	1.32	3.14

TABLE S36. Measurements of the distal sesamoidea of the third phalanx: 1. maximal breadth; 2. maximal depth; 3. height; 4. maximal anteroposterior diameter of the articular facet.

measurement	n	Mean	Min	Max	s	cv
1	9	23.22	20.65	25.95	1.94	8.34
2	12	10.48	9.25	11.26	0.56	5.37
3	12	8.08	6.60	9.39	0.88	10.85
4	12	6.86	6.25	7.67	0.46	6.75

TABLE S37. Measurements of the first phalanx of the lateral digits: 1. maximal length; 2. proximal maximal breadth; 3. proximal maximal depth; 4. distal maximal breadth; 5. minimal breadth of the diaphysis (Eisenmann *et al.*, 1988).

anterior						
measurement	n	Mean	Min	Max	s	cv
1	24	31.14	28.67	34.01	1.57	5.06
2	24	8.97	7.39	10.34	0.76	8.44
3	23	15.68	13.09	17.46	1.07	6.84
4	24	9.25	8.04	10.20	0.59	6.36
5	24	5.91	4.97	6.99	0.55	9.29
posterior						
measurement	n	Mean	Min	Max	s	cv
1	26	27.60	24.72	29.87	1.13	4.11
2	26	8.94	7.27	10.25	0.69	7.75
3	26	15.41	12.87	17.23	1.10	7.15
4	26	9.08	7.71	9.83	0.56	6.22
5	26	6.59	4.84	7.58	0.58	8.83

TABLE S38. Measurements of the second phalanx of the lateral digits: 1. maximal length; 2. proximal maximal breadth; 3. proximal maximal depth; 4. distal maximal breadth (Eisenmann *et al.*, 1988).

anterior						
measurement	n	Mean	Min	Max	s	cv
1	32	15.73	13.59	18.04	1.13	7.17
2	33	10.17	8.73	11.26	0.75	7.42
3	32	14.08	12.17	16.17	1.08	7.65
4	33	8.62	7.19	10.01	0.69	8.02

TABLE S38. (Continued)

posterior						
measurement	n	Mean	Min	Max	s	cv
1	15	16.23	14.65	17.58	0.78	4.83
2	15	17.18	15.33	19.58	0.99	5.74
3	14	14.62	13.45	16.24	0.72	4.96
4	11	19.56	17.66	22.01	1.28	6.53

TABLE S39. Measurements of the third phalanx of the lateral digits: 1. anterior length; 2. proximal articular breadth; 3. proximal articular depth (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	25	18.00	14.97	19.92	1.24	6.90
2	26	9.51	8.02	11.07	0.81	8.50
3	14	14.97	13.23	17.44	1.29	8.59

TABLE S40. Measurements of the femur: 2. length from caput femoris to lateral condyle; 3. minimal breadth; 4. diameter perpendicular to, and at the level of 3; 5. proximal maximal breadth; 7. distal maximal breadth; 10. maximal depth of caput femoris; (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
2	2	260.25	251.50	269.00	-	-
3	2	27.71	27.25	28.17	-	-
4	4	39.12	37.97	42.07	1.97	5.05
5	2	77.62	73.91	81.32	-	-
7	2	68.11	64.64	71.58	-	-
10	9	37.01	35.05	38.92	1.20	3.24

TABLE S41. Measurements of the tibia: 1. maximal length; 2. medial length; 3. minimal breadth; 4. minimal depth of the diaphysis; 5. proximal maximal breadth; 6. proximal maximal depth; 7. distal maximal breadth; 8. distal maximal depth; 9. length of the fossa digitalis (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	2	287.75	279.50	296.00	-	-
2	4	279.13	276.50	285.00	3.97	1.42
3	12	34.51	31.22	40.62	2.82	8.17
4	11	24.57	21.27	30.30	2.63	10.71
5	4	65.75	58.13	73.68	6.35	9.67
6	1	59.88	-	-	-	-
7	19	50.44	45.86	58.78	3.52	6.97
8	20	34.85	32.64	40.36	2.01	5.77
9	1	35.20	-	-	-	-

