Mesowear Analysis for Cheek Teeth of Extant Ungulates
- Application for the Paleodietary Reconstruction of Fossil Ungulates -

Graduate School of Science and Engineering, Kagoshima University

Eisuke Yamada

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ABSTRACT

This thesis mainly comprises to test the reliability, application and limitation of mesowear analysis by using extant ungulates with known food habits. This study also investigated paleoecology of the Late Miocene large mammalian fauna by mesowear analysis based on the extant knowledge.

Chapter 1 gives background, aim and significance of this study as following sentences. First paragraph describe the relationships of food habits and vegetational habitats of extant ungulates, which strongly contribute to understand paleoecology and evolution of extinct mammals. Second paragraph review the several paleodietary reconstructive methods based on teeth, which are most likely to be preserved as fossils. Mesowear analysis is described as compare to the conventional methods. The following paragraph focused ecologies and significance of the extant ungulates in Japan to investigate the reliability of mesowear analysis.

Chapter 2 described materials and method information including mesowear scoring definition, mesowear data scored in this study and previous studies, and how to analyze the data.

Chapter 3 analyzed two extant ungulates, sika deer (*Cervus nippon*: Cervidae) and Japanese serow (*Capricornis crispus*: Bovidae) in Japan, to evaluate the effect of intraspecific difference and dietary differences in sympatric environment on their dietary reconstruction. In first paragraph, wild deer populations from different habitats were compared. Data set of one population was significantly different from the others. Hierarchical cluster analysis (HCA) divided them into two food habits. The deer in south and west Japan were classified into browsers, and the deer in north and east Japan were into mixed feeders. Dietary classifications of the populations were supported by ecological studies about them. Japanese Sika deer has been known to be able to switch their food habit based on the surrounding vegetational environment. The deer show browsing diet in an evergreen broad-leaved forest. On the other hands, the deer mainly rely on grazing diet in a deciduous broad-leaved forest or grassland. The results of this study contribute to comparative analysis between several fossil localities or ages. In second paragraph, an interspecific comparison was conducted using by the sympatric populations of the Japanese serow and the sika deer in the deciduous broad-leaved forest of the Nikko National Park, central Japan. The Japanese serow population was classified as browsers and the sika deer population was classified as mixed feeders by hierarchical cluster analysis and principal component analysis. As previous ecological

studies provide good support for these results, this study concluded that mesowear analysis was sensitive to dietary differences of several species in a sympatric area. From this perspective, mesowear results of fossil assemblages from the same locality should be interpreted as a reflection of food habits of each species. Thus, the findings of this study will provide basic knowledge for the paleoecological studies based on food availability of fossil herbivorous ungulates. Furthermore, the sexual foraging separation in the same population was investigated. The mesowear variables indicated that male deer had more abrasive diet (i.e. fibrous food). HCA classified the bucks into grazers and the does into browsers. The body size differences between sexes are likely to play an important role in the contrasting result.

Chapter 4 proposed the new methodologies of mesowear analysis, the "Teeth Expanded Model". Previous mesowear analysis for selenodont analyzed only upper second molar. Application of lower cheek teeth for mesowear analysis will make the mesowear analysis to be a more useful tool for paleontlogists.

Chapter 5 investigated the paleoecology of fossil hypsodont equid and bovids from the Late Miocene Maragheh Formation, Northwestern Iran. The excavation report of the animals from Maragheh used in this study suggests that they were excavated from a single quarry and a bed, namely their sympatric habitat. Mesowear analysis was applied to upper and lower fossil cheek teeth of specimens of equids and bovids from Maragheh ("*Hipparion*" fauna). The results indicate that the equids have mainly grazing diet whereas sympatric bovids had inclination to browsing diet. Based on the results of extant forms, the mesowear results of the Maragheh hypsodont animals suggest their dietary niche segregation. This result supports a hypothesis that the paleoenvironments of the Late Miocene Maragheh formation had been a mosaic of woodland and herbaceous land for feeding segregation of the plant-eaters.

Chapter 6 summarized the results of this study.

ABSTRACT IN JAPANESE
和文要旨
「現生有蹄類頬歯のメゾウェア解析 －化石有蹄類の古食性復元に用いた例－」

本論文は、古食性復元法の一つであるメゾウェア解析について、食性既知の現生有蹄類による基礎的知見の収集と、それに基づく後期中新世大型哺乳類化石群集の解析結果をまとめたものである。

第 1 章は、本研究の背景や目的などについて記述した。
植物食有蹄類の食性は、生息環境と密接に関連している。そのため、化石有蹄類の古食性復元は、個々の種の古生態に加え、当時の古環境を理解するうえでも重要である。
メゾウェア解析は、化石頬歯の摩滅形態に注目した、古食性復元法の一つである。本手法は、大量の標本を安価かつ簡便に解析可能という利点をもつ。一方で、復元結果の精度については、正確な評価がなされていない。その主な原因は、基礎となる現生有蹄類の知見が不足しているためである。そこで本研究では、生息環境や食性が既知の現生有蹄類に注目し、化石研究への応用を念頭に置いた知見の収集を行った。

第 2 章は、本研究で用いた、現生有蹄類および化石試料の標本情報を示すとともに、データ収集の実際や、多変量解析の過程を記述した。

第 3 章は、現生種から得られた基礎的知見について検討した。
【3-A. 種内比較】
生息環境の異なる現生ニホンジカ個体群を比較解析した。各個体群の食性復元結果は、実際の生態学的知見と整合的であり、本手法が食性の地域差を検出可能であることが確かめられた。これは、化石産出地域間、および層序間を比較する差異に有用な知見である。
また、解析結果を、各個体群の定量的な食性データと比較したところ、咬頭の摩滅形態と食物組成との間に相関が認められた。これは、絶滅動物の定量的な食性を推測する際の手がかりとなる知見である。
さらに、雌雄別食性が既知の個体群を用いた比較解析結果は、本手法が採食生態の雌雄差を検出可能であることを示唆した。この結果は、現生種の生態学的研究に寄与するものである。

【3-B. 種間比較】
同一植生環境下で異なる採食生態を示す現生有蹄類群集に注目して解析を行った。食性復元結果は、両者の生態学的知見と整合的であり、種間のニッチ分化を検出可能であることを確認した。この成果は、特に同所的化石群集を用いた生息環境復元の際に有用である。

第 4 章は，メゾウェア解析が対象とする歯種を拡張した新たな方法論の構築を目指した。

従来手法の上顎第 2 大臼歯だけでなく、下顎歯をメゾウェア解析の対象歯種に加えることができれば、化石標本の産出地域や時代ごとに、より広範な比較検討が可能になる。そこで、現生動物の下顎大臼歯から収集したメゾウェアデータを、同一個体の上顎大臼歯や他の現生有蹄類と比較した。そして、従来手法による解析結果との整合性を検討した。その結果、上下の咬合様式から予想される通り、反芻類においては、下顎第 2 および第 3 大臼歯が、従来の上顎第 2 大臼歯と同等に解析可能であることが示唆された。

第 5 章は、後期中新世有蹄類化石群集の古食性復元を行った。

イラン北西部に位置するマラゲー層は、後期中新世のパラテチス地域における代表的な哺乳類化石産地の一つである。本研究では、メゾウェア解析法を用いて、当該地域から発掘されたウマ科およびウシ科化石の食性復元を行った。その際、これまでの研究成果を踏まえ、下顎臼歯からもデータを収集した。

データ比較の結果、ウマ科が草本食傾向を示した一方、ウシ科は木本葉食傾向を示した。堆積環境や現生種の知見から、両者の違いは、食性のニッチ分化と、それを可能にする多様な植生環境の存在を示唆していると結論した。

第 6 章は，本研究の成果を総括した。

CHAPTER 1
INTRODUCTION

Feeding ecology of extant ungulates

Today, ungulates have huge geographic and climatic diversity; from the frozen polar regions to the arid desert (Chapman and Feldhammer 1982; Kingdon 1997). Since the pioneer work in Tarangire National Park, Tanzania (Lamprey 1963), many studies have focused on their food habits from the points of behavior, digestive physiology or morphology, and the ecological relationships between plants and ungulates. Based on these studies, the food habits of ungulates have been classified broadly as three dietary categories: browser, grazer, and mixed feeder (e.g. Hofmann and Stewart 1972). Dietary reconstruction of fossil ungulates has also adopted these extant classifications.

Based on observation of migrational behavior of grazing ungulates in Serengeti National Park, Tanzania, Gwynne and Bell (1968) have introduced the concept of “food segregation”. Bell (1970) has also investigated rumen contents of five ungulates (Buffalo, Zebra, Wildebeest, Topi, and Thomson’s gazelle) and found smaller ruminants fed on forage of higher protein content than larger one. Furthermore, Jarman (1974) reported the relationships among herd size, social behaviour like defense against predators, and their feeding ecology (selective or non-selective) of African extant antelopes. Based on these studies, Geist (1974) has introduced the concept of “Jarman-Bell principal”: the body size and population biomass of ungulate species is a function of the fiber content (digestibility) and density of the forage they exploit. This principal focused on the energy requirement by per unit of body weight between small and large ungulate. The energy and protein requirements of mammals are a function of their body weight raised to the power of 0.75 (Geist 1974). Therefore, small bodied mammals need more nutrient forages (i.e. low fiber and high protein) than large one to live on. This principal has well explained the feeding habits of herbivores.

Hofmann (1973, 1988) classified ruminants by their digestive physiology and morphology. He has pointed out the pattern among body size, diet, and morphology of digestive organs. Large ruminants’ stomach such as African buffalo generally have six characters as follow; 1) relatively large forestomach compartment (reticulum, rumen and omasum) and well developed constrictor muscle, 2) weak and uneven development of rumen papillary, 3) well developed reticulum high crests, 4) narrow ostia of reticulum and omasum, 5) numerous laminae absorption of omasum, and 6) relatively small abomasum. These characters of stomach have thought to be adaptations for fibrous, roughage food. Besides these characters, large ruminants also have short lips and a small mouth opening, which prevents grass losses during plucking. Their incisor teeth have a wide, shovel-shaped and asymmetrical crown. Finally, large ruminants have relatively long intestine (25 to 30 by body length) (Fig 1-1A). Small ruminants such as roe deer have showed opposite characters such as developed salivary gland (Fig 1-1B). The function of the organ is thought to be diluting liquid which reduces retention time, or counter-adaptation to overcome the plant chemical defense, and so on (Hofmann 1989). Hofmann (1973) named the ruminants which rely on the fibrous food (i.e. grazers) as “the grass and roughage eaters (GR)”, and which feed on forage rich in accessible plant cell contents (i.e. browsers) as “concentrate selectors (CS)”. The ruminants whose way of foraging is opportunistic (i.e. mixed feeders) have been named “Intermediate feeder (IM)”. In addition, Spencer (1995) showed correlation of morphological characters and dietary resource partitioning in the African bovidae. Janis (1990b) also suggested correlation of cranial and dental characters like jaw length with dietary categories.

As Clauss, Kaiser, and Hummel (2007) reviewed, there has been no consensus about rigorous scientific dietary classifications yet. For example, Gagnon and Chew（2000）proposed six categories based on an extensive survey of the literature: frugivores, browsers, generalists, browser-grazer intermediates, variable grazers, and obligate grazers. However, paleontologists have rarely used these subdivided classifications because it seems almost impossible to calculate percentages of food composition for extinct species. Andrews et al. (1979) proposed that examining the spectra of feeding and locomoter types, composition of the faunal community, and distribution of body size in modern mammals will contribute to understand paleoecology. Janis (1982) also discussed Neogene mammalian evolution on the point of habitat type, feeding behavior, social behavior, and morphology of extant ungulates. Vrba (1975, 1985) introduced antelope frequencies as reliable paleoecological evidences in early hominid-associated assemblages (e.g., Alcelaphini and Antilopini are recognized as indicator of open, plain grassland). Bibi et al. (2009) reviewed the fossil record and evolution of Bovidae and claimed that the Miocene evolution of Bovids is powerful proof about how environmental change effect on evolution of hominid. Konso, Ethiopia, is one of the earliest Acheulean site (Beyene et al. 2013). Katoh et al. (2000) reported chronostratigraphy and correlation of the Plio-Pleistocene tephra layers of the Konso Formation, Ethiopia. Ar/Ar method dated the Konso Formation as 1.9-1.4 Ma.

The first skull specimens of *Australopithecus boisei* were discovered from KGA 10, Konso (Suwa et al. 1997). *Homo erectus* is also excavated from Konso (Suwa et al. 2007). Large number of bovids has been excavated from these sites. Bovids tribe frequencies were different in locality and horizon, which recognized as reflection of environmental transition (Suwa et al. 2003).

Dietary reconstruction using fossil teeth

Fossil teeth of ungulates have been one of the main sources of information about their diet and the terrestrial environments. For example, hypsodonty (high crowned teeth) has been classically accepted to be an adaptive response to the spread of more open and arid vegetation (i.e. increasing fibrousness and abrasiveness) during the Late Miocene. Silica accumulation in plant correlates grazing (McNaughton et al. 1985). Teaford and Oyen (1989) reported difference in the rate of molar wear correlated to hardness of diet. Solounias et al. (1994) proposed molar wear rate and dental durability as a tool to evaluate longevity of ruminants. In fact, Pérez-Barbería and Gordon (1998) reported that tooth wear of red deer negatively correlate to the voluntary intake, digestion abilities. Carranza et al. (2004) suggested that tooth wear was correlated to lifelong of red deer. Loe et al. (2003) also reported that crown height of lower first molar positively correlated to body weight in red deer. Molar wear of stag was faster than doe. This character is usually expressed as “hypsodonty index (HI)”, which is calculated by dividing tooth crown height by other linear variable like length (Eisenmann et al. 1988) or width (Janis 1988). Based on HI scores, ungulates are classified as hypsodont, mesodont, and brachydont. These classifications have been recognised as dietary indicators of grazer, mixed feeder, and browser respectively. Hypsodonty is independent of body size (Janis and Fortelius 1988).

However, several studies reported that HI was not good for indicator of dietary category. MacFadden (2000) mentioned that extant lama is grazer in spite of brachydont whereas some of hypsodont horses are likely to be browsers. Schulz et al. (2013) reported food preferences and tooth wear in the extant sand gazelle in the Middle East. They showed HI was misclassified these mixed feeding ungulates as grazers. In spite of high crown teeth and open habitat adaptive locomotors, pronghorn seldom feed on Grasses (Semprebon and Rivals 2007). Mihlbachler and Solounias (2006) reported that several stable carbon isotope analyses indicate some animals have browsing diet in spite of their high crowned check teeth. Therefore, they have concluded that there are no significant coevolutionary relationship between molar crown height and diet. On the other hand, Retallak (2001) showed the Cenozoic expansion of grasslands and teeth crown height of Equids correlated positively by isotopic comparison of paleosol. Fortelius et al. (1996, 2002, 2003 and 2006) have attempted to employ HI of Eurasian Neocene mammals as continental-scale climatic parameter. Eronen, Puolamäki, Lintulaakso, Damuth, Janis, and Fortelius (2010) also performed HI comparison of Neogene mammals in global scale as precipitation indicator. As Feranec (2003, 2004) mentioned, hypsodonty may make grazing possible, but it does not unequivocally mean the animal was a grazer because hypsodonty tells little about floral species that were eaten. Ozaki et al. (2007) inferred the effect of grazing as selective pressure which brings out adaptive changes of molar size and teeth crown height by using extant deer with known diet.

Microwear analysis is one of the studies of the wear patterns left on teeth surface by food. This analysis focused on “scratch” and “pit” left on teeth enamel. Although traditional microwear analysis have examined tooth surface at high magnification using scanning electron microscope (SEM), Solounias and Semprebon (2002) have introduced simplified methodology at low magnification (35×). They have revealed the trend that grazers have more scratches than browsers while browsers show more pits than grazers in extant species. These results were consisted to previous study for primates (Teaford and Walker 1984, Teaford 1988). Hayek et al. (1992) suggested “Hipparion” horses have elastic dietary trait including browsing. Solounias and Hayek (1993) proposed a mathematic standard for counting “pit” and “scratch”. Merceron et al. (2004) inferred the Late Miocene paleoenvironment of Afghanistan as evergreen woodland based on dental microwear results in artiodactyls. Schubert et al. (2006) discussed Plio–Pleistocene bovid diets from Makapansgat Limeworks Cave, South Africa, based on microwear evidence. Rodrigues et al. (2009) provide microwear dataset of extant Muridae (Rodentia, Mammalia). Semprebon et al. (2011) inferred chalicotheres (Perissodactyla, Chalicotherioidea) as potential bark and fruit browsers by microwear analysis. Calandra et al. (2012) examined the relationships between proportion of hard dietary items (e.g., fruits, seeds) in diet and micro texture of teeth enamel surface. Micro structures of teeth surface also provide important information about teeth wear. Walker (1984) investigated mechanism of horning in the male baboon canine by SEM observation of prism structure on teeth enamel surface.

The dietary interpretation based on microscopically visible details (microwear) has also limitation. The method is essentially based on the assumption that the last food animals fed on just before the death, which will change in a few days, reflects their typical diet. This limitation of microwear analysis should not be ignored when one perform the method to fossil specimen. Furthermore, there has been no mention of age-related changes (i.e., how molar wear facets change during the progression from light to heavy wear) which cause of these microwear characters (i.e., tooth-tooth contacts, or only tooth-food contact?) and variations in same tooth and teeth position (Teaford 1988). In addition, the method needs well preserved teeth specimens to perform reliable analysis. Furthermore, microwear data scoring is time consuming and laborious.

Carbon stable isotope analysis of tooth enamel has also been used to determine the dietary categories or terrestrial climatic conditions. This method is based on the fact that carbon isotopic ratio (^{13}C/ ^{12}C) of plants composition differs to photosynthetic pathway. The carbon isotope ratio ($\delta^{13}C$) is represented as the parts per thousand differences between the sample and a standard, the Pedee belemnite from South Carolina (Craig 1957). C_3 plants fix CO_2 by the action of the enzyme ribulose bisphosphate carboxylase. This group includes many trees, shrubs and dicot. On the other hands, C_4 plants take up CO_2 through carboxylation of phosphoenolpyruvate. The most grasses are mainly consisted of C_4 plants. C_3 plants have $\delta^{13}C$ values of approximately -28 ‰, while C_4 plants are approximately -14 ‰ (O'Leary 1988). Crassulacean acid metabolism (CAM) plants absorb CO_2 to synthesize malic acid in a process similar to that of C_4 plants at night. Most often $\delta^{13}C$ values for CAM plants are in the range -10 to -20 ‰, which enable to distinguish them from C_3 plants, but not C_4 plants (O'Leary 1988). However, paleoecological studies at temperate or subtropical paleoenvironments (e.g. Cerling et al. 2004; MacFadden and Higgins 2004) usually have not been considered. The $\delta^{13}C$ values of extant grazers, generally feed on C_4 grasses, show a range of 0 ‰ to +4 ‰, whereas extant browsers, feed on leaves of C_3 shrubs and trees, fall in a range of -21 ‰ to -8 ‰ (Cerling and Harris 1999). Care should be taken that during the 19th and 20th centuries, $\delta^{13}C$ slowly decreased anti parallel to the CO_2 concentration trend (Friedli et al. 1986).

The $^{18}O/^{16}O$ ratio ($\delta^{18}O$) of plant cellulose also reflects climatic temperature. The $\delta^{18}O$ values of meteoric water is enriched during periods of warm weather and depleted during periods of cool weather (McCrea (1950). For obligate drinkers, tooth enamel can reflect the $\delta^{18}O$ values of meteoric water. The $\delta^{18}O$ values of precipitation are controlled by temperature (Dansgaard 1964). The $\delta^{18}O$ of water in plants is influenced by temperature and humidity. There is a liner correlation between the $H_2\,^{18}O$ enrichment in the leaves and the relative humidity as well as with the air temperature (Dongmann et al. 1974). The ^{18}O of the cellulose in terrestrial plants would be sensitive to climates because two-thirds of the cellulose oxygen comes from the dissolved CO_2 whereas one-thirds originates from the oxygen of the water. The temperature is coefficient for this fractionation (Epstein et al. 1977). The leaves of terrestrial plants contain water enriched in ^{18}O compared to the soil water and to precipitation (Förstel 1978). Luz et al. (1984) examined fractionation of $\delta^{18}O$ between mammalian bone-phosphate and environmental drinking water as environmental indicator. The $\delta^{18}O$ of mammalian bone-phosphate varies linearly with that of environmental water. Species whose water consumption is large relatively to its energy expenditure is sensitive to isotopic ration change. Luz and Koloduy (1989) reported that animals which obtain a large part of their water supply from eating leaves would reflect the combined effects of changes in precipitation and relative humidity. The metabolic rate of the mammal can influence the $\delta^{18}O$ values recorded in the enamel (Zhow and Zheng 2002). Wang and Cerling (1994) suggested that $\delta^{13}C$ were much more resistant to diagenetic modification than $\delta^{18}O$ values. For some mammal species, the $\delta^{18}O$ of body water is normally more positive than the $\delta^{18}O$ of ingested water (Longinelli 1984). Kohn (1996) argued animal with different physiologies and diets tracked climate differently. Kohn et al. (1996) reported that diet and physiology have a strong control on animal isotope composition. The compositions of oxygen isotope of water–dependent animals (e.g. zebra) and not (e.g., gazelle) might discriminate water composition changes from humidity effect. Kohn et al. (1998) concluded seasonality rather than development physiology as most likely explanation for compositional differences in the $\delta^{18}O$ of herbivore teeth in the same jaw and within a single tooth. The same tooth can differ by difference in time in the formation of enamel within a single tooth (Bryant et al. 1996a, b). In general, high value of the $\delta^{18}O$ recognized as summer indicator (Fricke and O'Neil 1996). Higgins and MacFadden (2004) pointed out the "Amount Effect". When environmental temperatures rise above approximately 20℃ and there is significant precipitation and / or high humidity, ^{18}O abundance in meteoric water decreases. The $\delta^{18}O$ value of plant water is similar to that of surface water, except for water in leaves, which is $\delta^{18}O$-enriched by evapotranspiration. The enrichment is greatest under hot, dry conditions (Koch 1998). Tütken et al. (2011) attempted rare earth elements (Nd and Sr) isotope to be proxies for vertebrate provenance and taphonomy.

The teeth enamel has been thought to be more resistant to alternation than bone. Because of its highly porous structure, the remaining mineralized bone is prone to diagenetic alteration of the original chemical composition (Newesely 1989; Quade et al. 1992; MacFadden and Cerling 1996). Therefore, stable isotopic analysis usually determined the teeth enamel of extant and extinct ungulates.

MacFadden et al. (1999) studied equids habited in sympatrically. Isotope and microwear analysis reconstructed two of them as browser though all of them had high teeth crown. Zin-Maung-Maung-Thein et al. (2011) analyzed stable isotope of the tooth enamel of Chaingzauk mammalian fauna (late Neogene, Myanmar). They concluded co-occurrence of C3 browser and C4 Grazer. Uno et al. (2011) performed isotopic analysis the Late Miocene hominids sites Nakali and Samburu Hills. They are the only known East African hominids between 11 and 9 Ma. Their result suggested the existence of vegetational difference between the two hominids localities.

It is important to recognize that this method is based on two assumptions: 1) the metabolic pathway of plants does not change through time; 2) the metabolic pathway of ungulates is also unchanged through time. In other words, the isotopic ratio reflects just the record of nutritional condition when teeth enamel has developed. In addition, Cerling et al. (2004) showed isotopic ration can be changed in same vegetational habit correlated to ecological niche partitioning by stable isotope ecological study in the Ituri Forest, Congo. These differences of isotopic ratios in plants are reflected to herbivores tissues (Ayliffe et al. 2004). Furthermore, this method is relatively expensive.

Mesowear analysis was introduced by Fortelius and Solounias (2000) in order to analyze large number of specimens stored in museum. The unworn teeth morphology as hypsodonty has been recognized as reflection of long term adaptation. On the other hands, microwear analysis is other extreme which provide the information of last meals of an individual. Fortelius and Solounias termed their new methodology “mesowear” as it was the intermediate level in many ways. The method is based on facet development on the occlusal surfaces of cheek teeth. There are two factors for dental wear: attrition and abrasion. Attrition is a contact of tooth to tooth, and abrasion is a contact of tooth to food. The former wear will dominate when the cutting edges of molars can push all the way through relatively soft food item such as tree leaves; conversely, the latter wear will dominate when food items are tougher (i.e. fibrous forages). Their study demonstrated that the shape of buccal cusps (either paracone or metacone) and the height of these cusps generally reflect average lifelong diet of extant ungulates (Fig 1-3). Therefore, mesowear analysis has been mainly applied to reconstructions for the paleodiet of extinct species or of whole paleoecology. Louys et al. (2011) proposed new dataset of extant 33 antelopes for dietary reference.

Semprebon et al. (2004) investigated the diets of the Dromomerycidae (Mammalia: Artiodactyla) and their response to Miocene vegetational change.

Mesowear and microwear evaluated the diet of an extinct giraffid (*Sivatherium hendeyi*) (Mammalia, Giraffidae, Sivatheriinae) from Langebaanweg, the Early Pliocene South Africa, as a mixed feeder (Franz-Odendaal and Solounias 2004). Rivals and Semprebon (2006) compared the dietary habits of the Pleistocene pronghorn *Stockoceros onusrosagris* from the Papago Springs Cave in Arizona to the modern *Antilocapra americana* by mesowear and microwear. They showed that in spite of hypsodont can be reconstructed as browser. Merceron et al. (2007) performed mesowear and microwear analyses to the Late Miocene large herbivorous mammals from Rudabánya (Hungary) to investigate the paleoenvironment of *Dryopithecus brancoi*.

Schulz, Fahlke, Merceron, and Kaiser (2007) and Schulz and Fahlke (2009) applied mesowear to infer paleodiet of the Chalicotheriidae. Their results suggested that this extinct Perissodactyla had more abrasive diet, which inconsistent with previous leaf eater hypothesis. Mesowear also reconstructed *Anchitherium aurelianense* as a mixed feeder, which turned over conventional hypothesis of brachydont as a indicator of browsing diet (Kaiser 2009). Valli and Palombo (2008) performed to mesowear and microwear analysis to two fossil deer from the Upper Pliocene site of Saint-Vallier (France). Mesowear classified both species as mixed feeders whereas microwear as browser and mixed feeder. Croft and Weinstein (2008) applied the mesowear method to endemic South American ungulates (Notoungulata). Rivals et al. (2008) inferred climatic transition by mesowear. Stynder (2009) compared extant and fossil specimens of same species by mesowear to test taxonomic analogy of diet. Joomum et al. (2008, 2010) showed dietary transition of *Plagiolophus minor* (Mammalia: Perissodactyla) by change in dental wear from browser to more abrasive diet in the Eocene-Oligocene. Based on teeth crown height, microwear, and mesowear analysis, DeMiguel et al. (2008, 2010) reported the feeding state of the earliest deer, *Procervulus ginsburgi* from the Early Miocene (16.51Ma), as a mixed feeder. Mesowear also provided information about the Pliocene habit of *Ardipithecus ramidus* (White et al. 2009). Semprebon and Rivals (2010) used mesowear to detect the trends of paleodietary habits of fossil camels from the Tertiary and Quaternary of North America. Faith (2011) also employed mesowear analysis to examine the long-term dietary shifts (Pleistocene-Holocene) of the Cape grysbok (*Raphicerus melanotis*) in southern Africa. Rivals et al. (2010) reconstructed palaeoecology of the Mammoth Steppe fauna from the late Pleistocene of the North Sea and Alaska on the point of separating species preferences from geographic influence. DeMiguel et al. (2011) pointed out probability of seasonal feeding segregation of the Middle Miocene bovids and Cervids from central Spain based on their mesowear difference. Marder et al. (2011) investigated deer and gazelle of

Middle–Late Pleistocene (140Ka) to discuss human subsistence and ecology in the Southern Levant. Bravo-Cuevas et al. (2011) inferred dietary behavior of *Equus convesidens* from the late Pleistocene of Hidalgo, central Mexico based on mesowear and crown height. Stynder (2011) deduced a scarcity of grass in the Langebaanweg E Quarry (South Africa) late Miocene/early Pliocene environment based on fossil bovid diets. Bernor et al. (2011) described sytematics and paleobiology of *Hippotherium malpassii* n. sp. (Equidae, Mammalia) from the latest Miocene of Baccinello V3 (Tuscany, Italy) as a grazer by mesowear. Faith et al. (2011) also reviewed taxonomic status and *Rusingoryx atopocranion* (Mammalia, Artiodactyla) from the Pleistocene Rusinga Island, Kenya, and evaluated its paleoecology and dietary habitat suing by mesowear analysis. Rivals, Gardeisen, and Cantuel (2011) investigated domestic and wild ungulate dietary trait by mesowear analysis. Rivals, Solounias, and Schaller (2011) compared mesowear results of Mongolian gazelles and Tibetan antelopes from steppe habitats with known diet. Fraser and Theodor (2011) compared several dietary proxies and concluded that HI, microwear, and mesowear analysis as more reliable methods. Bravo-Cuevas et al. (2012) applied mesowear to *Hemiauchenia gracilis* (Camelidae) from the Late Pleistocene of Hidalgo, central Mexico. They reconstructed *H. gracilis* as a mainly browser. DeMiguel et al. (2012) examined dietary competition for vegetal resources in two Early Miocene pecoran ruminants from Central Spain by mesowear. Rivals and Semprebon (2012) compared four fossil communities by mesowear to reconstruct paleoenvironments of the late Pleistocene and early Holocene paleoenvironments in the northeastern and southwestern America. Louys et al. (2012) implied correlation of stable isotope and mesowear results in the specimen by specimen level. Fraser and Theodor (2013) compared mesowear characters of ungulates from the late Miocene Texas and Nebraska (6.5-7.5Ma) to reveal patterns of grassland evolution in North America. Based on comprehensive dietary reconstruction of extant Equidae, Schulz and Kaiser (2013) concluded that mesowear results should be interpreted as reflection of dietary trait, not local climatic conditions (e. g., mean annual precipitation, temperature). Kaiser et al. (2013) compared teeth crown height, mesowear to quantitative dietary data (% of grass in diet) and habitat (open, closed, or intermediate) in herbivorous ungulates. Clauss, Franz-Odendaal, Brasch, Castell, and Kaiser. (2007) and Kaiser et al. (2009) performed mesowear to captive ungulates to investigated the relationships beween abnormal teeth wear and their forages.

Fraser and Theodor (2010) tested the use of gross dental wear in dietary studies of extinct Lagomorphs. Hernesneimi et al. (2011) applied mesowear analysis to lower teeth of Rhinoceros by 3D methods and observation with naked eye. Kaiser et al. (2010)

reported that there is no significant difference of examined enamel ridge alignment in upper molars of ruminants in relation to their natural diet. Eronen, Evans, Fortelius, and Jarnvall (2010) tried to evaluate the mean slope of cusps on the buccal side (i.e., paracone, metacone) and lateral side (i.e., protocone, hypocone) for dietary reconstruction by 3D image analysis. They reported the dietary variation of *Anchitherium*, although Salsa et al. (2011) criticized the lack of geographic and stratigraphic range factor of specimens. Teeth wear character is also used to functional reconstruction (e.g., jaw movement) beyond mammalian species. Sereno et al. (2010) applied striation on the wear facets angle to discuss the power stroke during occlusion of a new dinosaur from Inner Mongolia *Psittacosaurus gobiensis*.

The robustness of mesowear analysis has been confirmed by blind test study that showed there are no significant differences in scoring of mesowear variables between several observers (Kaiser et al. 2000). Recently, mesowear “ruler” was proposed for improvement data scoring (Mihlbachler et al. 2011). Rivals, Mihlbachler and Solounias (2007) tested ontogenic stability of mesowear characters by extant ungulates. They recommended that any dietary interpretation of brachydont species using mesowear be examined in conjunction with some form of population age-structure analysis. Kaiser and Croitor (2004) implied that mesowear signal can be different by species though they have same diet because of mastication mechanism or teeth morphology. Rivals and Athanassiou (2008) investigated dietary adaptations of in an ungulate community from the late Pliocene of Greece. They suggested mesowear characters should be interpreted as food abrasiveness, not as dietary category.

Problems of Mesowear Analysis

1. Lack of basically knowledge from extant ungulates

Kahlke and Kaiser (2011) tried to examine intraspecific feeding variation by using mesowear results of several populations of Pleistocene *Stephanorhinus hundsheimensis* (Rhinocerotidae, Mammalia), though they had no empirical data from extant ungulates. Rivals (2012) also analyzed dietary trait of two middle Pleistocene ungulate communities at Hundsheim and Deutsch-Altenburg 1 (eastern Austria). Kaiser and Schulz (2006) preliminary reported tooth wear gradient in extant zebras as an environmental proxy. Schulz et al. (2007) attempted to detect dietary resource partitioning of two wild ranging Asiatic equid populations by mesowear. However, the lacks of dietary data for each population prevent to discuss the reliability and limitation of their results. Especially, previous mesowear study lack the view of the point that dietary segregation of same species (habitat or sexual difference) or several species in sympatric environment (e.g, Kaiser and Franz-Odendaal 2004; Franz-Odendaal et al. 2003; Kaiser 2003; Kaiser et al. 2003; Kaiser and Rössner 2007; Rivals, Solounias and Mihlbachler 2007; Rivals et al. 2009; Rivals 2012). For more reliable interpretation, it is necessary to score mesowear data from extant ungulates with known diet.

2. Improvement of methodology

Original mesowear method has used only upper second molar (M2) and demanded at least 20 specimens for reliable classification. This restriction would be good for a large number of specimens. However, fossil records are usually uncompleted, and mesowear methods restricted only for M2 can be applied to few populations in actual fossil study. For example, though the Dinotheriensande (Germany, Vallesian, MN9) is one of the largest hipparion assemblages in Europe, number of M2 specimens is only 22 (Kaiser and Solounias 2003). Therefore, as Kaiser and Solounias claimed, it is necessary to extend original method to additional teeth position as most of other fossil assemblages for reliable reconstruction. Besides the limitation of the number of analyzable specimens, it is difficult to identify M2 from other molar. For Equids, therefore, "Teeth Expanded Models" were proposed by Kaiser and Solounias (2003) and Kaiser and Fortelius (2003) for upper and lower cheek teeth. For selenodont forms, Franz-Odendaal and Kaiser (2003) reported upper third molar (M3) was useful for mesowear analysis whereas lower cheek teeth were not for use. Application of lower cheek teeth for mesowear analysis (Expanded Teeth Model) is important to make this method to be a more useful tool for paleontlogists. Especially, application for M3 will valuable because it is easy to identify.

The Japanese ungulates for mesowear study

Sika deer (*Cervus nippon*, Cervidae)

Sika deer broadly distributes from cool-temperate zone to subtropical zone of East Asia (Fig 1-4). The deer inhabit from boreal forest (Hokkaido Island) to subtropical rain forest (the Kerama Islands) in Japan archipelago (Fig 1-5A). They have very large geographic variation. Based on morphological traits, Ohtaishi (1986) has classified the Japanese Sika deer into six subspecies; *C.n.yesoensis*, *C.n.centralis*, *C.n.nippon, C.n.mageshimae*, *C.n.yakushimae*, and *C.n.keramae*. The deer in Tsushima Islands was once classified as distinct species "*C. pulchellus*" (Imaizumi 1970). However, molecular phylogenetic analyzes have suggested that the mitochondrial DNA (mtDNA) divergence of them remained at the subspecies level (Tamate and Tsuchiya 1995; Nagata et al.

1995). The Nikko population clearly showed sexual dimorphism; average body size of stag is over 1.5 times bigger than those of doe (Koganezawa et al. 1986).

Food habit of Japanese Sika deer also shows several variations. Direct observations, ingesta or faecal analysis have well documented the feeding ecology of them (reviewed in Takatsuki 2006). Cervidae has generally been recognized as mixed feeder to browser. Anatomical studies have showed that digestive organs of Cervidae have more browser-like features than those of Bovidae (Hofmann 1985). However, the food composition of the Japanese Sika deer is typical to their local habitats. Deciduous broad-leaved forest dominates in Hokkaido and eastern Honshu Island, whereas evergreen broad-leaved forest of western and south Japan. In Japan, the dwarf bamboo (e.g. *Sasa nipponica*) is dominant in the deciduous broad-leaved forest floor. These graminoids (general term of Gramineae, Cyperaceae, and Juncaceae) are thought to be an important food for deer (Takatsuki. 1980, 1989). In fact, the deer in Hokkaido (Kaji 1988; Yokoyama et al. 2000; Campos-Arceiz and Takatsuki 2005), the Mt. Goyo (Takatsuki 1986; Takatsuki and Ikeda 1993), the Kinkazan Island (Padmalal and Takatsuki 1994), and Nikko (Takatsuki 1983) mainly rely on graminoids. Takatsuki and Asahi (1978) analyzed fecal of the deer habit in open grassland of the Nara Park, central Japan and reported they show grazing diet. Ohtaishi (1975) reported that teeth wear speed of the population was faster than other wild population. Miura (1983) described grouping behaviour of them. In Boso Peninsula, the deer mainly rely on feed tree leaves addition to monocots (Ochiai 1995; Asada and Ochiai 1996). The deer in evergreen forest of Wakayama prefecture also show browsing diet (Takatsuki et al. 2011). Jayasekara and Takatsuki (2000) reported the deer in the warm temperature forest (Toyoda area in Yamaguchi Prefecture, Japan) relied on graminoids less than 20% in mean annual diet. In the Kyushu Island of Japan is covered mainly evergreen broad-leaved forest. In the habitat, the deer behave as browsers (Ikeda et al. 2002). The Tsushima Islands population is recognized as typical browsers (Takatsuki 1988; Suda 1997). In the Yakushima Island, the deer primarily feed on tree leaves in most areas (Takatsuki 1990; Agetsuma et al. 2011). In addition, dietary compositions of sika deer show seasonal variation. Kitamura et al. (2010) reported altitudinal variation in diet correlated to vegetation on the Izu Peninsula. Shimane Prefectural Government (2002) also reported seasonal variation from browsing to grazing diet of the deer. Agetsuma et al. (2011) therefore have pointed out that sika deer can switch their food habit based on the surrounding food environment, even in the same subspecies. Intraspecific variation of diet is known in other ungulates. Moehlman (1998a, b) reported the browsing diet in feral asses (*Equus africanus*).

Japanese Serow (*Capricornis crisps*, Bovidae)

Japanese serow are typical browser (Chiba 1968; Suzuki et al. 1978; Doi et al. 1984; Takatsuki and Suzuki 1984, 1985; Takatsuki et al. 1988; Takatsuki et al. 1995; Ochiai 1999; Jiang et al. 2008). Japanese serow showed little sexual dimorphism (Miura 1986b).They also show no sexual segregation in diet (Suzuki and Takatsuki 1986) and teeth wear rate (Miura and Yasui 1985), whereas Ohtaishi (1980) suggested that stag teeth worn out faster than doe in sika deer.

Sika deer inhabit a wide variety of habitats and gregarious（Miura 1986a） whereas Japanese serow are territorial and solitary in forest habitat (Akasaka and Maruyama 1977; Sakurai 1981; Ochiai 1983a, b; Kishimoto and Kawamich 1996; Ochiai and Susaki 2002; Ochiai et al. 2010). In general, these two species are not sympatric in most of Japan (Fig 1-6). The Japanese serow lives in higher mountains, whereas sika deer usually inhabit mountains and lowlands and tend to prefer flat habitats (Takatsuki et al. 2010). However, in Nikko National Park (NP, central Japan), previous ecological studies have shown that these two ungulates exist almost sympatrically despite having contrasting food habits. As Nowicki and Koganezawa (2001) described, the park is a mountainous area with many peaks over 2000 m (the highest is 2578 m) in elevation. The timberline is 2400 to 2500 m in elevation. The areas above 1500 to 1600 m in elevation are covered by sub-alpine coniferous forests. Broad leaved forests grow below 1600 m in elevation. In many areas, natural forests have been replaced by plantations of Japanese cedar (*Cryptomeria japonica*) up to 1800 m in elevation (Nowicki and Koganezawa 2001; Takatsuki 1983). The mean annual precipitation at Nikko Weather Station (1292 m in elevation) in the southern part of the park is 2230 mm (Nowicki and Koganezawa 2001). In the Nikko NP, the serow is also territorial and solitary. In contrast, sika deer are not territorial, occur in herds. However, distribution of the two ungulates overlapped (Koganezawa 1986, Maruyama 1986). The deer scatter widely over the mountains in summer, while they concentrate in mid-winter (Takatsuki 1983). Their food habits are also contrastive. Japanese serow feed on the leaves of deciduous trees and herbaceous shrubs during the summer, while in winter they feed mainly on the needle of coniferous trees (Koganezawa 1999). In contrast, graminoids (i.e., Gramineae, Cyperaceae and Juncaceae), which dominates the forest floor, is an important food for sika deer (Takatsuki 1983). Koganezawa (1999) suggested that there was overlap on the diet of the two species in winter although Japanese serow rarely fed on graminoids whereas sika deer consumed them at a high rate throughout the year. Nowicki and Koganezawa (2002) also reported there was no evidence of food competition between them. Therefore, the deer and serow in Japan are precious material to test the reliability and limitation of mesowear analysis in sympatric fossil assemblages.

Mesowear of Maragheh ungulates

Grassland comprise about one-third of the Earth's vegetation (Jacobs et al. 1999). Many paleoecological studies have focused on evolutional history of the glass-dominated ecosystems (e.g. Webb 1977; Solounias et al. 1999; Strönberg et al. 2007). De Vos (1969) and McNaughton (1984) focused on the relationships between grassland vegetation and grazing of herbivore ungulates. There is huge number of paleoecological study about Paratethys region. The theme of them is mainly attributed as following question; which vegetation was most likely to in the late Miocene Paratethys, savanna or forest? Abel (1927) referred recent savanna as late Miocene Pikermian Biome based on large mammalian fauna trend. Kurtén (1952) pointed out the possibility of the boundary between Samos and Pikermi being of a similar nature. The Pikermi and Western European fauna was characterized by a great number of brachydont whereas Maragheh and Samos were dominated by hypsodont. Based on HI comparison of the Pikermian fauna as precipitation indicator, Eronen et al. (2009) concluded that the late Miocene Maragheh was dry, openland habitat. Jafarzadeh et al. (2012) reconstructed ecology of *Urmiatherium polaki* (Bovidae, Mammalia) from Maragheh as grazer. Microwear result of Solounias and Hayek (1993) suggested dietary transitional trend from browsing in Pikermi (older) to grazing in Samos. Some of contradictions made the situation confusing. The two ungulates *Pachytragus crassicornis* and *Pachytragus laticeps* from Samos were recognised as grazers by microwear analysis Solounias and Moelleken (1992) whereas mesowear classified them as mixed feeders (Fortelius and Solounias 2000). Teeth enamel isotope analysis suggested that global vegetation change from C3 to C4 plants through the Miocene/Pliocene boundary (Cerling et al. (1997). Deng (2005) reported *Iranotherium morgani* from the Late Miocene of the Linxia Basin in Gansu, China. Judging from faunal comparison, the upper Miocene Linshu Formation is correlated to the late Vallesian Age of Europe. Previously, this species was discovered only from Iran, including Maragheh. A pollen analysis of the red clay of the Linshu Formation indicated grass expansion. Stable isotope analysis of paleosol and teeth enamel imply that a savanna dominated by C4 plants did not exist in the late Miocene China and Greece whereas these localities had few faunal similarity at the species level during the entire late Miocene (Deng 2006).