TABLE S42. Measurements of the astragalus: 1. maximal length; 2. maximal diameter of the medial condyle; 3. breadth of the trochlea; 4. maximal breadth; 5. distal articular breadth; 6. distal articular depth; 7. maximal medial depth (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	36	44.11	41.23	47.69	1.76	4.00
2	35	44.01	40.44	48.87	1.94	4.42
3	35	19.48	16.77	22.13	1.15	5.89

TABLE S42. (Continued)

4	31	41.90	37.35	46.86	1.98	4.73
5	34	33.44	29.99	35.89	1.55	4.63
6	34	24.91	22.13	26.96	1.14	4.58
7	28	36.73	34.32	39.96	1.49	4.05

TABLE S43. Measurements of the astragalus: 1. maximal length; 2. length of the proximal part; 3. minimal breadth; 4. proximal maximal breadth; 5. proximal maximal depth; 6. distal maximal breadth; 7. distal maximal depth (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	14	84.59	79.29	91.25	3.92	4.63
2	16	54.63	51.04	57.67	2.10	3.85
3	18	14.87	12.72	17.16	1.15	7.74
4	18	23.59	21.08	25.69	1.35	5.74
5	15	36.17	32.40	40.33	2.05	5.67
6	14	35.16	31.00	38.82	2.40	6.83
7	16	36.93	32.50	41.40	2.57	6.95

TABLE S44. Measurements of the naviculare: 1. maximal proximodistal distance; 2. maximal mediolateral distance; 3. maximal craniocaudal distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	21	33.86	31.49	37.76	1.68	4.97
2	20	28.95	25.73	33.00	1.59	5.49
3	18	36.32	33.80	41.14	1.88	5.18

TABLE S45. Measurements of the cuboideum: 1. maximal craniocaudal distance; 2. maximal proximodistal distance; 3. maximal mediolateral distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	14	22.31	19.16	24.20	1.37	6.13
2	14	30.71	29.02	33.53	1.07	3.49
3	13	18.84	17.14	19.86	0.88	4.68

TABLE S46. Measurements of the cuneiforme 1+2: 1. maximal mediolateral distance; 2. maximal proximodistal distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	3	26.55	25.36	27.28	1.04	3.92
2	5	14.84	14.36	15.12	0.30	2.04

TABLE S47. Measurements of the cuneiforme 3: 1. maximal proximodistal distance; 2. maximal mediolateral distance; 3. maximal craniocaudal distance (Bernor *et al.*, 1997).

measurement	n	Mean	Min	Max	s	cv
1	15	8.78	7.98	9.37	0.42	4.79
2	14	31.46	29.12	34.33	1.64	5.23
3	11	27.08	24.95	29.11	1.23	4.53

TABLE S48. Measurements of the third metatarsal: 1. maximal length; 2. medial length; 2'. lateral length; 3. minimal breadth of the diaphysis; 4. depth of the diaphysis at level of 3; 5. proximal articular breadth; 6. proximal articular depth; 7. maximal diameter of the articular facet for the third tarsal; 8. diameter of the articular facet for the fourth tarsal; 9. diameter of

the articular facet for the second tarsal; 10. distal maximal supra-articular breadth; 11. distal maximal articular breadth; 12. distal maximal depth of the keel; 13. distal minimal depth of the lateral condyle; 13'. distal maximal depth of the lateral condyle; 14. distal maximal depth of the medial condyle; 14'. distal minimal depth of the medial condyle (Eisenmann *et al.*, 1988).

measurement	n	Mean	Min	Max	s	cv
1	13	230.71	223.00	243.80	5.99	2.60
2	13	226.10	219.60	237.40	5.64	2.50
2'	11	230.26	224.00	243.00	6.29	2.73
3	16	21.43	19.24	24.00	1.15	5.36
4	15	23.24	21.80	26.46	1.34	5.75
5	16	31.87	29.67	35.59	1.60	5.01
6	19	25.79	22.49	28.53	1.75	6.78
7	17	29.15	26.63	32.66	1.67	5.74
8	19	7.99	6.48	9.42	0.89	11.11
9	17	4.32	3.38	5.49	0.61	14.01
10	17	28.55	26.30	32.19	1.48	5.19
11	17	27.04	25.07	28.53	1.06	3.91
12	14	24.66	23.07	26.50	0.88	3.58
13	15	19.55	17.29	21.59	1.07	5.46
13'	15	19.85	18.21	21.62	0.86	4.35
14	16	21.90	19.70	23.92	1.11	5.08
14'	16	20.22	17.43	22.06	1.16	5.73