On the other hands, more forested hypothesis is also argued. Based on paleodietary comparison of ungulates between the Late Miocene of China, Pikermi, and Samos indicated the Pikermian Biome was closed habitat, Solounias et al. (2013) claimed different from recent African savanna. Solounias et al. (1999) reviewed paleoecological studies of the Late Miocene Pikermi as woodland habitat. Isotope analysis of paleosol and teeth enamel suggested the existence of C3 dominant habitat from the late middle to late Miocene (Agusti et al. 1999); botany fossil data suggested subtropical condition; mammal mastication is not likely to extant savanna ones. Paleobotanical fossil records suggested there were little C4 plants in Mediterranean region trough Miocene (Strönberg et al. 2007). Axelrod (1975) inferred that forest and woodlands distribute along with edge of grassland in the Late Miocene in his review of Madrean–Tethyan sclerophyll vegetation. Mirzaie Ataabadi, Zaree, and Orak (2011) reported hipparion horses and *Deinotherium giganteum* from new late Miocene localities of northwestern Iran. They claimed lophodont and brachyodont molars of *Deinotherium* are signals of woodland or open forest habitat. Fortelius et al. (1996) analyzed land mammal faunas in the late Miocene of western Eurasia and inferred transition from closed to open, seasonal habitat. Quade et al. 1994 analyzed the carbon and oxygen isotopic composition of paleosol and fossil teeth from Chios, Pikermi, Samos, Rhodes in 11Ma. The results suggested that C3 plants have dominated the vegetation of the depositional basins over the past 11Ma. C4 plants have also been present, but always in setting dominated by C3 plants. Bernor et al. (2001) investigated biogeography and paleoecology of the *Oreopithecus bambolic* (late Miocene hominid primates) “Faunal Zone” based on hypsodonty and fauna resemblance of 15 fossil localities (e.g., Pikermi, Sahabi). As results, brachydont were predominated in early Turolian localities whereas the Pikermian fauna showed relatively high percentages of mesodont and hypsodont. They interpreted these results as habitat signals and inferred the paleohabitats of Central and Western European Vallesian and early Turolian interval forests with warm climates and low seasonality and the Pikermian fauna as humid woodland with adjacent open country. Faunal resemblance based on Simpson’s Index and Dice indicated the close relationships of *Oreopithecus* Zone fauna and Pikermi fauna. They concluded that these results supported the close phylogenetic relationship of *Dryopithecus* and *Oreopithecus*. Solounias et al. （2010）interpreted late Miocene of Greece as forest with openland like recent India based on microwear results for herbivores from Pikermi and Samos. They reconstructed most of bovids as mixed feeders, hipparion horses as grazers. They also reported *Mesopithecus pentelici* (Primates) from Pikermi showed mixed fruits, leaf diet. Paleobotanical data of the Late

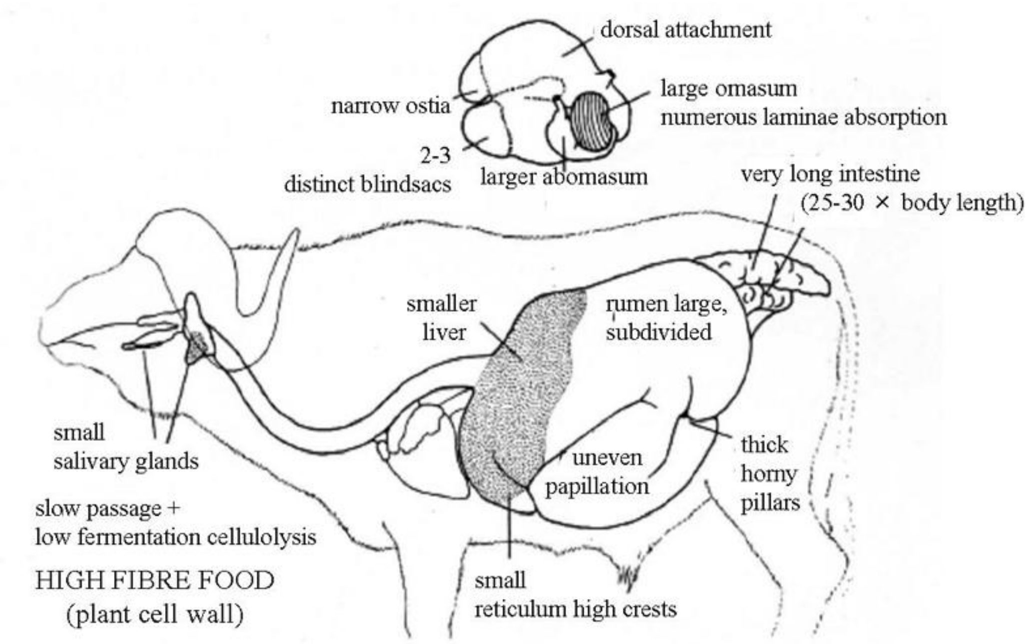
Miocene Europe showed and overall warm, humid, and homogenous climate with very low latitudinal and longitudinal gradient (Bruch et al. 2006, 2007). Rudabánya, Hungary, is also a rich late Miocene fossil locality including primate taxa. Paleohabitat of the area are thought to be a very wet, like subtropical forest (Bernor et al. 2003). Bibi and Savas Güleç (2008) reported five bovidae from the late Miocene of Sivas, Turkey. Paleoecology of the locality was thought to be shrubland to woodland.

The Maragheh, Northwest of Iran, is one of the late Miocene Pikermian fossil mammal localities. As Mirzaie Ataabadi et al. (2013) summarized, Maragheh was investigated from 19th century and yield many mammalian species including primates, *Mesopithecus*. Mecquenem (1911) reported *Mesopithecus* from Maragheh. Clavel et al. (2012) reconstructed *Mesopithecus* habitat by mesowear for ungulates from late Miocene fossil vertebrate localities of Bulgaria. The results indicated bovids as browsers to mixed feeders whereas equids as grazers. Colobine monkeys were also discovered in Irrawaddy. Stable isotope analysis for the tooth enamel of Chaingzauk mammalian fauna (late Neogene, Myanmar) suggested co-occurrence of C3 browser and C4 Grazer (Zin-Maung-Maung-Thein et al. 2011). Though *Mesopithecus* is thought to be the late Miocene to the Pleistocene arboreal, foliborous Cercopithecidae (colobine monkeys), Heintz et al. (1981) claimed that primate fossil from Maragheh should be another taxon, perhaps new and not be *Mesopithecus pentelicus.* He also pointed out the facts that no other *Mesopithecus* was reported from Maragheh and the specimen reported by Mecquenem (1911) has been lost. Lydekker (1886) showed list of Maragheh fossil specimens sent to the British Museum by Mr. R. Damon. Although these specimens were purchased and no excavated data, Maragheh Mammalia was a matter of considerable important in relation to west limit of the Siwalik fauna of India. He recognized the Maragheh deposit as the proof that the Pikermian fauna extended to the Middle East, where it came in contact with one member of the extreme western branch of the Siwalik fauna of India. Takai (1958) also reported vertebrate fossils from Maragheh. Davoudzadeh et al. (1997) summarized paleogeography, stratigraphy, and tectonics of the Tertian of Iran. Urmyyeh-Bazman volcanic belt of northwest of Iran (Maragheh) resulted from the collision of the Arabian and Iranian plates. Kamei et al. (1977) team named the fossiferous formation of Maragheh as the Maragheh Formation. Bernor et al. (1980) divided the Maragheh fauna into three intervals based on biochronology of hipparionine horses: 11-8.5 Ma for the lower, 8.5-8.0 for the middle, and 8-7.4 Ma for the upper level of the Maragheh Formation. Campbell et al. (1980) limit the Maragheh Formation about 300m. They also estimated ages of Maragheh biostratigraphical intervals as follow: ~9.5-8.5Ma for Lower Maragheh; 8.5-8.0 Ma for

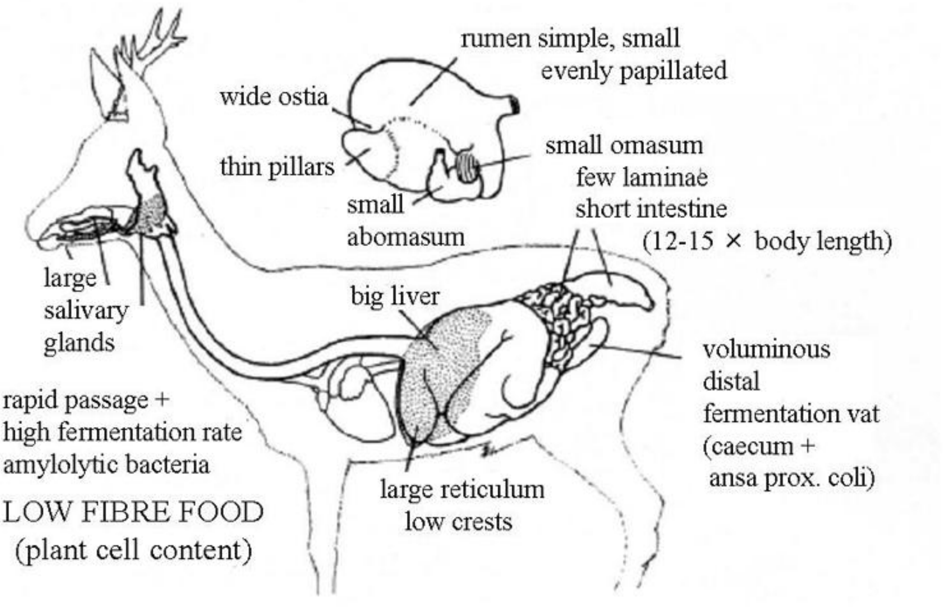
Middle Maragheh; 8.0 -7.5 Ma for Upper Maragheh (K/Ar and FT methods). These ages were slightly older than Kamei et al. (1977). The latest study reported 9-7.5Ma (Mirzaie Ataabadi et al. 2013). Kostopoulos et al. (2003) reported magnetostoratigraphy and revised chronology of the late Miocene mammal localities of Samos Island as 7.8-6.7 Ma (core: 7.2-6.9 Ma). The Samos Intermediately and Dominant Mammal Assemblages were 7.4 -6.9 Ma, and the lower fossil horizon was 7.8-7.4 Ma. Therefore, upper Samos is nearly same to lowest of Maragheh Formation.

Most of fossil specimens from Maragheh were without their locality or horizon data, which made difficult to study the Maragheh paleoenvironment. In fact, Kostopoulos and Bernor (2011) mentioned in their systematic revision of the Maragheh bovids that there is no precise stratigraphic data for the Paris samples collected by R. de Mecquenum. In 1973, the Kyoto University and Geological Survey of Iran (GSI) joint team excavated a lot of large mammal (Kamei et al. 1977). They are exceptional collection on the point of their detailed records of geology and taphonomy of fossil sites. Small mammals, which were valuable as indicator of local environment, have been reported only *Hystricidae* (Mirzaie Ataabadi et al. 2013) and plant fossil (e.g., pollen) have not been reported in Maragheh. Therefore, large herbivorous mammals are important resources of the Late Miocene Maragheh vegetation.

This thesis mainly comprises to test the reliability, application and limitation of mesowear analysis by using extant ungulates with known food habits. This study also investigated paleoecology of the Late Miocene large mammalian fauna of Maragheh, Northwest Iran, by mesowear analysis based on the extant knowledge.



A



B

Fig. 1-1. Digestive organs of ungulates. A: grass and roughage eater (GR) and B: concentrate selector (CS). Modified from Hofmann 1985).

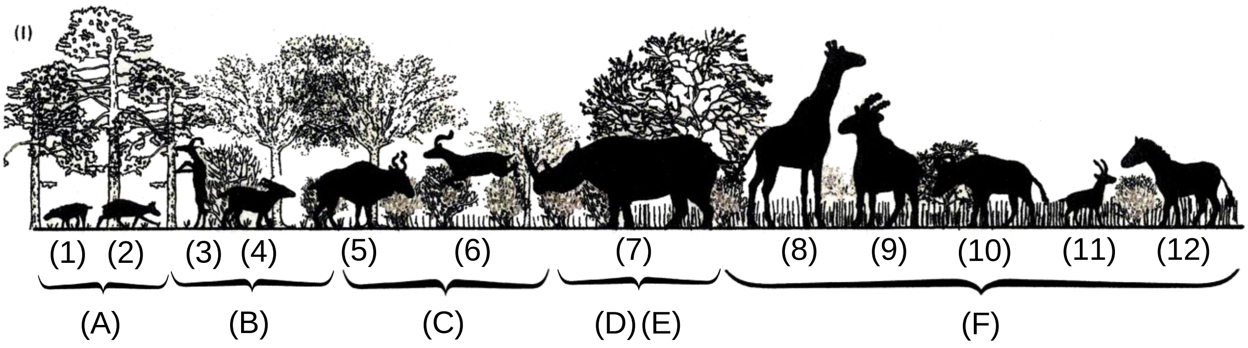


Fig. 1-2. Savanna faunas (Recent, East Africa). Modified from Janis (1982).

Habitat types and associated fauna.

(A) Forest. Small selective browsers, non-dimorphic･ Jarman‘s (1974) feeding category A; (B) Closed canopy woodland. Small to medium-sized browsers. Ruminants territorial, males with horns, Jarman‘s (1974) feeding Category B; (C) open canopy woodland. Medium-Sized browsers/mixed feeders. Ruminants seasonally territorial, males with elaborate horns. Jarman‘s (1974) feeding category C; (D) Woodland-Savanna Grade I. Medium- to large-sized browsers. Ruminants herd-forming, non-territorial, non-dimorphic; (E) Woodland-Savanna Grade 2. Medium- to large-sized browsers and mixed feeders. Ruminants herd- or harem-forming, non-territorial, non-dimorphic; (F) Open savanna. Medium- to large-sized grazers, mixed feeders and high-level browsers. Ruminants usually isomorphic, and herd-forming. Jarman‘s (1974) feeding Categories D and E.

Animals

(1) *Hyemoschus aquaticus* (water chevrotain). (2) *Cephalophus nigrifrons* (duiker). (3) *Litocranius walleri* (gerenuk). (4) *Tragelaphus scriptus* (bushbuck). (5) *Tragelaphus strepsiceros* (greater kudu). (6) *Aepyceros melampus* (Impala). (7) *Diceros bicornis* (black rhino). (8) *Giraffa camelopardalis* (giraffe). (9) *Taurotragus oryx* (eland). (10) *Connochaetes taurinus* (wildebeest). (11) *Gazella granti* (Grant's gazelle). (12) *Equus burchelli* (Burchell's zebra).

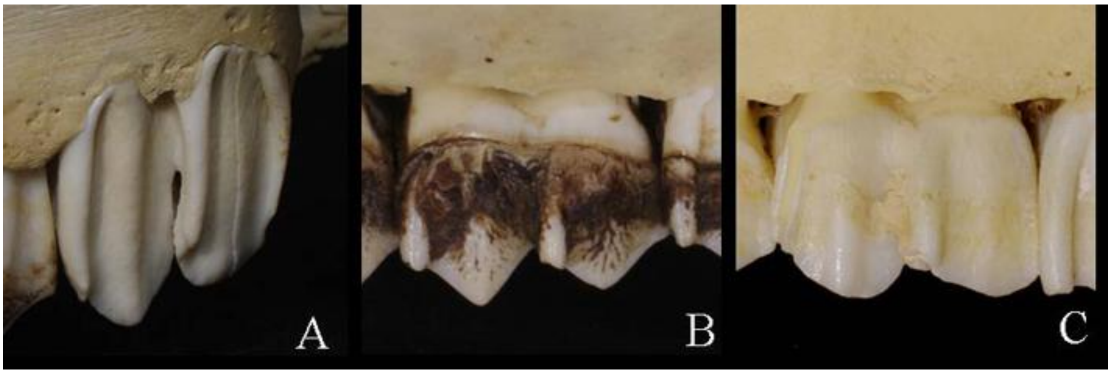


Fig. 1-3. Diet and molar wear of extant *Cervus nippon*. A. unworn upper M3. B, upper M2 of browsing population (5yrs), C, upper M2 of grazing population (5yrs).

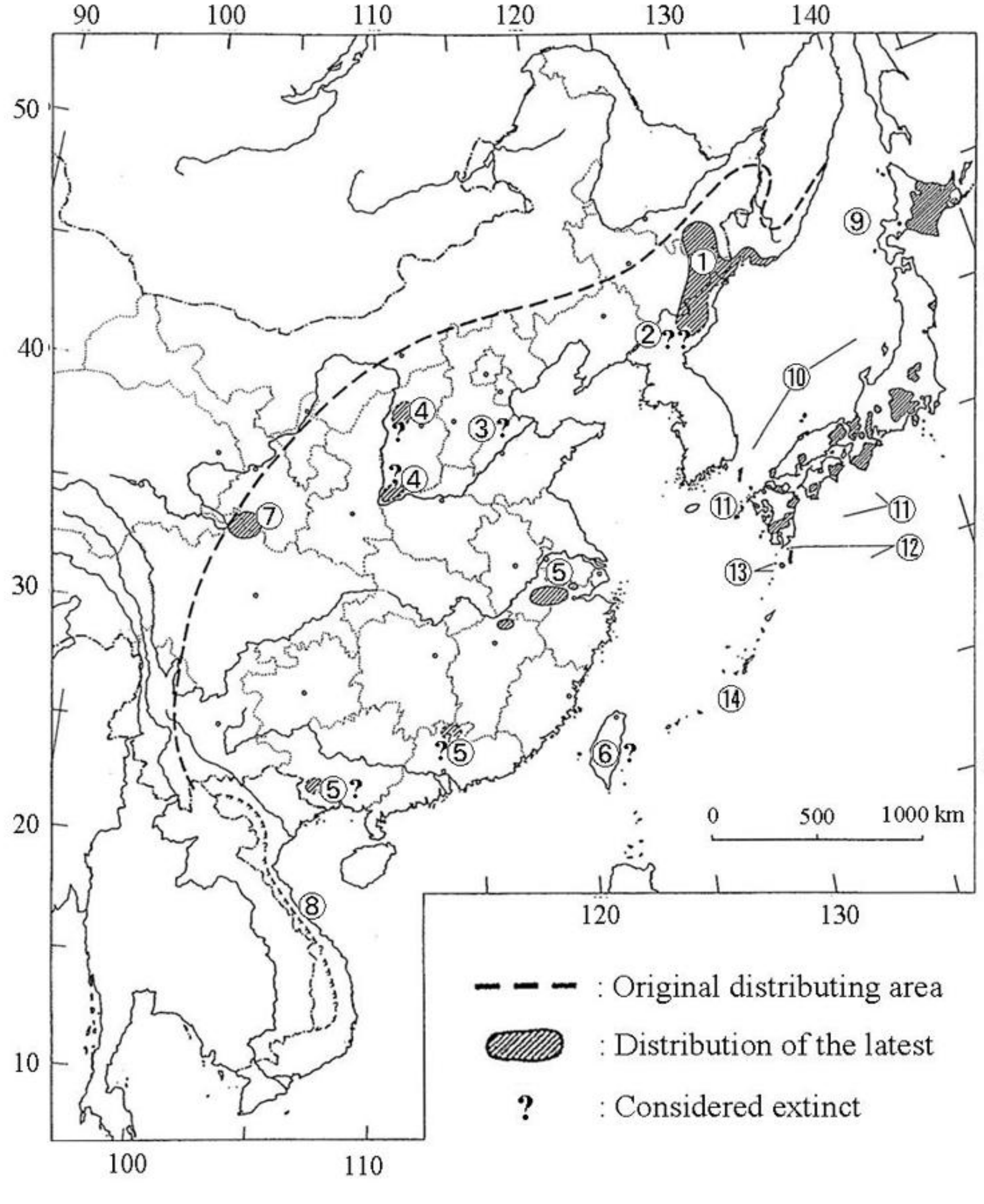


Fig. 1-4. Distribution map of *Cervus nippon* in east Asia.
Abbreviation: ① *C.n.hortulorum* ② *C.n.manchurius* ③ *C.n.mandarius* *C.n.grassianus* ⑤ *C.n.kopschi* ⑥ *C.n.taiouanus* ⑦ *C.n.sichuanicus* ⑧ *C.n.pseudaxis* ⑨ *C.n.yesoensis* ⑩ *C.n.centralis* ⑪ *C.n.nippon* ⑫ *C.n.mageshimae* ⑬ *C.n.yakushimae* ⑭ *C.n.keramae*.
(modified from Ohtaishi 1986)

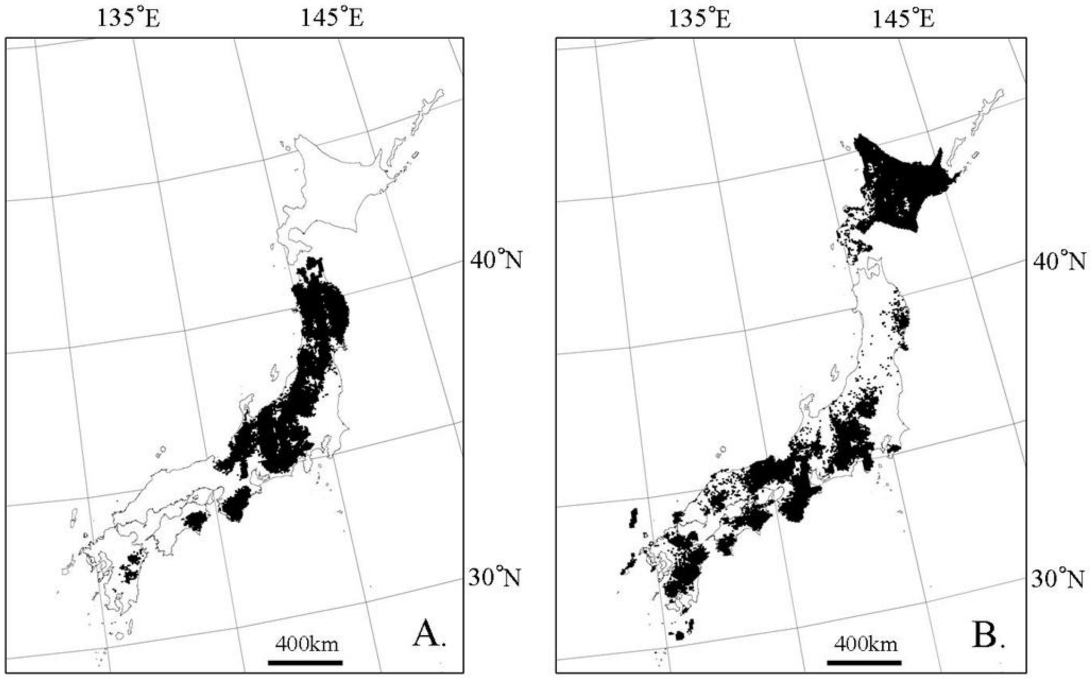


Fig. 1-5. Distribution map of two extant ungulates in Japan. A: *Capricornis crisps*, B: *Cervus nippon*. (showed as black, 1978-2003). (modified from Biodiversity Center of Japan 2004)

CHAPTER 2
MATERIALS AND METHODS

Extant ungulates of Japan.

This study analyzed four wild populations of *Cervus nippon* and one of *Capricornis crispus* (Fig. 2-1). Skull or teeth specimens of them were stored in the Tochigi Prefectural Museum, the Hokkaido University Museum, and the University Museum, the University of Tokyo. This study referred dietary data from rumen contents or faecal analyses of each population.

Maragheh fossil ungulates

This study also analyzed the Maragheh fossil equids and bovids stored in the Geological institute of Kyoto University. The specimens were excavated by the Kyoto University and Geological Survey of Iran in 1973 (Kamei et al. 1977). This study compiled fossil equids as "*Hipparion*" horses. Identifications of fossil bovids were followed Watabe (1990). Some of upper teeth with skull fragments were identified as *Miotragoceros*. Some of teeth specimens were recognized as "small bovids" based on teeth row length. Fossil mandible specimens were also divided into "middle bovids" and "small bovids" based on teeth row length.

Data scoring

Mesowear analysis indicates diet based on two morphological data variables of the buccal cusps of the upper second molar (M2), occlusal relief (OR), and cusp shape (CS). Occlusal relief is classified as "high" or "low" depending on how high the buccal cusps are raised above the valley between them. Occlusal relief measurements are conducted as follows: First, the vertical distance between a line connecting two adjacent cusp tips and the valley bottom between them is measured ("1" of Fig 2-2A). Second, the distance is divided by the entire tooth length ("2" of Fig 2-2A). The cut-off point for the selenodont molar is 0.1 (low <0.1, high ≥0.1, Fortelius and Solounias 2000). Relatively "high" occlusal relief is noted in taxa that browse more, whereas "low" occlusal relief is noted in taxa that tend to graze more (Fortelius and Solounias 2000). Cusp shape is classified as "sharp," "round," or "blunt." A "sharp" cusp has practically no rounded area between the mesial and distal facets (Fig B-1). A "round" cusp has a distinct round tip without planar facet wear but with retained facets on the lower slopes (Fig B-2). A blunt cusp lacks distinct facets altogether (Fig B-3), following Fortelius and Solounias (2000). Browsers tend to have a sharp cusp shape, and grazers, which consume a more abrasive diet, tend to have rounded or blunted cusps. Their teeth were examined visually or using a low-magnification (10×) hand lens. Paracone and metacone were scored for the sharper left M2 buccal cusps. Fortelius and Solounias (2000) observed an increase in abrasive wear with increasing age in individuals of extant ungulates. This study used tooth specimens from full eruption of the dentitions to the loss of the inner profile of the first molar (i.e., Individual Dental Age Stages 3-4 of Anders et al. 2011). In addition, cusps that were damaged were not scored, in accordance with the methods of Fortelius and Solounias (2000). This study also tested mesowear score which is a combination of OR and CS and was scored as follows: high relief and sharp cusps = 0; high relief and round cusps = 1; low relief and round cusps= 2; low relief and sharp cusps = 2.5; high or low relief and blunt cusps = 3 (Croft and Weinstein 2008). A higher score indicated grazing as the dominant food habit.

Mesowear data of extant ruminants as a reference（Table 2-1）

Although Fortelius and Solounias (2000) provided reference data for 64 extant ungulates, they selected 27 extant ungulates to form a subset of species for which good dietary data were available and where the interpretation was uncontroversial. Because the dataset of “typical” species formed a good basis for comparison with fossil forms, most previous studies have used it. In addition, the different phylogenetic histories of mammals bias the way teeth wear, and consequently, the way OR and CS are worn is correlated to tooth development and morphology (Fortelius and Solounias 2000; Blondel et al. 2010). Hence, this study used mesowear data set of 64 extant ungulates (expanded data set) as well as a subset of 27 ungulates with “typical” food habits (typical data set) following Fortelius and Solounias (2000). These ungulates have been classified into the following three broad dietary categories: browsers, consuming <10% grass; grazers, consuming <10% of the browsers; and mixed feeders, which fall between the above two groups.

Statistical analysis

The percentage of OR and CS were compared by hierarchical cluster analysis (HCA) with complete linkage (furthest neighbors), based on the Euclidian distance and principal component analysis (PCA). All statistical analyses were computed using R 2.11.0 computer open ware (R Development Core Team 2005).

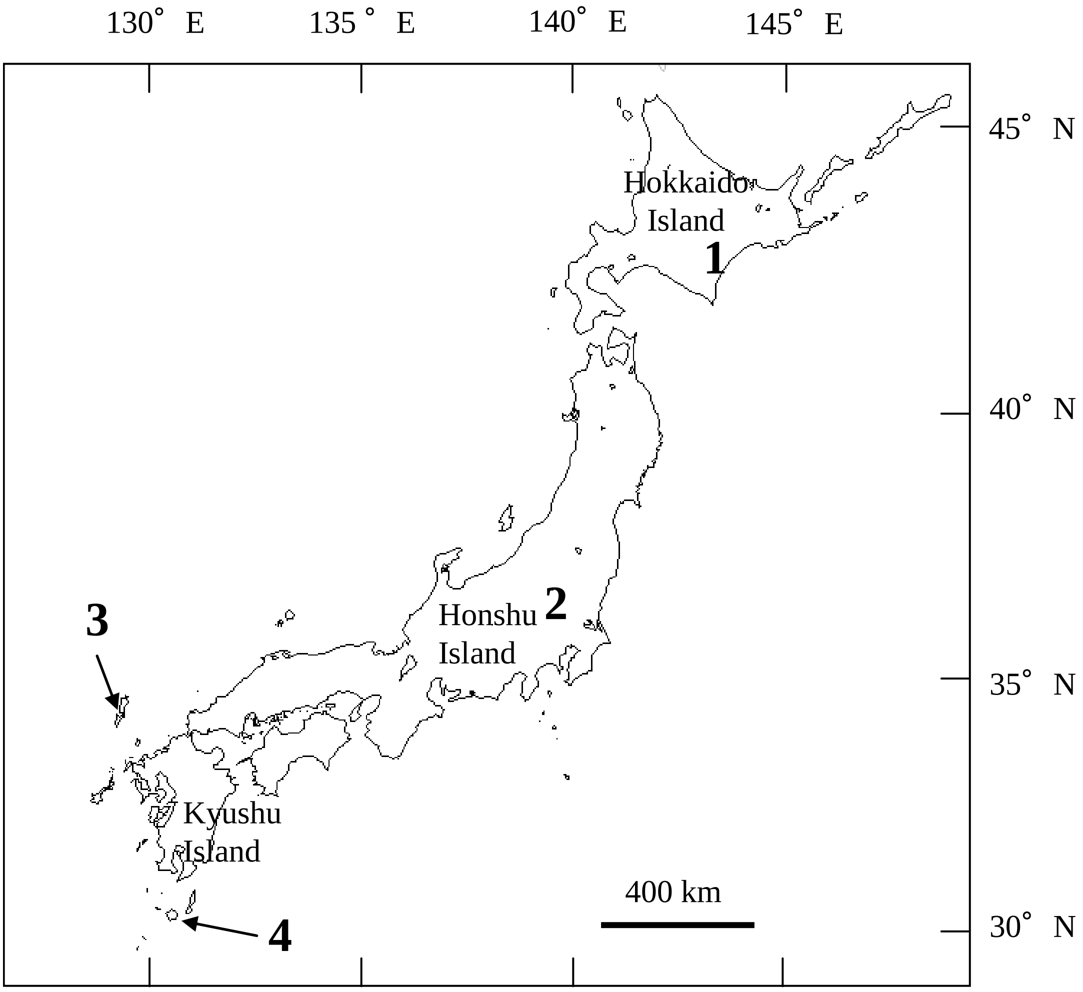


Fig. 2-1. Locality map of the extant ungulate in this study. 1; Urahoro, 2; Nikko, 3; Tsushima,　4; Yakushima.

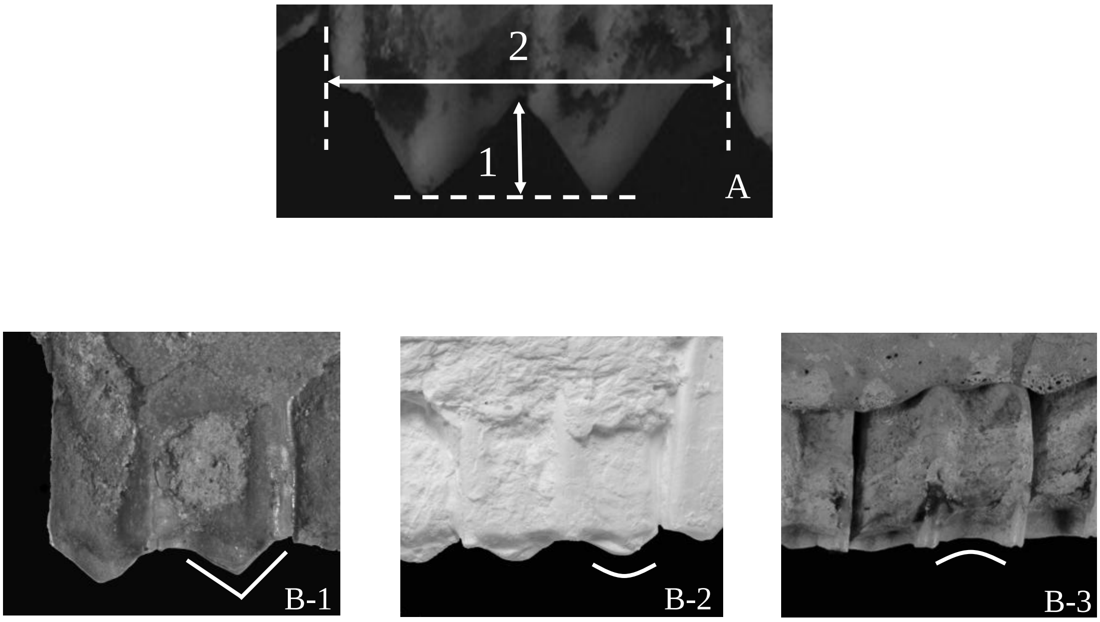


Fig. 2-2. Mesowear variables used in this study. A: Occlusal Relief. 1; the vertical distance between a line connecting two adjacent cusp tips and the valley bottom between them, 2; the entire tooth length. B: Cusp Shape. B-1; “sharp”, B-2; “round”, B-3; “blunt”.

Table. 2-1 Mesowear data of extant ungulates by Fortelius and Solounias (2000)

	N	% low	% high	% sharp	% round	% blunt	Diet	Dataset	MS	Note
Aepyceros melampus	17	0.0	100.0	35.2	64.8	0.0	M	T	0.6	
Alcelaphus buselaphus	76	43.0	57.0	3.2	68.8	28.0	G	T	1.5	
Alcelaphus lichtensteinii	17	18.0	82.0	5.8	82.5	11.7	G	E	?	
Alces alces	30	0.0	100.0	100.0	0.0	0.0	B	T	0.0	
Ammodorcas clarkei	7	0.0	100.0	28.5	71.5	0.0	B	E	0.7	
Antidorcas marsupialis	26	4.0	96.0	73.0	27.0	0.0	M	E	0.3	
Antilocapra americana	44	4.0	96.0	88.6	11.4	0.0	B	E	0.4	
Axis axis	43	21.0	79.0	6.9	67.6	25.5	M	E	1.4	
Axis porcinus	24	12.0	88.0	4.1	95.9	0.0	M	E	1.1	
Bison bison	15	100.0	0.0	0.0	26.7	73.3	G	T	2.7	
Boocercus euryceros	27	0.0	100.0	44.4	55.6	0.0	B	E	0.6	
Boselaphus tragocamelus	15	13.0	87.0	0.0	100.0	0.0	M	E	1.1	
Budorcas taxicolor	38	5.0	95.0	42.1	57.9	0.0	M	E	0.7	
Camelus dromedarius	16	0.0	100.0	31.2	68.8	0.0	M	E	0.7	
Capra ibex	24	3.0	97.0	54.1	37.6	8.3	M	E	0.5	
Capreolus capreolus	68	4.0	96.0	72.0	25.1	2.9	B	E	0.4	
Capricornis sumatraensis	22	0.0	100.0	45.4	50.1	4.5	M	T	0.7	
Cephalophus dorsalis	28	7.0	93.0	32.1	60.8	7.1	B	E	1.0	
Cephalophus natalensis	6	0.0	100.0	16.6	83.4	0.0	B	E	1.0	
Cephalophus niger	31	9.0	91.0	35.4	61.4	3.2	B	E	0.8	
Cephalophus nigrifrons	44	18.0	82.0	25.0	70.5	4.5	B	E	1.0	
Cephalophus silvicultor	39	20.0	80.0	0.0	94.9	5.1	B	E	1.1	
Ceratotherium simum	26	100.0	0.0	0.0	72.0	28.0	G	T	2.3	
Cervus canadensis	19	0.0	100.0	47.3	52.7	0.0	M	T	0.5	
Connochaetes taurinus	52	45.0	55.0	15.3	55.9	28.8	G	T	1.5	
Damaliscus lunatus	5	80.0	20.0	20.0	60.0	20.0	G	T	2.0	
Dendrohyrax arboreus	20	0.0	100.0	50.0	50.0	0.0	B	E	0.5	
Dendrohyrax dorsalis	28	18.0	82.0	46.4	53.6	0.0	B	E	0.9	
Dicerorhinus sumatrensis	5	0.0	100.0	80.0	20.0	0.0	B	T	0.2	
Diceros bicornis	34	0.0	100.0	94.1	5.9	0.0	B	T	0.1	

N: Number of specimens, B: browser, G: grazer, M: mixed feeder, T: "Typical" species, E: "Expanded" species, MS: Average of mesowear score(high/sharp cusp = 0; high/round cusp = 1, low/sharp cusp = 2.5, low/round cusp = 2, high or low/blunt.

Table 2-1 continued.

	N	% low	% high	% sharp	% round	% blunt	Diet	Dataset	MS	Note
Equus burchelli	122	100.0	0.0	27.0	39.4	33.6	G	T	2.3	
Equus grevyi	29	100.0	0.0	34.4	41.5	24.1	G	T	2.2	
Eudorcas thomsoni	146	12.0	88.0	55.4	43.3	1.3	M	T	0.6	*Gazella thomsonii*
Giraffa camelopardalis	61	6.0	94.0	73.7	26.3	0.0	B	T	0.3	
Heterohyrax brucei	11	64.0	36.0	81.8	18.2	0.0	B	E	1.4	
Hippotragus equinus	26	15.0	85.0	3.8	96.2	0.0	G	T	1.1	
Hippotragus niger	20	15.0	85.0	0.0	85.0	15.0	G	T	1.3	
Hyaemoschus aquaticus	18	0.0	100.0	16.6	83.4	0.0	B	E	0.8	
Kobus ellipsiprymnus	22	4.0	96.0	0.0	100.0	0.0	G	T	1.0	
Lama glama	32	0.0	100.0	28.1	68.8	3.1	M	E	0.7	
Lama vicugna	12	0.0	100.0	41.6	58.4	0.0	M	E	0.6	
Litocranius walleri	69	4.0	96.0	33.3	66.7	0.0	B	E	0.7	
Nanger granti	18	12.0	88.0	50.0	50.0	0.0	M	T	0.6	*Gazella granti*
Odocoileus hemionus	33	0.0	100.0	72.7	27.3	0.0	B	T	0.5	
Odocoileus virginianus	18	0.0	100.0	88.8	11.2	0.0	B	T	0.1	
Okapia johnstoni	8	0.0	100.0	87.5	12.5	0.0	B	T	0.1	
Ourebia ourebi	128	4.0	96.0	21.8	77.5	0.7	G	E	0.8	
Ovibos moschatus	52	19.0	81.0	57.6	42.4	0.0	M	T	0.8	
Ovis canadensis	31	13.0	87.0	48.3	51.7	0.0	M	E	0.6	
Procavia capensis	24	54.0	46.0	62.5	37.5	0.0	M	E	1.3	
Redunca fulvorufula	7	14.0	86.0	0.0	100.0	0.0	M	E	1.1	
Redunca redunca	77	9.0	91.0	6.4	91.1	2.5	G	T	1.1	
Rhinoceros sondaicus	5	0.0	100.0	100.0	0.0	0.0	B	T	0.0	
Rhinoceros unicornis	5	0.0	100.0	80.0	20.0	0.0	M	E	0.2	
Cervus duvaucelii	50	33.0	67.0	12.0	64.0	24.0	M	E	1.5	
Cervus unicolor	21	9.0	91.0	14.2	81.1	4.7	M	E	1.0	
Saiga tatarica	5	60.0	40.0	60.0	40.0	0.0	M	E	1.4	
Syncerus caffer	31	0.0	100.0	0.0	93.6	6.4	M	E	1.0	
Taurotragus oryx	14	0.0	100.0	50.0	50.0	0.0	M	T	0.3	
Tetracerus quadricornis	21	9.0	91.0	28.5	71.5	0.0	M	E	0.9	

N: Number of specimens, B: browser, G: grazer, M: mixed feeder, T: "Typical" species, E: "Expanded" species, MS: Average of mesowear score(high/sharp cusp = 0; high/round cusp = 1, low/sharp cusp = 2.5, low/round cusp = 2, high or low/blunt.

Table 2-1 continued.

	N	% low	% high	% sharp	% round	% blunt	Diet	Dataset	MS	Note
Tragelaphus angasi	20	0.0	100.0	35.0	65.0	0.0	M	E	0.7	
Tragelaphus imberbis	31	0.0	100.0	61.2	38.8	0.0	M	E	0.4	
Tragelaphus scriptus	47	0.0	100.0	51.0	49.0	0.0	M	T	0.5	
Tragelaphus strepsiceros	7	0.0	100.0	0.0	100.0	0.0	B	E	1.0	

N: Number of specimens, B: browser, G: grazer, M: mixed feeder, T: "Typical" species, E: "Expanded" species, MS: Average of mesowear score(high/sharp cusp = 0; high/round cusp = 1, low/sharp cusp = 2.5, low/round cusp = 2, high or low/blunt.

CHAPTER 3
MESOWEAR RELIABILITY

1. Mesowear analysis of same species in different food habits

Results

All the deer populations showed 100% “high” OR, except for the Nikko population where only 9.1% showed “low”. None of the specimens in this study showed a blunt cusp. The frequency of “sharp” CS ranged from 38.1% in the Urahoro population to 92.9% in the Tsushima population (Table 3-1).

Few homogenous dietary clusters were produced from HCA of the “expanded” ungulates data set (Fig. 3-1A). Five grazers (e.g., *Bison bison*) formed one small cluster, 12 mixed feeders and three browsers formed another cluster. The later included two deer populations, Urahoro and Nikko. Both of two is clustered with mixed feeders. The other sika deer populations formed another subcluster with 11 browsers and six mixed feeders. They were clustered with browsers. The remaining eight grazers, eight browsers, and 11 mixed feeders formed one subcluster. Four main clusters were produced from HCA of the “typical” ungulate dataset: two grazers, one mixed feeder, and one browser (Fig. 3-1B). The sika deer populations were clustered into two feeding groups. The browser cluster included the same two deer populations that were observed in HCA of the “expanded” data set whereas the Urahoro and Nikko populations clustered with mixed feeders. None of the sika deer populations were classified as grazers.

In PCA of the typical data set, the percentage of sharp cusp shape had the greatest influence on PC1. Similarly, the effect of high occlusal relief percentage on PC2 was the greatest (Table 3-2). A plot of PC1 and PC2 showed good separation along the PC1 axis but little separation along the PC2 axis. The Tsushima and Yakushima population were pointed among browsers, and the other sika deer populations were distributed among mixed feeders. Mesowear scores for the “expanded” data set ranged from 0.0 in moose (browser) to 2.7 in American plains bison (grazer) as shown in Table 2-1. Separation among the groups was more pronounced for the “typical” ruminant data set; the range (and mean) of scores was 0.0–0.5 (0.2) for browsers, 0.3–0.8 (0.6) for mixed feeders, and 1.0–2.7 (1.5) for grazers. Mesowear scores for the sika deer populations ranged from 0.26 in the Tsushima population to 0.67 in the Nikko population (Table 3-1).

Discussion

HCA and PCA clarified the position of each sika deer population among extant ungulates. The sika deer populations were not grouped as 'Japanese sika deer' on a whole but were clustered separately with ungulates that had different feeding ecology. The two browsing populations in evergreen forest were classified as browsers whereas the deer in deciduous or open habitat reconstructed as more grazing feed habits. The Urahoro and Nikko populations were grouped with mixed feeders, although previous ecological studies have reported these two populations as grazers. This contradiction is because of the definition of a grazer, in which the conventional classification for extant ruminants considers grazers as those consuming >90% graminoids in their diets. Based on this classification, the present mesowear analyses results agreed well with the previous reports on sika deer food habits.

Occlusal relief had little contribution to the classification of diets. All four wild sika deer populations showed high occlusal relief, with major differences observed in the frequencies of “sharp” and “round” cusps (Table 3-1). The percentage of “high” OR was the highest factor loading for PC2 (Table 3-2), which could not clearly separate the three diet categories (Fig. 3-2). In the expanded data set, only three bovids showed predominantly low occlusal relief (Table 2-1). When dental specimens scored as “high” were compared, slightly worn cusps could not be distinguished from the strongly worn cusps under the present scoring procedure, suggesting that ruminant dentition is more likely to be scored as high occlusal relief because of their well-developed cusp valley.

As shown in Figs. 3-1A and B, the Urahoro and Nikko populations were clustered near the African bovids which live in savannahs and woodlands (Kingdon 1982a, b). The grit or dust on leaf surfaces and soil ingested during foraging affects food abrasiveness (Janis 1988; Ozaki et al. 2010). Although the amount of exogenous grit should be greater in an open and dry habitat, thus greater in the African bovids than in sika deer, these factors are barely reflected in the mesowear classification methods. Therefore, the results of mesowear analysis should be interpreted as rough dietary trends rather than as a reflection of habitat conditions.

This study is the first attempt to verify the reliability and limitations of mesowear analysis by using wild populations with known food habits. In conclusion, mesowear analysis indicated intraspecific differences in diet, although the differences among the populations were not statistically significant. More specimens and populations are necessary to further expand this study. Based on the results of this study, different dietary classifications among fossil localities, as shown by Kaiser (2003), should be interpreted as signals of dietary variation corresponding to local vegetation. Therefore, the findings obtained using sika deer are useful for investigating the paleoenvironments through the dietary spectrum of extinct herbivorous species.

2. Effects of dietary differences in a sympatric habitat

Results

An interspecific comparison of mesowear variables (i.e., frequencies of occlusal relief and cusp shape) was conducted using wild populations of the Japanese serow and the sika deer in the deciduous broad-leaved forest of the Nikko NP, central Japan. The Japanese serow population showed 100.0% “high” OR while the sika deer population showed only 4.8% “low”. The “sharp” CS frequency was 70.3% in the Japanese serow population but only 50.0% in the sika deer population. None of the specimens in this study had a “blunt” cusp.

Two multivariate analyses, HCA and PCA, were performed using data from other extant ruminants to investigate which food habits the mesowear variables of Japanese serow and sika deer in Nikko NP resembled most closely. Four main clusters were produced from HCA of the typical ruminant dataset: two grazers, one mixed feeder with two subcluster (mixed feeder and mixed feeder with browser), and one browser (Fig. 3-3). The sika deer population clustered with Grant’s gazelle, mixed feeders. The Japanese serow population clustered with mule deer and giraffe, browsers, and their subcluster was connected to mixed feeders. A plot of the first and second principal components (PC1 and PC2) showed good separation of three dietary categories along the PC1 axis but little separation along the PC2 axis (Fig. 3-4). The proportions of variance for the PC1 and PC2 axis were 66.2% and 30.7% respectively (Table 3-4). The percentages of low/blunt cusps and percentages of high/sharp cusps had a great influence on PC1 whereas the percentage of sharp and round cusps had a great influence on PC2 (Fig. 3-4). The Japanese serow was plotted among browsers, whereas the sika deer population was plotted among mixed feeders.

Discussion

The frequencies of CS were significantly different between the Japanese serow and the sika deer populations in Nikko NP. The Japanese serow population showed a higher proportion of high, sharp cusps than the sika deer population, which indicated a browsing diet. Percentage of low occlusal relief observed with abrasive food habits was 9.1% in the sika deer population. However, the deer showed significantly higher percentage of round cusp shape than the serow. These results suggest that a different tooth wear regime exists between the two ungulates and the difference correlates with their food habits, although they were sympatric.

A dietary reconstruction based on HCA with other extant ruminants classified the Japanese serow as a browser and the sika deer as a mixed feeder. Although Japanese serow were classified into “mixed feeder with browser” subcluster (Fig. 4), PCA of the same dataset also showed the two ungulates to have different dietary patterns. As mesowear results corresponded well with these ecological studies in the Nikko NP, a valid inference can be made that their mesowear signatures was a results of their different dietary strategy.