TABLE S49. Measurements of the lateral metatarsals: 1. maximal length; 2. minimal breadth of the diaphysis; 3. proximal maximal breadth; 4. proximal maximal depth; 5. distal articular breadth; 6. distal articular depth (Eisenmann *et al.*, 1988).

second metatarsal						
measurement	n	Mean	Min	Max	s	cv
1	2	210.20	209.20	211.20	-	-
2	6	5.10	4.62	5.86	0.53	10.33
3	18	10.51	9.50	12.10	0.71	6.71
4	18	14.46	12.34	16.65	1.30	9.00
5	4	6.34	5.71	6.90	0.58	9.22
6	4	13.39	12.02	14.80	1.17	8.75
fourth metatarsal						
measurement	n	Mean	Min	Max	s	cv
1	2	215.85	211.70	220.00	-	-
2	3	5.33	4.84	5.92	0.55	10.24
3	20	14.72	13.44	16.34	0.85	5.78
4	20	22.06	20.01	24.49	1.42	6.43
5	2	6.29	6.04	6.54	-	-
6	2	12.935	12.33	13.54	-	-

#### REFERENCES CITED

- Alberdi, M.-T. 1974. El genero *Hipparrison* en Espana. Nuevas formas de Castilla y Andalucia, revision e historia evolutina. Trabajos sobre Neogeno-Cuaternario 1:1—146, 56tabl., 7pl., Madrid.
- Bernor, R.L., H., Tobien, C. L-A., Hayek, and H.-W., Mittmann. 1997. Hippotherium primigenium (Equidae, Mammalia) from the late Miocene of Höwenegg (Hegau, Germany). Andrias 10:1—230.
- Eisenmann, V., M.T., Alberdi, C., De Giuli, and U., Staesche. 1988. Methodology; p. 1—71 in Woodburne, M., and P.Y., Sondaar (eds), Studying Fossil Horses. E. J. Brill, Leiden; New York.
- Forsten, A. and R. Garevski. 1989. Hipparions (Mammalia, Perissodactyla) from Macedonia, Yugoslavia. Geologica Macedonica 3(2):159—206.
- Gromova, V.I. 1952. Gippariony (rod *Hipparrison*) po materialam Taraklii, Pavlodara i drugim. Trudy Paleontologicheskogo Instituta Akademi Nauk SSSR, 36, 475 pp. (in Russian)
- Hammer, O. and Harper, D., 2006. Paleontological Data Analysis, Blackwell Publishing, p. 351.
- Hammer, O., D.A.T. Harper, and P.D. Ryan. 2001. PAST: Paleontological Statistics software package for education and data analysis. Palaeontology Electronica 4(1):9.
- Koufos, G.D. and Vlachou, T.D., 2005. Equidae (Mammalia, Perissodactyla) from the late Miocene of Akkasdagı, Turkey. Geodiversitas 27(4):633—705.
- Lazaridis, G. 2010. Contribution to the study of the Neogene Perissodactyles from Kryopigi (Kassandra, Chalkidiki, Greece). M.S. thesis, Geology School, Aristotle University of Thessaloniki, 365 pp. (in Greek with English summary).
- Simpson, G.G. 1941. Large Pleistocene felines of North America. American Museum Novitates 1136:1—27, 11 fig., New York.
- Simpson, G.G. & Roe, A., 1939. Quantitative Zoology-Numerical concepts and methods in the study of recent and fossil animals. First Edition. McGraw-Hill Book Company, 414 pp.
- Sondaar, P.Y. 1971. The Samos Hipparrison. Koninklijke Nederlandse Akademie Van Wetenschappen Proceedings Series B 74:417—441.