Results of this study suggest the following two explanations for the outcomes of heterogeneous dietary reconstruction of fossil assemblages: (1) When mesowear signatures of several species differ from each other but are classified as having similar food habits, they most likely relate to dietary differences in a sympatric area. For example, the two ungulates in the Nikko NP habit in same vegetation (deciduous broad-leaved forest). Their food habits were contrastive although there is overlap in winter (Koganezawa 1999). In addition, Kobayashi and Takatsuki (2012) reported feeding segregation of sympatric populations of the two ungulates in Mt. Yatsugatake, central Japan: the deer rely on dwarf bamboo whereas the serow select tree leaves, and their diet overlapped in winter. Mishra et al. (2004) reported dietary overlap between domestic livestock and wild ungulates. It is reasonable to assume that the extinct species were under same circumstances. Therefore, no statistically significant difference of mesowear observed in sympatric assemblage should reflect the feeding segregation in same vegetational habits. (2) When mesowear analysis indicates contrasting food habits, the differences should reflect environmental conditions. Yamada (2012) showed that mesowear reflect difference of vegetation in same species. In case several mesowear patterns were detected, mosaic habitat (i.e., open savanna with closed forest) was most likely to exist. In addition, catastrophic assemblages may contain animals from different habitats. Different habitat fossil assemblages may contain animals from different habitats because of drought or flood. Thus, a taphonomic approach is strongly demanded for reconstructing an ancient environment by mesowear analysis.

However, the mesowear signal of co-occurring herbivores should not immediately be assumed to reflect differences in forage availability in local areas.

Dietary reconstructive methods based on fossilized teeth wear will not distinguish the cause of wear as to environmental differences or dietary segregation in sympatric areas. For example, the amount of exogenous grit or dust on leaf surfaces and soil ingested during foraging should be greater in an open and dry habitat. Kaiser *et al*. (2013) presented a hypothesis that those abrasives of very fine particle size were main factor in tooth wear. Therefore, care should be taken when using this approach as the only pathway to reconstruct habitat change. Stable isotope analysis may be a powerful tool to examine the effect of these ecological factors on mesowear results. Louys et al. (2012) reported that dietary differences suggested by mesowear analysis are also indicated in the stable isotope ratios of individual hair of 16 species of African antelopes (Mammalia: Bovidae).

Based on the results of this study, mesowear analysis of two extant ungulates can be used to reconstruct several different food habits in a sympatric environment. From this perspective, diverse mesowear results of fossil assemblages reflect dietary signals, not the environment. The findings of this study provide additional robust basic knowledge of mesowear analysis for paleoecological studies based on food availability for herbivorous ungulate fossils. For example, the hominid site TM266, the Upper Miocene of Chad, excavated the sympatric mammal assemblage (Vignaud 2002, Le Fur 2009) addition to *Sahelanthropus* Brunet et al. (2002). Blondel et al. (2009) performed mesowear analysis to bovids from TM266. They were compelled to discuss their result without basic data of extant ungulates under same situation. The result of sympatric populations shown in this chapter is good help for these studies.

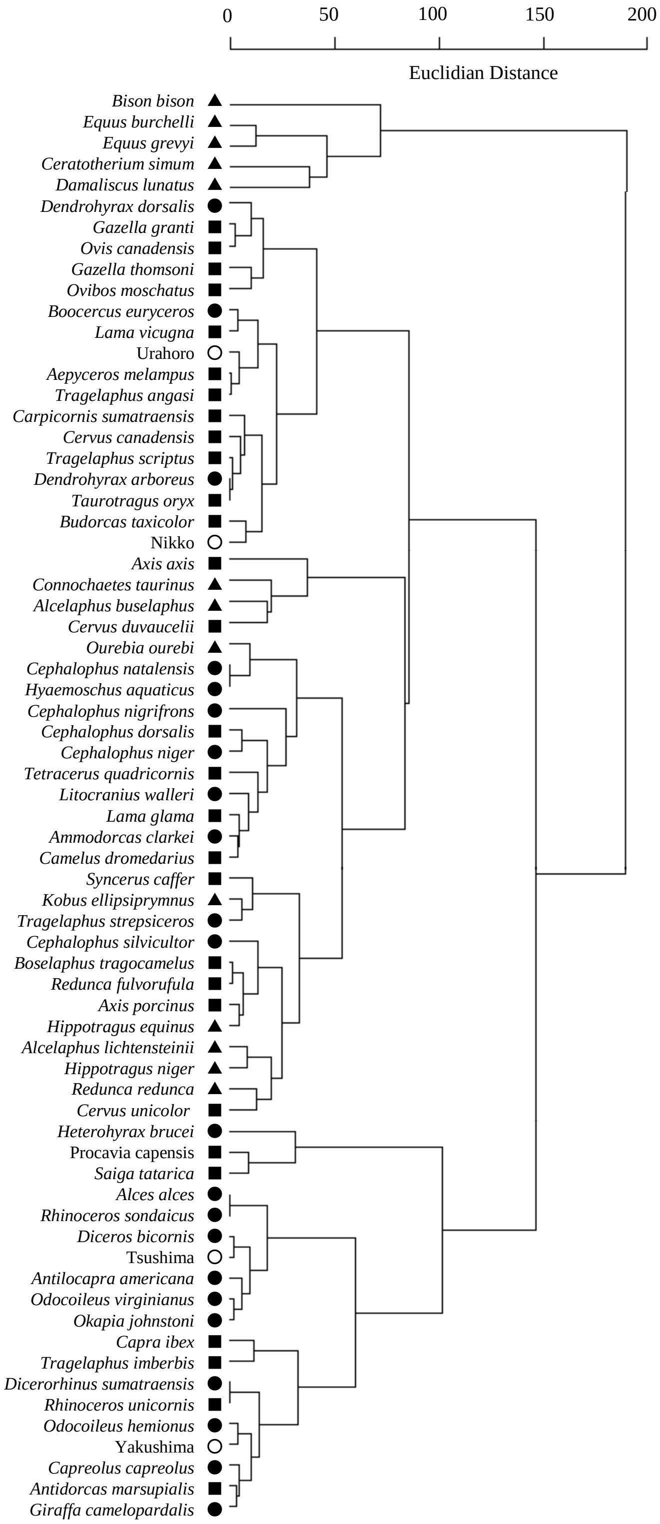


Fig. 3-1A. Hierarchical cluster diagram of four wild populations of *Cervus nippon* based other extant “expanded” ungulates data set (Fortelius and Solounias 2000). ● = browser, ▲ = grazer, ■ = mixed feeder.

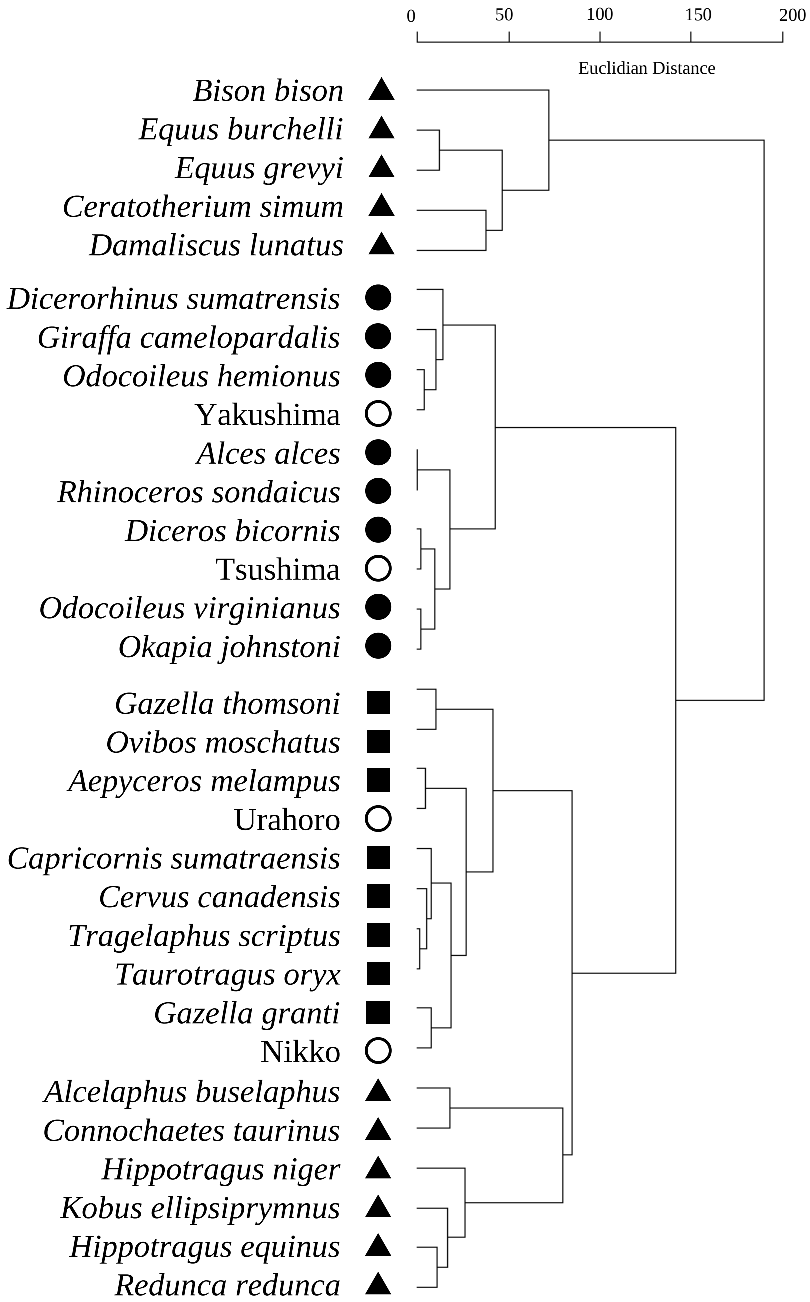


Fig. 3-1B. Hierarchical cluster diagram of four wild populations of *Cervus nippon* based other extant "typical" ungulates data set (Fortelius and Solounias 2000). ● = browser, ▲ = grazer, ■ = mixed feeder.

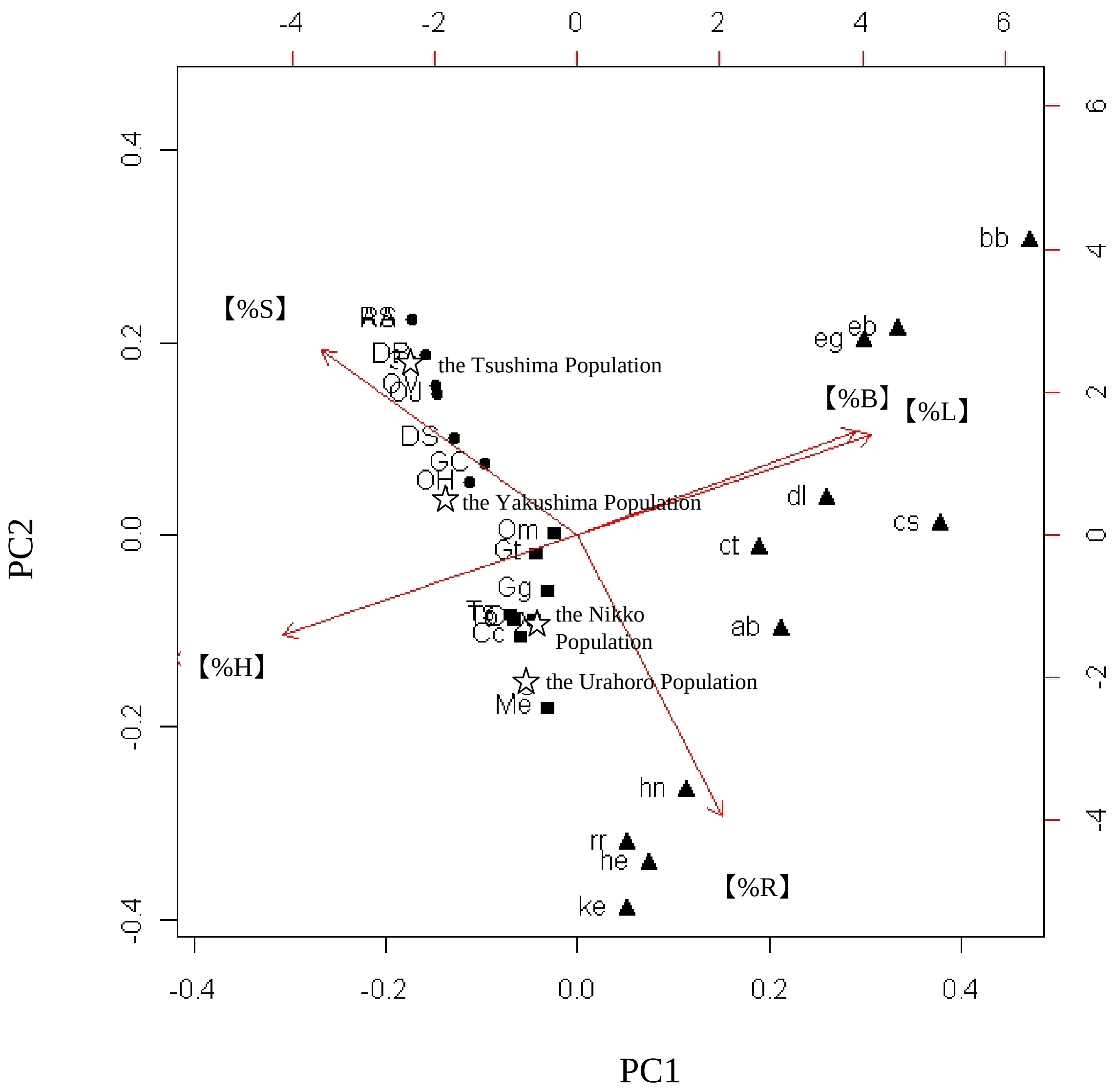


Fig. 3-2. Principal component plot of four wild populations of *Cervus nippon* based other extant "typical" ungulates data set (Fortelius and Solounias 2000). PC1 (67.2% of variance): first principal component, PC2 (28.5% of variance): second principal component. ● the capital letters = browser, ▲ the small letters = grazer, ■ the capital and small letters = mixed feeder. AA: *Alces alces*, DB: *Diceros bicornis*, DS: *Dicerorhinus sumatrensis*, GC: *Giraffa camelopardalis*, OH: *Odocoileus hemionus*, OV: *Odocoileus virginianus*, OJ: *Okapia johnstoni*, RS: *Rhinoceros sondaicus*, Me: *Aepyceros melampus*, Cs: *Capricornis sumatraensis*, Cc: *Cervus canadensis*, Gg: *Nanger granti*, Gt: *Eudorcas thomsoni*, Om: *Ovibos moschatus*, To: *Taurotragus oryx*, Ts: *Tragelaphus scriptus*, ab: *Alcelaphus buselaphus*, bb: *Bison bison*, cs: *Ceratotherium simum*, ct: *Connochaetes taurinus*, dl: *Damaliscus lunatus*, eb: *Equus burchelli*, eg: *Equus grevyi*, he: *Hippotragus equinus*, hn: *Hippotragus niger*, ke: *Kobus ellipsiprymnus*, and rr: *Redunca redunca*. 【%H】: percentage of high occlusal relief, 【%L】: percentage of low occlusal relief, 【%S】: percentage of sharp cusp shape, 【%R】: percentage of round cusp shape, 【%B】: percentage of blunt cusp shape.

Table 3-1. Mesowear variables of the sika deer populations (sharper cusp of left upper second molar)

		OR		CS			% OR		% CS				
Locality	N (m: f)	l	h	s	r	b	%l	%h	%s	%r	%b	MS	(*SD*)
Urahoro	21 (11: 10)	0	21	8	13	0	0.0	100.0	38.1	61.9	0.0	0.62	0.50
Nikko area	55 (13: 42)	5	50	25	30	0	9.1	90.9	45.5	54.5	0.0	0.66	0.67
Tsushima Islands	56 (24:32)	0	56	52	4	0	0.0	100.0	92.9	7.1	0.0	0.07	0.26
Yakushima Island	20 (11: 9)	0	20	14	6	0	0.0	100.0	70.0	30.0	0.0	0.30	0.47

OR: Occlusal Relief. CS: Cusp Shape. N: number of specimens (m, males; f, females). %l: percentage of low occlusal relief. %h: percentage of high occlusal relief. %s: percentage of sharp cusp shape. %r: percentage of round cusp shape. %b: percentage of blunt cusp shape. MS: average mesowear score. SD: Standard deviation.

Table 3-2. Eigenvectors of the principal components (PC)1 and PC2 axes for the “typical” data set and the sika deer populations

Character	PC1	PC2
	Eigenvector (factor loading)	Eigenvector (factor loading)
Percentage of high occlusal relief	−0.507 (−0.929)	−0.264 (−0.315)
Percentage of low occlusal relief	0.507 (0.929)	0.264 (0.315)
Percentage of sharp cusp shape	−0.441 (−0.809)	0.485 (0.579)
Percentage of round cusp shape	0.248 (0.455)	−0.743 (−0.887)
Percentage of blunt cusp shape	0.480 (0.879)	0.272 (0.325)
Eigenvalue	3.360	1.143
Proportion of Variance	0.672	0.285

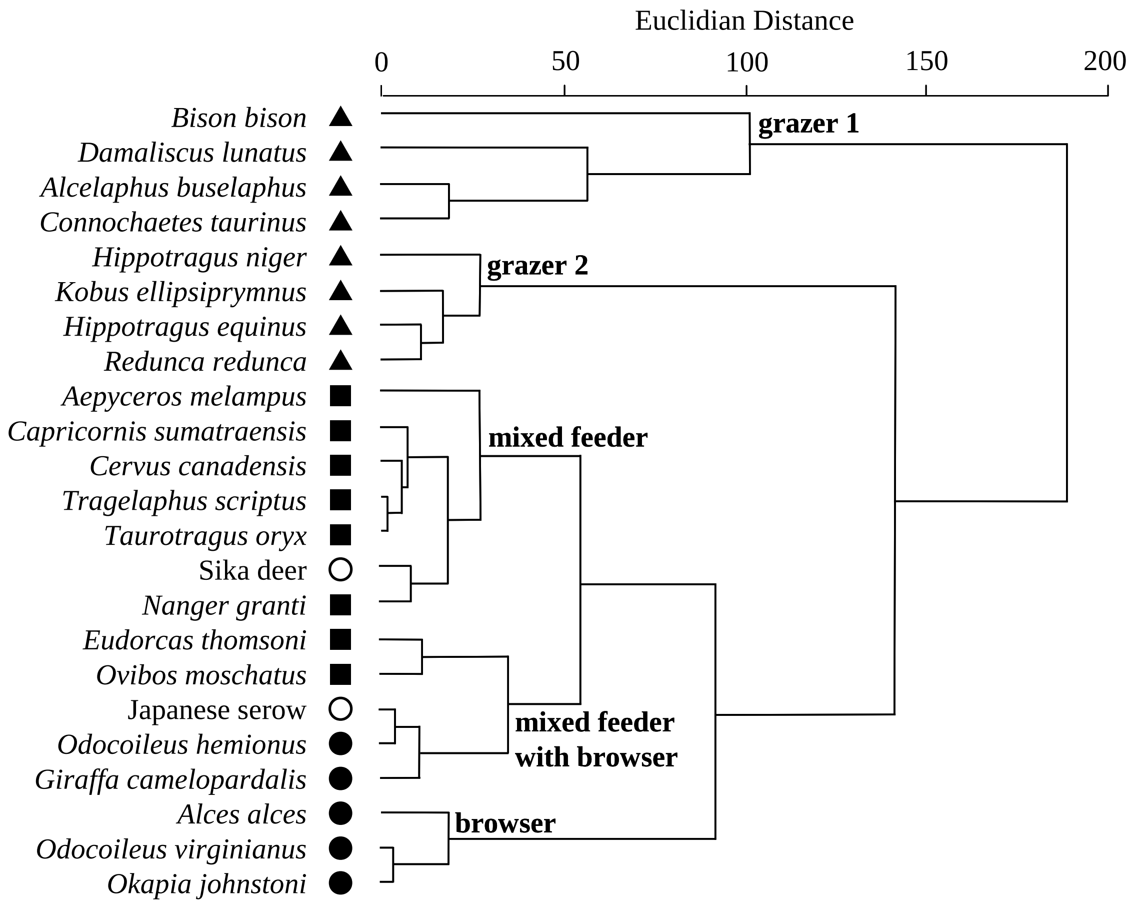


Fig. 3-3. Hierarchical cluster diagram of *Capricornis crisps* and *Cervus nippon* in the Nikko NP based on a 21 extant "typical" ruminant data set. ● = browser, ▲ = grazer, ■ = mixed feeder.

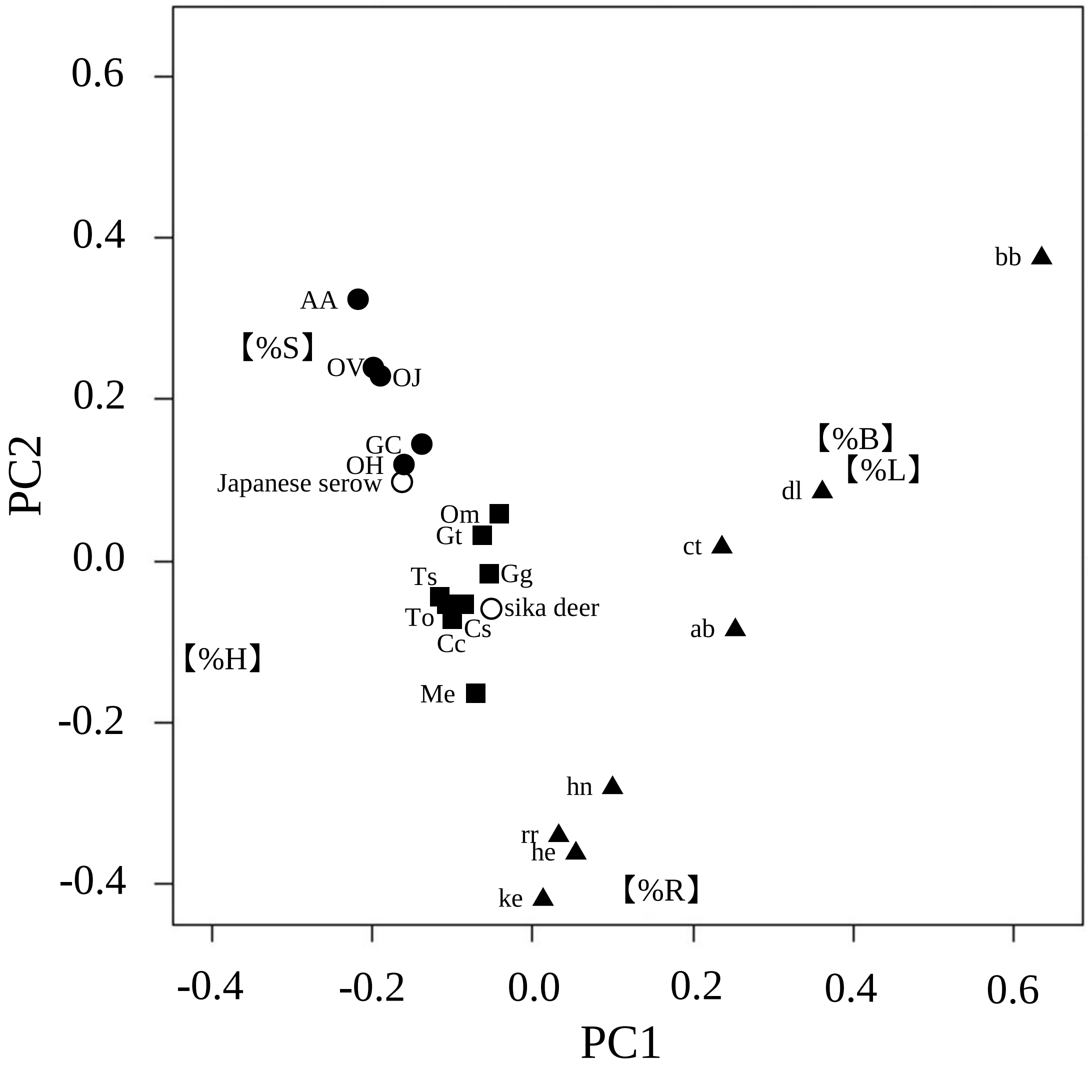


Fig. 3-4. Principal component plot of *Capricornis crisps* and *Cervus nippon* in the Nikko NP based on a 21 extant “typical” ruminant data set. PC1 (66.2% of variance): first principal component, PC2 (30.7% of variance): second principal component. ● the capital letters = browser, ▲ the small letters = grazer, ■ the capital and small letters = mixed feeder. AA: *Alces alces*, GC: *Giraffa camelopardalis*, OH: *Odocoileus hemionus*, OV: *Odocoileus virginianus*, OJ: *Okapia johnstoni*, Me: *Aepyceros melampus*, Cs: *Capricornis sumatraensis*, Cc: *Cervus canadensis*, Gg: *Nanger granti*, Gt: *Eudorcas thomsoni*, Om: *Ovibos moschatus*, To: *Taurotragus oryx*, Ts: *Tragelaphus scriptus*, ab: *Alcelaphus buselaphus*, bb: *Bison bison*, ct: *Connochaetes taurinus*, dl: *Damaliscus lunatus*, he: *Hippotragus equinus*, hn: *Hippotragus niger*, ke: *Kobus ellipsiprymnus*, and rr: *Redunca redunca*. 【%H】: percentage of high occlusal relief, 【%L】: percentage of low occlusal relief, 【%S】: percentage of sharp cusp shape,【%R】: percentage of round cusp shape,【%B】 : percentage of blunt cusp shape.

Table 3-3. Mesowear variables of the two extant ungulates in the Nikko NP.

		n	low	high	sharp	round	blunt	%low	%high	%sharp	%round	%blunt
Japanese serow	male	23	0	23	18	5	0	0.0	100.0	78.3	21.7	0.0
	female	14	0	14	8	6	0	0.0	100.0	57.1	42.9	0.0
	total	37	0	37	26	11	0	0.0	100.0	70.3	29.7	0.0
sika deer	male	13	3	10	4	9	0	23.1	76.9	30.8	69.2	0.0
	female	42	2	40	21	21	0	9.1	90.9	45.5	54.5	0.0
	total	55	5	50	25	30	0	4.8	95.2	50.0	50.0	0.0

OR: Occlusal Relief. CS: Cusp Shape. N: number of specimens (m, males; f, females). %l: percentage of low occlusal relief. %h: percentage of high occlusal relief. %s: percentage of sharp cusp shape. %r: percentage of round cusp shape. %b: percentage of blunt cusp shape.

Table 3-4. Eigenvectors of the principal components (PC)1 and PC2 axes for the ruminant data set, the Japanese serow population, and the sika deer population

Character	PC1	PC2
	Eigenvector (factor loading)	Eigenvector (factor loading)
Percentage of high occlusal relief	−0.521 (−0.948)	−0.218 (−0.270)
Percentage of low occlusal relief	0.521 (0.948)	0.218 (0.271)
Percentage of sharp cusp shape	−0.421 (−0.766)	0.513 (0.635)
Percentage of round cusp shape	0.180 (0.327)	−0.761 (−0.943)
Percentage of blunt cusp shape	0.498 (0.905)	0.252 (0.312)
Eigenvalue	3.312	1.535
Proportion of Variance	0.662	0.307

CHAPTER 4
NEW METHODOLOGY

This study tried to apply mesowear analysis to selenodont lower cheek teeth. Previous mesowear analysis analyzed only M2. I set up a hypothesis that lower lingual cusps were functionary analogue to buccal cusps of upper teeth because of its wear morphologies (Fig4-1) and previous studies (e.g., Janis 1990a). Four populations of sika deer were scored (Table 4-1, 2).

Results

This study scored both of lingual and buccal cusps of lower cheek teeth. As most of lower buccal cusps showed “low” and “blunt”, however, Table 4-1 and 2 showed only lingual side of lower teeth (see also Appendix). Original teeth model proposed by Fortelius and Solounias (2000) restricted only M2. Therefore, this study set M2 data of each population as “standard” results and compared to other teeth data.

For upper teeth, upper first molar (M1) showed higher mesowear score in two grazing populations in north Japan whereas little different score in two browsing populations in south Japan (Table 4-1). In all populations, upper third molar (M3) showed lower mesowear score. For lower teeth, lower first molar (m1) of all populations were higher than M2 and other lower teeth.

To test the reliability for dietary reconstruction, this study performed HCA for each teeth model. As results, only the Urahoro population showed consistent classification between m1 and M2, (Fig 4-2a). In the other population, m1 cannot reconstruct their dietary trait correctly. Furthermore, the result of the Urahoro populations also should be problematic (see Discussion). Classifications of m2 and m3 were more comfortable, though not perfect. Results of m2 data of the Urahoro and Tsushima population (Fig 4-2c) were well consisted with those of M2 nevertheless they showed contrastive diet. In addition, m3 data of all populations were clustered with dietary ungulates which were same dietary category of M2 data. However, the Yakushima and Tsushima population were sub-clustered with others, which were inconsistent with “standard” (Fig 4-2c, d). All of “standard” results were well supported by their ecological study (see also Chapter 3).

Discussion

Higher mesowear score is recognized as indicator of more abrasive (i.e., grazing) diet whereas lower score as attritive (i.e., browsing) diet. In this study, M1 of two grazing populations scored higher than M2. Furthermore, in lower teeth, m1 of all populations tend to show highest score. Although dietary classification by m1 was well consisted to those other teeth In the Urahoro population, the result should not be recognised as “correct” classification. The Urahoro population originally showed grazing diet and abrasive teeth wear. Therefore, their teeth wear trend match with those of m1 by coincidence. In fact, m1 of all populations were classified as more abrasive diet (mixed feeder: the Tsushima population, grazer: others) than “standard” results of M2 for them.

The fact that M1 and m1 firstly erupt may be a key to resolve this problem. Although previous study reported that mesowear was stable against ontogenic effect (Fortelius and Solounias 2000; Rivals, Mihlbachler, and Solounias 2007), they also recommended not to analyze extreme worn teeth specimen. First molar should wear out faster than others. In addition, m1 is located in the bottom of the mandible arch, which would be under most powerful pressure, which will also accelerate wear of m1. To clearly understand these results, investigation of relationship between mastication and teeth wear is strongly demanded. Butler (1952) is pioneer work about cusp morphology and jaw movement. He discussed lateral jaw movement based on position of wear facet. The buccal surfaces of the protoconid and hypoconid shear against the lingual surfaces of the paracone and metacone. Beyond molar pattern diversity, analogue cusps have analogue wear facet. Smith and Savage (1959) is also representative work in relation to the mechanics of mammalian mastication. They reviewed jaw movements of several species based on mandible proportion, masseter, temporal muscles, and teeth. Butler (1971) argued that lingual upper cusps move more or less horizontally across buccal lower cusps. After that, Rensberger (1973) proposed an occlusion model for mastication and dental wear based on rodents. He suggested teeth wear contained three major contents; contact with another tooth surface, contact with food, and effect of food movement related to lateral jaw movement. On the other hand, Hiiemae and Kay (1973) and Kay and Hiiemae (1974) proposed two processes as follow based on jaw movement and tooth use in primates; Phase Ⅰ: puncture-crushing process, make cusp blunted, and PhaseⅡ: chewing process with tooth-tooth contact.

To understand relationship between food and teeth wear, Kay (1977) proposed the concepts of attrition and abrasion. Wear area of attrition is smooth or polished surfaces covered with minute subparallel striations, whereas that of abrasion is rough rounding and eventual obliteration of dental enamel. In addition, Lucas (1979) suggested that wear pattern is correlated to tooth design. Lucas et al. (2000) reviewed two mechanical defenses of plants to herbivory; hardness (against crack), and toughness (against expansion of crack). Hardness in plant is associated with amorphous silica whereas the primary source of toughness is the composite cell wall. In addition, Lucas et al. (2002) claimed that mastication contain two process; selection function (i.e. contact by the teeth) and breakage function (i.e., size reduction). For future work, like X-ray movie analysis will be good help to understand relationships between actual jaw movement and food break.

This study is the first attempt to apply mesowear analysis to lower cheek teeth of selenodont. This study confirmed that buccal cusps of lower molar were not suitable for analysis though previous study tried to analyze the cusps with calibration (Kaiser and Fortelius 2000). Instead, this study recommends analyzing lingual side based on functional and morphological analogue. Especially, m3 will favorable materials for the “Teeth Expanding Model” for selenodont teeth because it is easy to identify. This study also showed that lower teeth tended to scored more abrasive than upper one. This study suggested that m1 was not to be reliable materials. Other lower teeth were also showed instability. It may hard for mesowear analysis by lower teeth to detect dietary segregation in same species. More species and specimens must be analyzed to establish the model which proposed by this study.

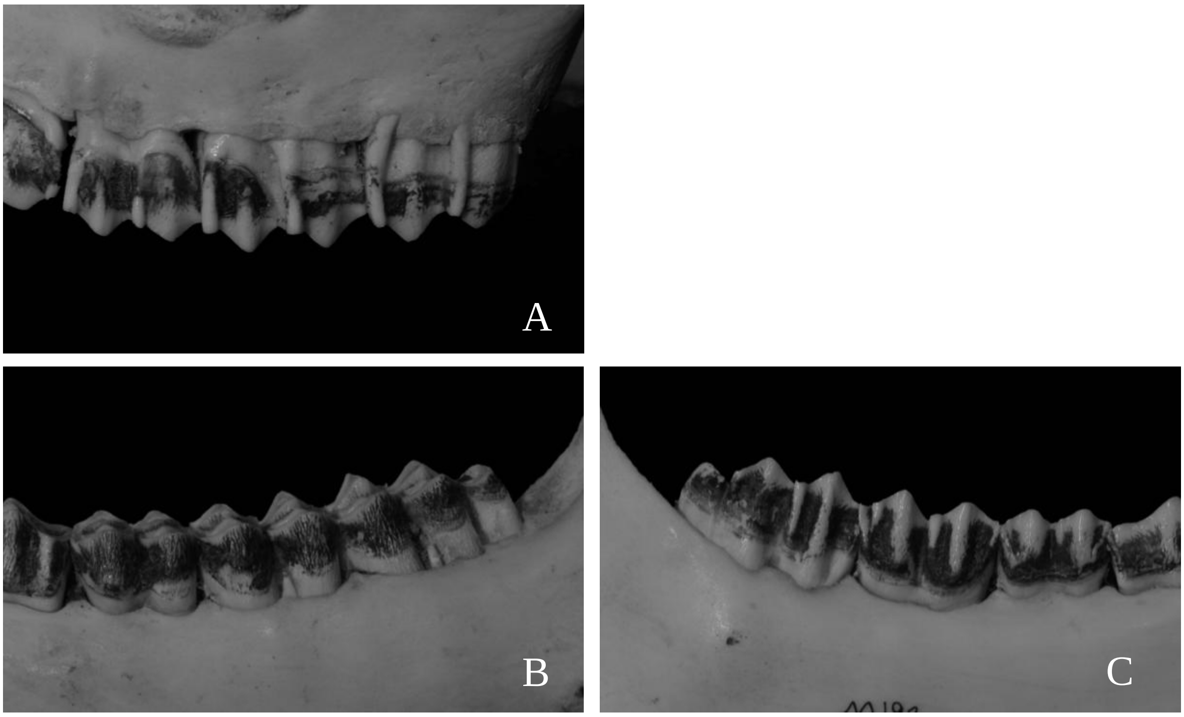


Fig. 4-1. Molar cusp shapes of same individual (*Cervus nippon*).
A. Buccal side of left upper cheek teeth; B. buccal side of lower cheek teeth; C. lingual side of lower cheek teeth.

Table 4-1. Left upper buccal sharper cusp of M1, M2, M3 (*Cervus nippon*).

Locality	Material	N	% l	% h	% s	% r	% b	MS	*SD*
Urahoro	M1	9	66.67	33.33	0.00	77.78	22.22	1.89	0.78
Nikko		25	60.00	40.00	0.00	84.00	16.00	1.76	0.72
Tsushima		41	0.00	100.00	97.56	2.44	0.00	0.02	0.16
Yakushima		7	0.00	100.00	85.71	14.29	0.00	0.14	0.38
Urahoro	M2	9	0.00	100.00	11.11	88.89	0.00	0.89	0.33
Nikko		25	8.33	91.67	36.00	64.00	0.00	0.75	0.61
Tsushima		41	0.00	100.00	90.24	9.76	0.00	0.10	0.30
Yakushima		7	0.00	100.00	85.71	14.29	0.00	0.14	0.38
Urahoro	M3	9	0.00	100.00	88.89	11.11	0.00	0.11	0.33
Nikko		25	0.00	100.00	80.00	20.00	0.00	0.20	0.41
Tsushima		41	0.00	100.00	95.12	4.88	0.00	0.05	0.22
Yakushima		7	0.00	100.00	100.00	0.00	0.00	0.00	0.00

M1: upper first molar, M2: upper second molar, M3: upper third molar. N: number of specimens. %s: percentage of sharp cusp shape. %r: percentage of round cusp shape. %b: percentage of blunt cusp shape. MS: average mesowear score. SD: Standard deviation.

Table 4-2. Left lower lingual sharper cusp of m1, m2, m3 (Cervus nippon).

Locality	Material	N	% l	% h	% s	% r	% b	MS	*SD*
Urahoro	m1	9	55.56	44.44	0.00	44.44	55.56	2.22	0.97
Nikko		25	60.00	40.00	0.00	68.00	32.00	1.92	0.86
Tsushima		40	10.00	90.00	37.50	62.50	0.00	0.73	0.64
Yakushima		7	0.00	100.00	14.29	85.71	0.00	0.86	0.38
Urahoro	m2	9	0.00	100.00	0.00	100.00	0.00	1.00	0.00
Nikko		25	8.00	92.00	12.00	88.00	0.00	0.96	0.45
Tsushima		41	0.00	100.00	80.49	19.51	0.00	0.17	0.38
Yakushima		7	0.00	100.00	42.86	57.14	0.00	0.57	0.53
Urahoro	m3	9	11.11	88.89	11.11	88.89	0.00	1.11	0.60
Nikko		25	4.00	96.00	32.00	68.00	0.00	0.72	0.54
Tsushima		41	0.00	100.00	68.29	31.71	0.00	0.32	0.47
Yakushima		6	0.00	100.00	66.67	33.33	0.00	0.33	0.52

m1: lower first molar, m2: lower seconf molar, m3: lower third molar. N: number of specimens. %s: percentage of sharp cusp shape. %r: percentage of round cusp shape. %b: percentage of blunt cusp shape. MS: average mesowear score. SD: Standard deviation.

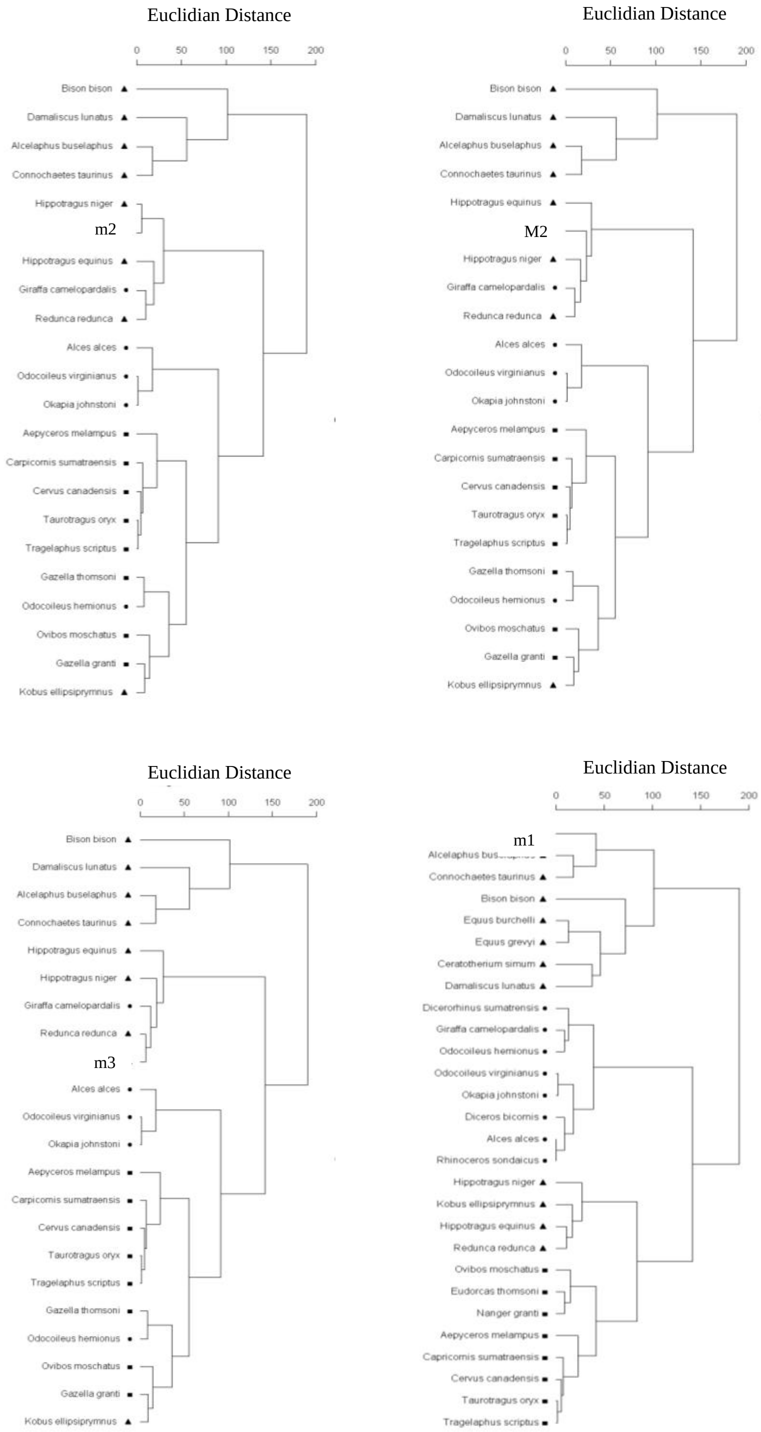


Fig. 4-2. HCA results of upper buccal and lower lingual sharper cusp of the studied populations with other extant ungulates. A: the Urahoro population. ●: browser, ▲: grazer, ■: mixed feeder.

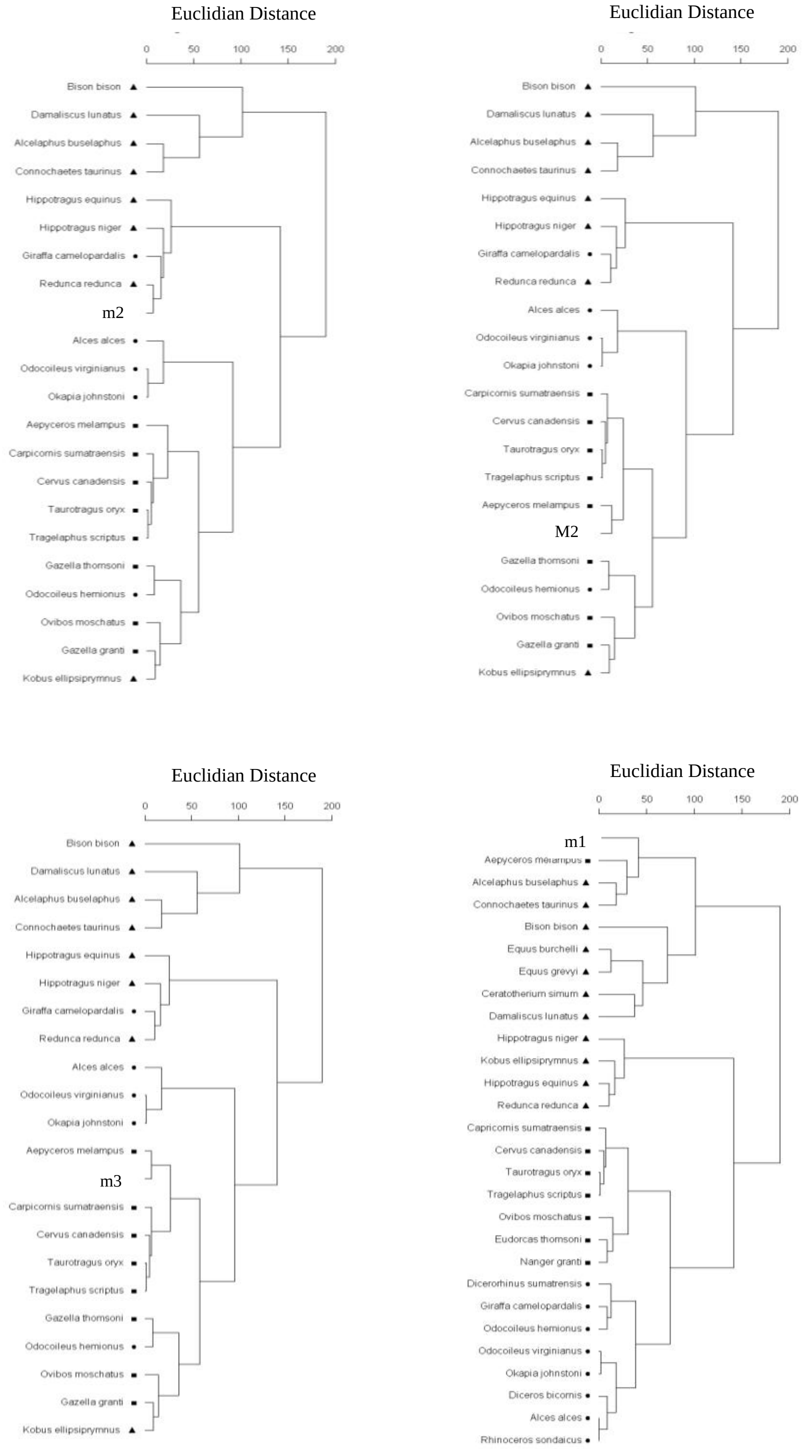


Fig. 4-2B. the Nikko population. ●: browser, ▲: grazer, ■: mixed feeder.

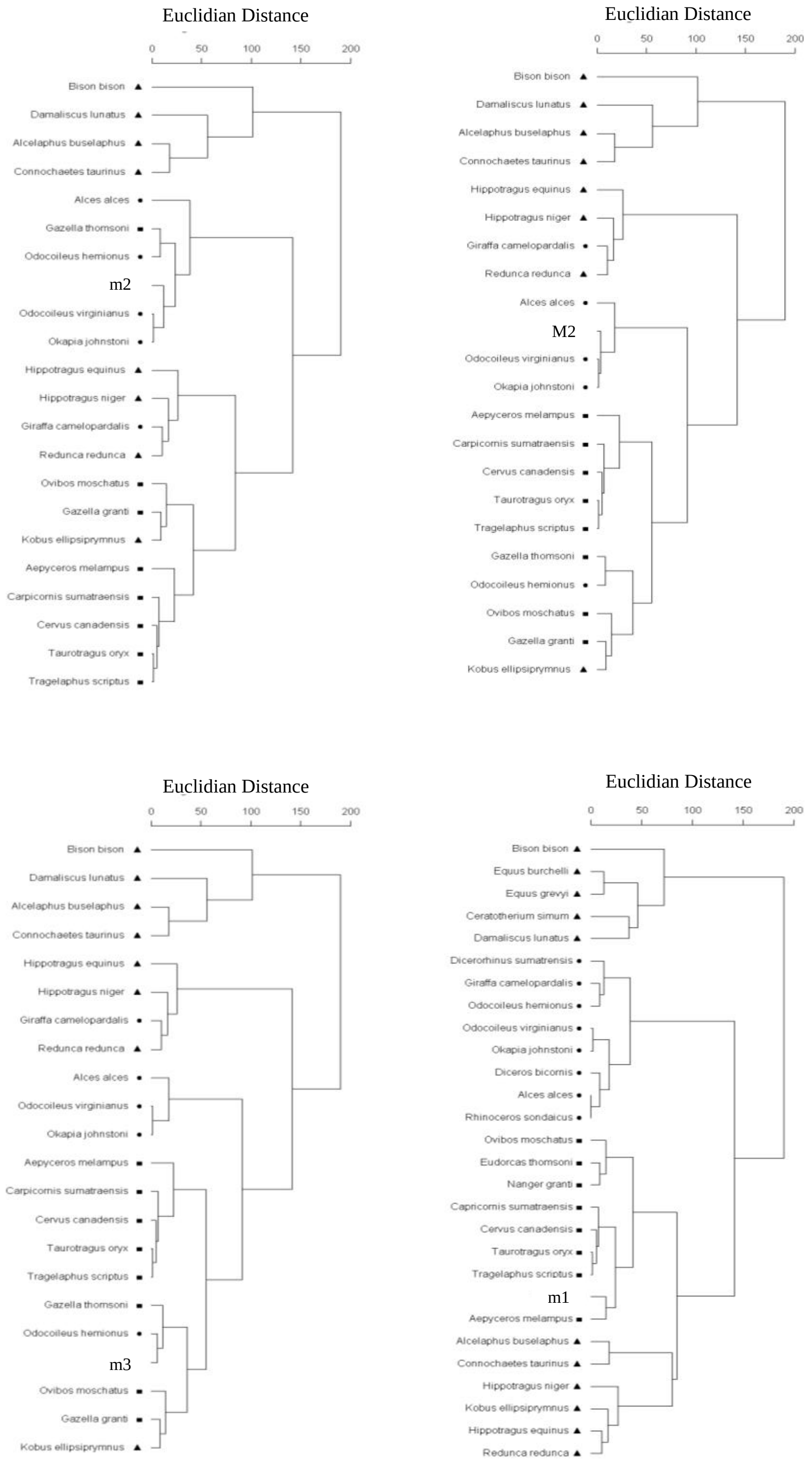


Fig. 4-2C. the Tsushima population. ●: browser, ▲: grazer, ■: mixed feeder.

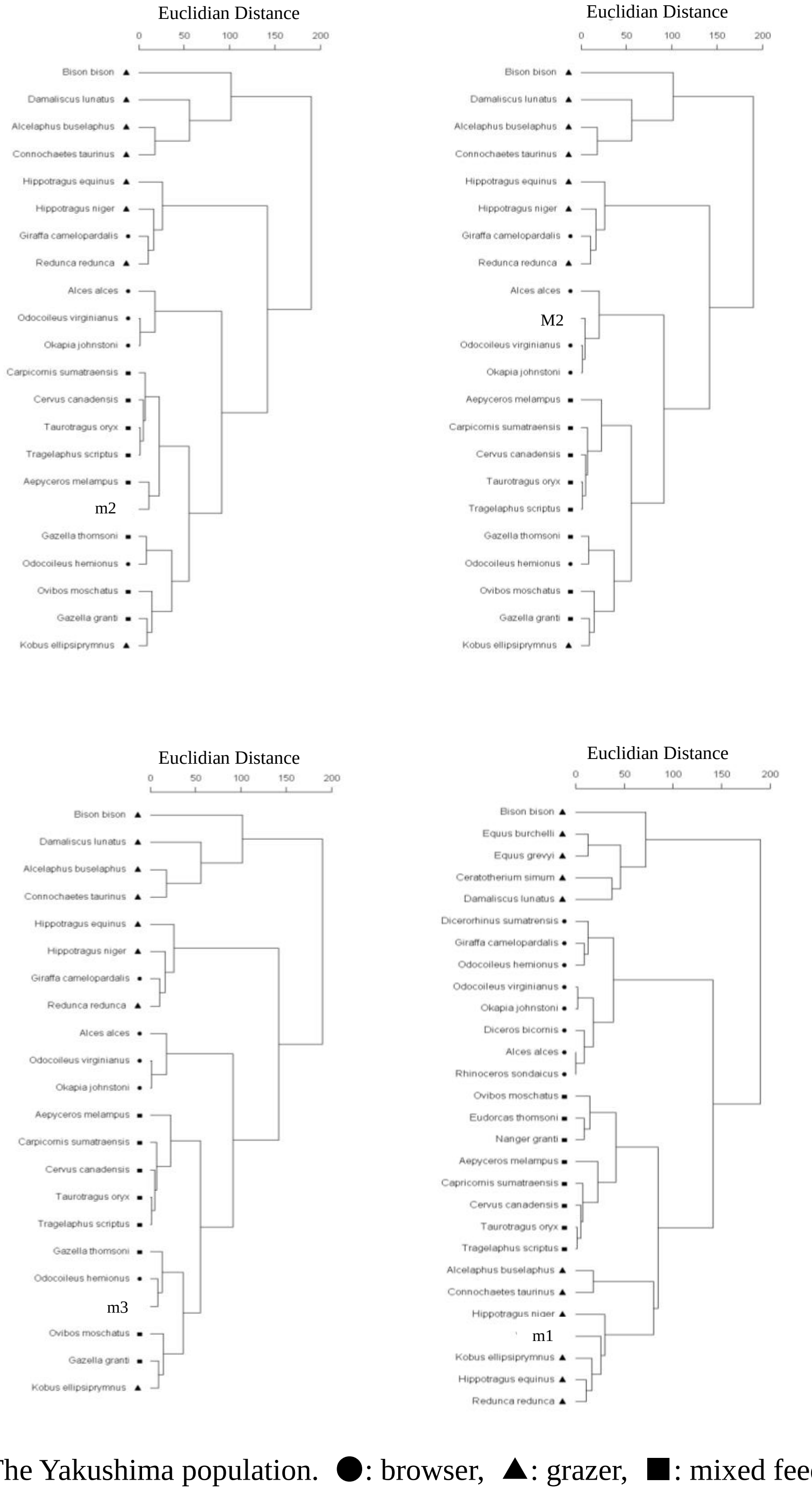


Fig. 4-2D. The Yakushima population. ●: browser, ▲: grazer, ■: mixed feeder.

CHAPTER 5
FOSSIL STUDY

This study investigated the paleoecology of fossil hypsodont equid and bovids from the Late Miocene Maragheh Formation, Northwestern Iran (Fig 5-1).

Results

Mesowear analysis was applied to upper and lower fossil cheek teeth of fossil equids and of bovids from Upper Dareh-e Gorg (Fig 5-2) of Maragheh ("*Hipparion*" fauna). This study analyzed upper P4 to M3 for equids and upper/lower M2 and M3 for bovids following previous study (Solounias and Kaiser 2003; Franz-Odendaal and Kaiser 2003; see also chapter 4) though I scored all fossil cheek teeth (Appendix A-10, 11). However, the number of "small bovids" is less than 10 specimens. Therefore, this study set high value on "Miotragoceros" and "Middle bovids". They were analyzed with extant ungulates (the sika deer and Japanese Serow: Yamada 2013, the others: Fortelius and Solounias 2000). This study also analyzed *Pachytragus crasicomis* and *P. latoceps* from the Late Miocene Samos provided by Fortelius and Solounias (2000) as reference.

The scoring result is shown in Table 5-1. In relation to sharper cusps, Maragheh equids showed relatively high proportion of "high", "round" cusps whereas no "blunt" ones. These results were different from those of extant equids in African savanna. Fortelius and Solounias (2000) reported that no zebra showed "high" cusps. On the other hand, Maragheh bovids showed high percentages of "round" and no "low", "blunt" cusp. The Maragheh equids were clustered with extant grazing bovids and sub-clustered with extant equids. On the other hand, the Maragheh bovids were clustered one mixed feeder and fossil bovids from Samos and sub-clustered with grazers (Fig 5-3). These dietary classifications were supported by PCA (Fig 5-4). The Maragheh equids and bovids were separated as grazers and browsers respectively by OR frequency. Mesowear score of Miotragoceros and Middle bovids were in range those of Samos bovids (Fig 5-5).

Discussion

This study reconstructed the Maragheh equids as grazers whereas the Maragheh bovids as grazer-like mixed feeders. The excavation report of the animals from Maragheh used in this study (Kamei et al. 1977) suggests that they were excavated from a single quarry and a bed, namely their sympatric habitat. The results indicate that the equids have mainly grazing diet whereas sympatric bovids had inclination to more browsing diet. Based on the results of extant forms (Yamada 2013), the mesowear results of the Maragheh hypsodont animals suggest their dietary niche segregation which was suggested by Hasumi (2009 MS) and Miyazato (2009 MS). Therefore, this study habitat supported a hypothesis that the paleoenvironments of the Late Miocene Maragheh formation had been a mosaic of herbaceous land with woodland for feeding segregation of the plant-eaters. Previous studies already tried to detect signals of the segregation. For example, MacFadden (2008) revealed population-level variation in four sympatric species of early Pliocene horses from southern North America by teeth enamel isotopic comparison. Mesowear score of the Maragheh bovids were in range those of the two Samos bovids, which were mixed feeder ranges. These results suggested the similarity of vegetational conditions in the two localities though geological ages were not exactly same. Miyazato (2009 MS) analyzed the Maragheh bovids by mesowear and concluded them as browsers based on only upper teeth results. However, she calculated OR as divided cusp height by “inter-cusp distance” (Croft and Weinstein 2009), whereas this study divided by “teeth length” following original methods provided by Fortelius and Solounias (2000). Inter-cusp length is obviously shorter than whole teeth length. Consequently, Miyazato (2009) tended to score OR as more “high”, which was one of characters for browsers. This contradiction should be problematic when referred the extant ungulates dataset of Fortelius and Solounias (2000). Solounias et al. (2013) reported that mesowear result of Maragheh ungulates were similar to those of Pikermi (Greece), which were browser-like. However, they scored mesowear data by “mesowear ruler”, which mainly set point on angle of cusps whereas original methods scored sharpness of them. Furthermore, some species were represented by only one or two specimens in their study. Gentry and Kaiser (2009) reconstructed *Miotragoceros* of Dorn-Dürkheim 1, Germany (Turolian age) as browsers based on mesowear whereas this study reconstructed as grazer-like mixed feeders. This difference was attributed to dietary segregation in same species as tested in Yamada (2012).

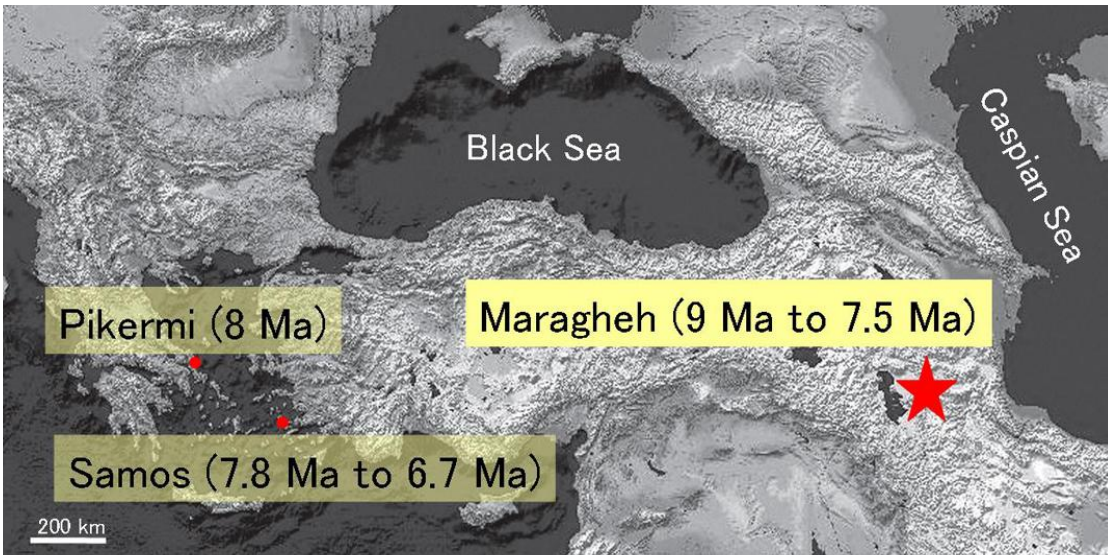


Fig. 5-1. Fossil localities of sub-paratethys region (Kostopoulos and Bernor 2011 modified. Chronology: Mirzaie Ataabadi et al. 2013)

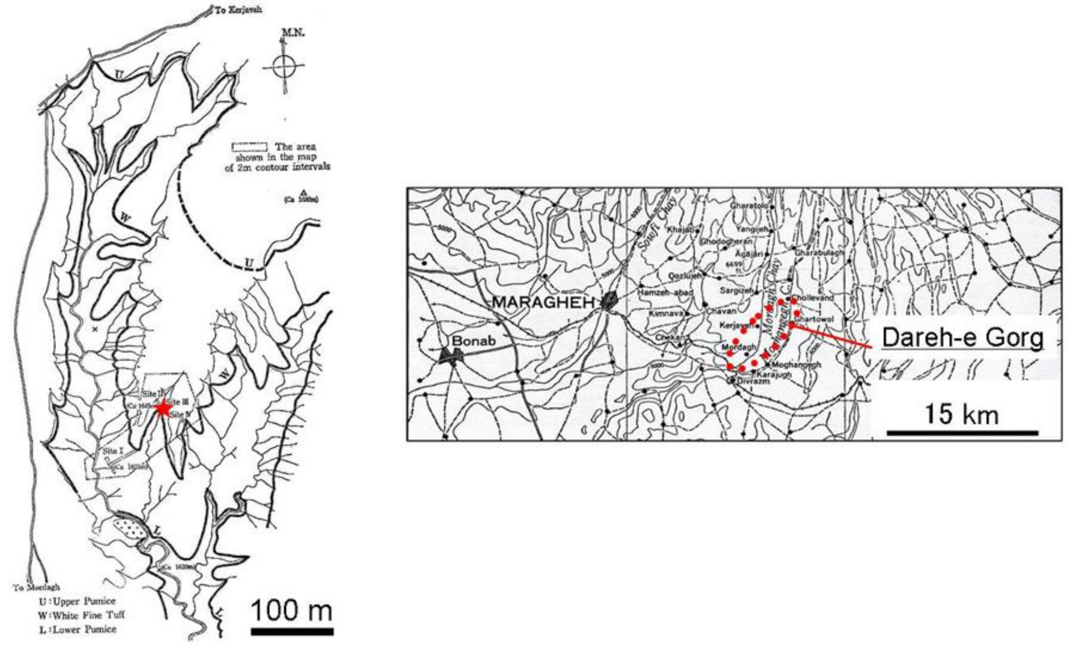


Fig. 5-2. Geologic sketch map of Upper Dareh-e Gorg (Kamei et al. 1977 modified)

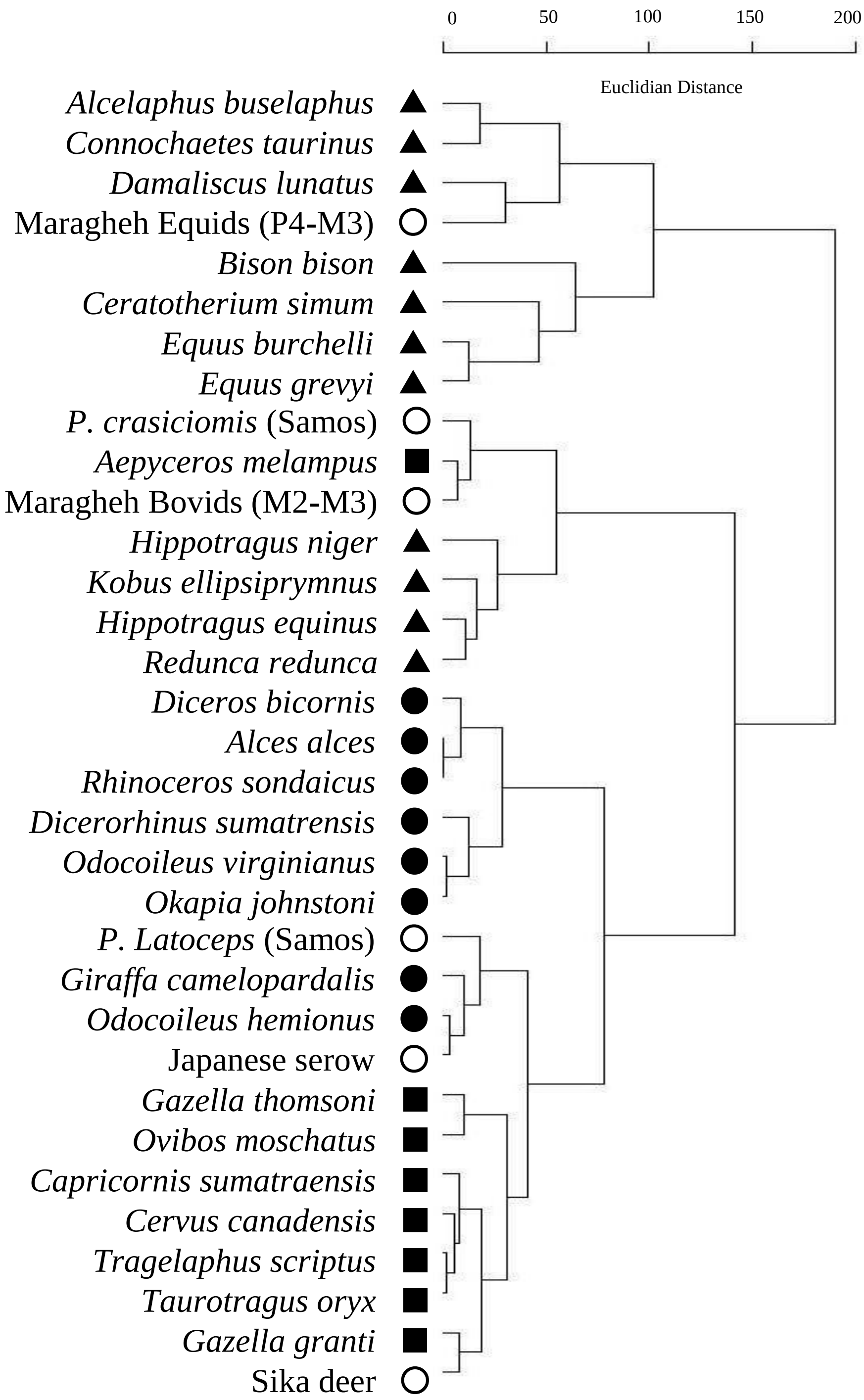


Fig. 5-3. Hierarchical cluster diagram of the Maragheh, Samos, and extant ungulates. Extant "typical" ungulates followed Fortelius and Solounias (2000) and two wild populations followed Yamada (2013). ● = browser, ▲ = grazer, ■ = mixed feeder.

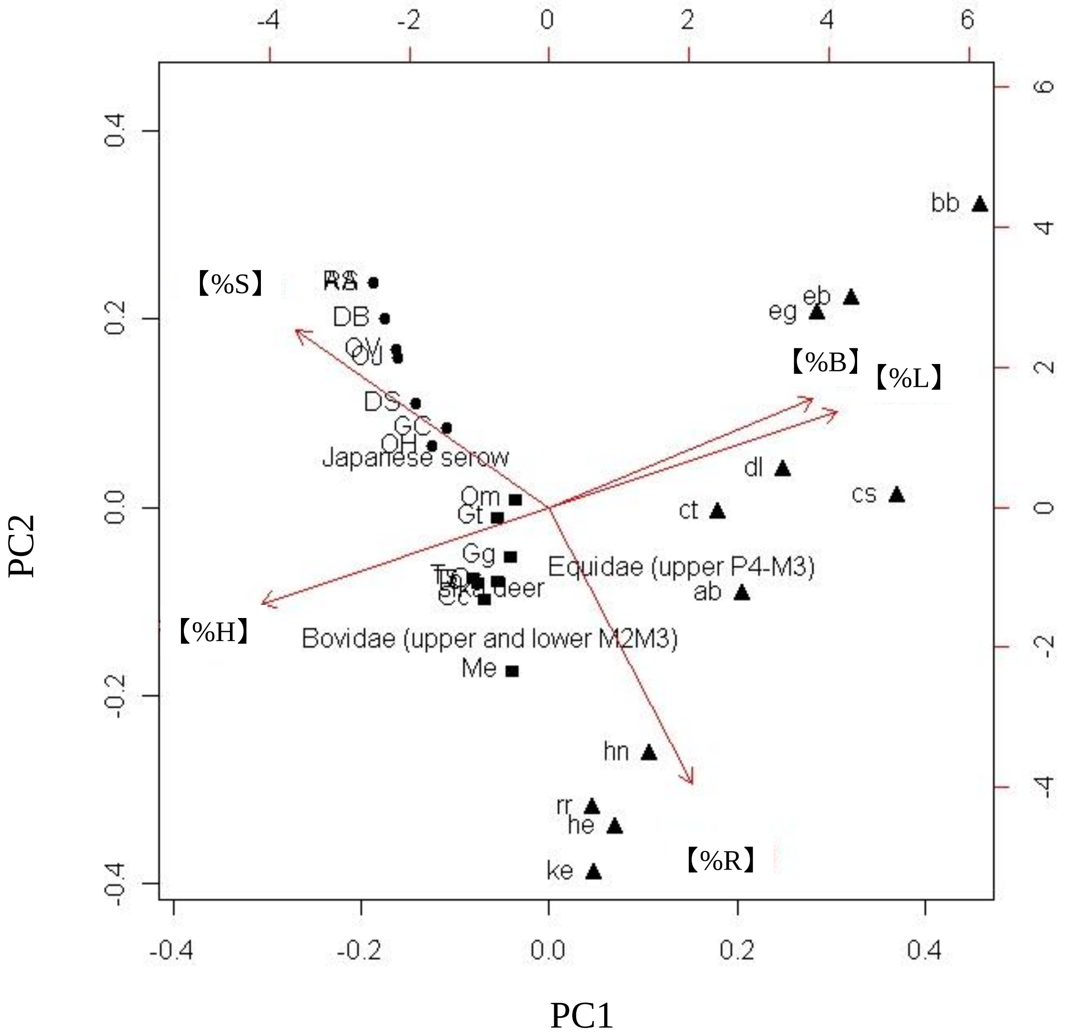


Fig. 5-4. Principal component plot of the Maragheh, Samos, and extant ungulates. Extant “typical” ungulates followed Fortelius and Solounias (2000) and two wild populations followed Yamada (2013). PC1 (65.7% of variance): first principal component, PC2 (28.8% of variance): second principal component. ● the capital letters = browser, ▲ the small letters = grazer, ■ the capital and small letters = mixed feeder. AA: *Alces alces*, DB: *Diceros bicornis*, DS: *Dicerorhinus sumatrensis*, GC: *Giraffa camelopardalis*, OH: *Odocoileus hemionus*, OV: *Odocoileus virginianus*, OJ: *Okapia johnstoni*, RS: *Rhinoceros sondaicus*, Me: *Aepyceros melampus*, Cs: *Capricornis sumatraensis*, Cc: *Cervus canadensis*, Gg: *Nanger granti*, Gt: *Eudorcas thomsoni*, Om: *Ovibos moschatus*, To: *Taurotragus oryx*, Ts: *Tragelaphus scriptus*, ab: *Alcelaphus buselaphus*, bb: *Bison bison*, cs: *Ceratotherium simum*, ct: *Connochaetes taurinus*, dl: *Damaliscus lunatus*, eb: *Equus burchelli*, eg: *Equus grevyi*, he: *Hippotragus equinus*, hn: *Hippotragus niger*, ke: *Kobus ellipsiprymnus*, and rr: *Redunca redunca*. 【%H】: percentage of high occlusal relief, 【%L】: percentage of low occlusal relief, 【%S】: percentage of sharp cusp shape,【%R】: percentage of round cusp shape,【%B】: percentage of blunt cusp shape.

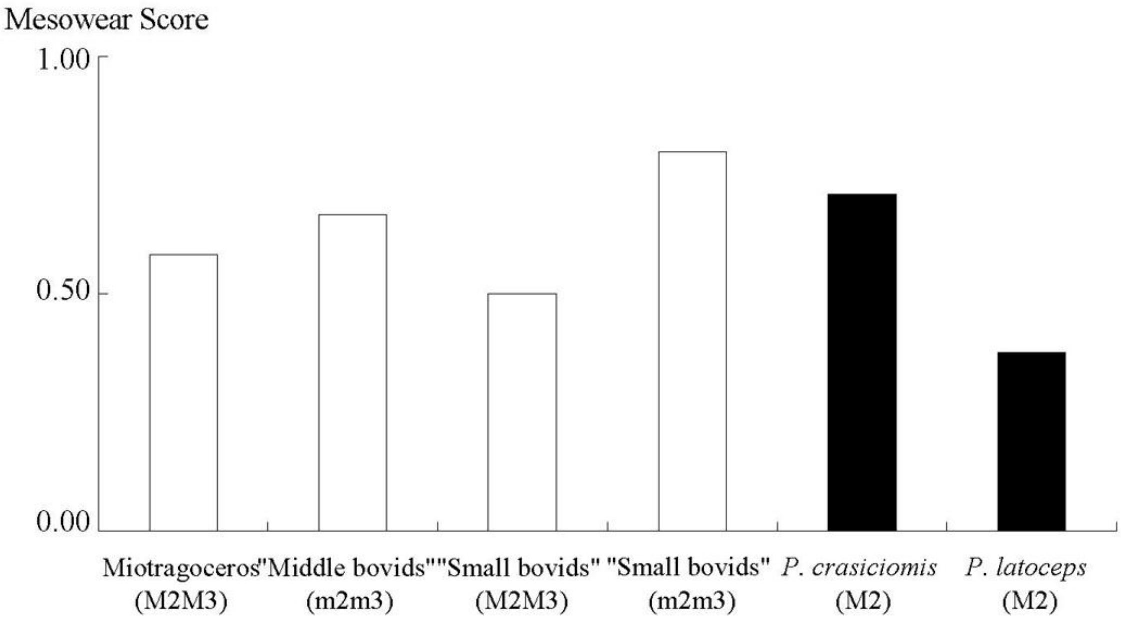


Fig. 5-5. Mesowear Score of the Maragheh and Samos ungulates (*Pachytragus crasiciomis* and *P. latoceps*; calculated from Fortelius and Solounias 2000). Mesowear Score: sharp and high (0); sharp and low (2.5), round and high (1), round and low (2); blunt and low (3) following Croft and Weinstein (2008).

Table 5-1. Mesowear variables of the Maragheh ungulates (Sharper cusp).

		low	high	sharp	round	blunt	%low	%high	%sharp	%round	%blunt	MS	(*SD*)
"Hipparion"	M2	7	6	2	11	0	53.8	46.2	15.4	84.6	0.0	1.50	0.71
	P4-M3	35	17	15	37	0	67.3	32.7	28.8	71.2	0.0	1.61	0.78
Miotragoceros	M2	0	6	2	4	0	0.0	100.0	33.3	66.7	0.0	0.67	0.52
	M2-M3	0	12	5	7	0	0.0	100.0	41.7	58.3	0.0	0.58	0.51
"Middle bovids"	m2	0	11	3	8	0	0.0	100.0	27.3	72.7	0.0	0.73	0.47
	m2-m3	1	23	9	15	0	4.2	95.8	37.5	62.5	0.0	0.67	0.56
"Small bovids"	M2	0	2	1	1	0	0.0	100.0	50.0	50.0	0.0	0.50	0.71
	M2-M3	0	4	2	2	0	0.0	100.0	50.0	50.0	0.0	0.50	0.58
	m2	0	4	0	4	0	0.0	100.0	0.0	100.0	0.0	1.00	0.00
	m2-m3	0	4	1	4	0	0.0	100.0	20.0	80.0	0.0	0.80	0.45

OR: Occlusal Relief. CS: Cusp Shape. N: number of specimens (m, males; f, females). %l: percentage of low occlusal relief. %h: percentage of high occlusal relief. %s: percentage of sharp cusp shape. %r: percentage of round cusp shape. %b: percentage of blunt cusp shape. MS: average mesowear score. SD: Standard deviation.

Table 5-2. Eigenvectors of the principal components (PC)1 and PC2 axes of Maragheh, Samos, and extant ungulates

Character	PC1	PC2
	Eigenvector (factor loading)	Eigenvector (factor loading)
Percentage of high occlusal relief	−0.511(−0.926)	0.256 (−0.308)
Percentage of low occlusal relief	0.511 (0.926)	−0.256 (0.308)
Percentage of sharp cusp shape	−0.444 (−0.804)	0.484 (−0.581)
Percentage of round cusp shape	0.245 (0.444)	−0.743 (−0.892)
Percentage of blunt cusp shape	0.470 (0.851)	0.286 (0.344)
Eigenvalue	3.280	1.440
Proportion of Variance	0.657	0.288

CHAPTER 6
CONCLUSION

Intra-interspecific variation:

These studies are the first attempt to verify the reliability and limitations of mesowear analysis by using wild populations with known food habits. The results indicated that mesowear analysis can detect dietary spectrum in same species and dietary segregation in same habit. The findings obtained using extant ungulates are useful for investigating the paleoenvironments through the dietary spectrum of extinct herbivorous species between sites, ages and assemblages.

Expanded teeth model for selenodont:

Selenodont forms like Bovidae have been excavated from all over the worlds, which include several hominid sites. This study suggested that mesowear can be applied to lower cheek teeth of selenodont forms. Especially, m3 model is useful as it is easy to identify. This study provided a new and more useful model for many researchers who investigate paleoenvironment by mesowear.

Application for fossil study:

This study investigated the paleoecology of sympatric equid and bovids from the Late Miocene Maragheh Formation, Northwestern Iran. The results suggest their dietary niche segregation. This result supports a hypothesis that the paleoenvironments of the Late Miocene Maragheh formation had been a mosaic of woodland and herbaceous land for feeding segregation of the plant-eaters. This study also show the significance of extant ungulates data provided by chapter 3 and 4.

APPENDIX A

MESOWEAR VALUABLES OF JAPANESE EXTANT UNGULATES

Abbreviations: No = catalogue number of Tochigi prefectural museum, OR = Occlusal relief, CS (m) = Cusp shape of mesial cusp, CS (d) = Cusp shape of distal cusp, MS (m) = mesowear score of mesial cusp, MS (d) = mesowear score of distal cusp, m = male, f = female, L. P2 = left upper 2nd premolar, L. P3 = left upper 3rd premolar, L. P4 = left upper 4th premolar, L. M1 = left upper 1st molar, L. M2 = left upper 2nd molar, L. M3 = left upper 3rd molar, L. DP2 =left upper 2nd deciduous premolar, L. DP3 = left upper 3rd deciduous premolar, L. DP4 = left upper 4th deciduous premolar, L. p2 = left lower 2nd premolar, L. p3 = left lower 3rd premolar, L. p4 = left lower 4th premolar, L. m1 = left lower 1st molar, L. m2 = left lower 2nd molar, L. m3 = left lower 3rd molar, L. dp2 =left lower 2nd deciduous premolar, L. dp3 = left lower 3rd deciduous premolar, L. dp4 = left lower 4th deciduous premolar, R. P2 = right upper 2nd premolar, R. P3 = right upper 3rd premolar, R. P4 = right upper 4th premolar, R. M1 = right upper 1st molar, R. M2 = right upper 2nd molar, R. M3 = left upper 3rd molar, R. DP2 = right upper 2nd deciduous premolar, R. DP3 = right upper 3rd deciduous premolar, R. DP4 = right upper 4th deciduous premolar, R. p2 = right lower 2nd premolar, R. p3 = right lower 3rd premolar, R. p4 = right lower 4th premolar, R. m1 = right lower 1st molar, R. m2 = right lower 2nd molar, R. m3 = right lower 3rd molar, R. dp2 = right lower 2nd deciduous premolar, R. dp3 = right lower 3rd deciduous premolar, R. dp4 = right lower 4th deciduous premolar, - = no data. *1 = DP2 and DP3 have two cusps. *2 = dp4 have three cusps (scored mesial two cusps). TMP = Tochigi Prefectural Museum, UMUT = University Museum, the University of Tokyo, UHM = University of Hokkaido Museum.

A-1. the Urahoro population (buccal cusps).

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M0211	Urahoro-cho	f	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	-	r	-	-	-	distal cusp broken	L. m2	l	r	r	2	2	
					L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R. M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R. M2	h	r	r	1	1		R. m2	l	r	r	2	2	
					R. M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M0212	Urahoro-cho	m	-	TPM	L. DP2	-	r	-	-	-		L. dp2	-	s	-	-	-	
	(Hokkaido)				L. DP3	h	r	r	1	1	*1	L. dp3	-	r	-	-	-	
					L. DP4	h	s	r	1	1	*1	L. dp4	l	b	r	3	2	*2
					L. M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L. M2	-	r	-	-	-	distal cusp unworn	L. m2	h	r	r	1	1	
					L. M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R. DP2	-	r	-	-	-		R. dp2	-	-	-	-	-	
					R. DP3	h	r	r	1	1	*1	R. dp3	-	r	-	-	-	
					R. DP4	h	r	r	1	1	*1	R. dp4	l	s	s	2.5	2.5	*2
					R. M1	h	r	s	1	0		R. m1	l	r	r	2	2	
					R. M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	r	0	1	
					R. M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted
M0213	Urahoro-cho	f	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	l	r	r	2	2		L. m1	l	b	r	3	2	
					L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
					L.M3	l	s	s	2.5	2.5		L. m3	l	r	r	2	2	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	l	r	r	2	2		R. m1	-	-	-	-	-	absent
					R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
					R.M3	l	s	s	2.5	2.5		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M0214	Urahoro-cho	f	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	b	r	3	2	
					L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
					L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
					R.M3	h	s	r	0	1		R. m3	l	s	s	2.5	2.5	
M0215	Urahoro-cho	f	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	s	s	3	3	
					L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
					L.M3	h	r	s	0	1		L. m3	h	r	r	1	1	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
					R.M3	-	r	-	-	-	distal cusp broken	R. m3	h	r	r	1	1	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M0216	Urahoro-cho	m	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
					L.M3	l	s	r	2.5	2	distal cusp unworn	L. m3	l	s	r	2.5	2	
					R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
					R. P3	-	-	-	-	-	broken	R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
					R.M3	-	s	-	-	-	distal cusp unworn	R. m3	l	s	s	2.5	2.5	
M0217	Urahoro-cho	f	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
					L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	r	r	1	1		R. m2	l	b	r	3	2	
					R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M0218	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Hokkaido)				L.DP3	h	r	r	1	1	*1	L. dp3	-	r	-	-	-	
					L.DP4	h	s	r	0	1	*1	L. dp4	l	r	r	2	2	*2
					L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
					L.M2	-	r	-	-	-	distal cusp unworn	L. m2	h	s	s	0	0	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	-	r	r	-	-	*1	R. dp3	-	r	-	-	-	
					R.DP4	l	r	r	2	2	*1	R. dp4	l	r	r	2	2	*2
					R.M1	h	r	r	1	1	1	R. m1	h	r	r	1	1	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	r	0	1	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted
M0219	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	-	-	-	-	absent
	(Hokkaido)				L.DP3	l	s	r	2.5	2	*1	L. dp3	-	r	-	-	-	
					L.DP4	l	r	r	2	2	*1	L. dp4	l	r	r	2	2	*2
					L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
					L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	r	s	1	0	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	l	r	r	2	2	*1	R. dp3	-	r	-	-	-	
					R.DP4	l	r	r	2	2	*1	R. dp4	l	r	r	2	2	*2
					R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	s	0	0	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M0220	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Hokkaido)				L.DP3	l	r	r	2	2	*1	L. dp3	-	r	-	-	-	
					L.DP4	h	r	r	1	1	*1	L. dp4	l	r	r	2	2	*2
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	s	0	0	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	l	r	r	2	2	*1	R. dp3	-	s	-	-	-	
					R.DP4	h	s	r	0	1	*1	R. dp4	l	r	r	2	2	*2
					R.M1	h	s	s	0	0		R. m1	l	s	r	2.5	2	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	s	0	0	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted
M221	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Hokkaido)				L.DP3	h	r	r	1	1	*1	L. dp3	-	r	-	-	-	
					L.DP4	h	r	r	1	1	*1	L. dp4	l	r	r	2	2	*2
					L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
					L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	r	0	1	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	h	r	r	1	1	*1	R. dp3	-	r	-	-	-	
					R.DP4	h	r	r	1	1	*1	R. dp4	l	r	r	2	2	*2
					R.M1	h	s	r	0	1	1	R. m1	l	s	r	2.5	2	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	r	r	1	1	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M222	Urahoro-cho	m	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	h	s	r	0	1		L. m2	l	r	r	2	2	
					L.M3	h	r	s	1	0		L. m3	l	r	s	2	2.5	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	s	r	0	1		R. m2	l	r	r	2	2	
					R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
M223	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Hokkaido)				L.DP3	l	r	r	2	2	*1	L. dp3	-	r	-	-	-	
					L.DP4	l	r	r	2	2	*1	L. dp4	l	r	r	2	2	*2
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	s	0	0	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	l	r	r	2	2	*1	R. dp3	-	r	-	-	-	
					R.DP4	h	r	r	1	1	*1	R. dp4	l	r	r	2	2	*2
					R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	s	0	0	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M224	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Hokkaido)				L.DP3	l	r	r	2	2	*1	L. dp3	-	r	-	-	-	
					L.DP4	h	r	r	1	1	*1	L. dp4	l	b	r	3	2	*2
					L.M1	l	r	s	1	0		L. m1	l	r	r	2	2	
					L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	r	0	1	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	l	r	s	2	2.5	*1	R. dp3	-	r	-	-	-	
					R.DP4	h	r	r	1	1	*1	R. dp4	l	b	r	3	2	*2
					R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	r	0	1	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted
M225	Urahoro-cho	m	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Hokkaido)				L.DP3	h	r	r	1	1	*1	L. dp3	-	r	-	-	-	
					L.DP4	h	r	r	1	1	*1	L. dp4	l	b	r	3	2	*2
					L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
					L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	r	r	1	1	
					L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
					R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
					R.DP3	l	r	r	2	2	*1	R. dp3	-	r	-	-	-	
					R.DP4	h	r	r	1	1	*1	R. dp4	l	b	r	3	2	*2
					R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
					R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	r	0	1	
					R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M226	Urahoro-cho	m	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
					L.M3	h	r	r	1	1		L. m3	l	s	r	2.5	2	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
					R.M3	h	r	r	1	1		R. m3	l	s	s	2.5	2.5	
M227	Urahoro-cho	m	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
					L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
					L.M3	h	s	s	0	0		L. m3	l	r	s	2	2.5	
					R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
					R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
					R.M3	h	s	r	0	1		R. m3	l	r	s	2	2.5	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M228	Urahoro-cho	m	-	TPM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	unworn
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	unerupted
					L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	unerupted
					L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
					L.M2	h	r	r	1	1		L. m2	h	s	s	0	0	
					L.M3	-	-	-	-	-	unworn	L. m3	-	-	-	-	-	unerupted
					R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	unworn
					R. P3	-	-	-	-	-	absent	R. p3	-	-	-	-	-	unerupted
					R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	unerupted
					R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
					R.M2	h	s	r	0	1		R. m2	h	r	r	1	1	
					R.M3	-	-	-	-	-	unworn	R. m3	-	-	-	-	-	unerupted
M229	Urahoro-cho	f	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
					L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
					L.M3	-	-	-	-	-	unworn	L. m3	-	-	-	-	-	unerupted
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	s	1	0		R. m1	-	-	-	-	-	absent
					R.M2	h	s	s	0	0		R. m2	h	s	r	1	0	
					R.M3	-	-	-	-	-	unworn	R. m3	-	-	-	-	-	unerupted

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
M230	Urahoro-cho	m	-	TPM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Hokkaido)				L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
					L.M2	h	s	r	0	1		L. m2	l	r	r	2	2	
					L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
					R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	s	r	0	1		R. m1	-	-	-	-	-	absent
					R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
					R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
HKD-0401	Hokkaido	F	-	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
					L. P4	-	b	-	-	-	broken	L. p4	-	r	-	-	-	
					L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
					L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
					R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	b	-	-	-	broken	R. p4	-	r	-	-	-	
					R.M1	l	r	b	2	3	distal cusp broken	R. m1	l	b	b	3	3	
					R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
					R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
HKD-0409	Hokkaido	F	-	UMUT	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	l	r	b	2	3	mesial cusp broken	L. m1	l	r	b	2	3	
					L.M2	h	r	s	1	0		L. m2	l	b	r	3	2	
					L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	l	r	r	1	1		R. m1	l	b	b	3	3	
					R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
					R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
HKD-0413	Hokkaido	F	-	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
					L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
					L.M1	h	r	r	1	1		L. m1	-	-	-	-	-	
					L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
					L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
					R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
					R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
					R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
HKD-0431	Hokkaido	F	-	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	b	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	l	b	r	3	2	
					L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
					R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	b	-	-	-		R. p3	-	r	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
					R.M2	h	r	r	1	1	distal cusp broken	R. m2	l	b	r	3	2	distal cusp broken
					R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
HKD-0440	Hokkaido	M	-	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
					L.M3	h	r	s	1	0		L. m3	l	b	b	3	3	
					R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	l	r	b	2	3		R. m1	l	r	b	2	3	
					R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
					R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
HKD-0444	Hokkaido	M	-	UMUT	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
					L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
					R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	l	b	r	3	2		R. m1	l	b	b	3	3	
					R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
					R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
HKD-0449	Hokkaido	M	-	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	broken
					L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
					L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
					R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
					R. P3	-	-	-	-	-	absent	R. p3	-	r	-	-	-	
					R. P4	-	-	-	-	-	absent	R. p4	-	r	-	-	-	
					R.M1	-	-	-	-	-	absent	R. m1	h	b	b	3	3	
					R.M2	-	-	r	-	-	mesial cusp broken	R. m2	h	r	r	1	1	mesial cusp broken
					R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	

A-1 continued.

Reg.No.	Locality	Sex	Age	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Memo
HKD-0457	Hokkaido	M	-	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
					L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
					L.M1	l	r	b	2	3	distal cusp broken?	L. m1	l	r	b	2	3	
					L.M2	h	r	r	1	1	distal cusp broken?	L. m2	h	r	r	1	1	
					L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
					R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
					R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
					R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
					R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
					R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
HKD-0460	Hokkaido	M	-	UMUT	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
					L. P3	-	b	-	-	-		L. p3	-	b	-	-	-	
					L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
					L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
					L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
					L.M3	h	r	r	1	1		L. m3	h	r	r	1	1	
					R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
					R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
					R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
					R.M1	l	b	b	3	3		R. m1	l	b	b	3	3	
					R.M2	l	r	r	2	2		R. m2	l	b	b	3	3	
					R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	

A-2. the Urahoro population (lingual cusps).

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	MS (m)	MS (m)	MS (d)	Note
HKD-0401	-	Hokkaido	-	F	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	s	-	-	-	
								L. p4	-	b	-	-	-	
								L. m1	h	r	b	1	3	
								L. m2	h	r	r	1	1	
								L. m3	h	s	s	0	0	
								R. p2	-	s	-	-	-	
								R. p3	-	s	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	b	r	3	1	
								R. m2	h	s	r	1	1	
								R. m3	h	s	r	1	1	
HKD-0409	-	Hokkaido	-	F	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	r	-	-	-	
								L. p4	-	r	-	-	-	
								L. m1	h	r	r	1	1	
								L. m2	h	r	r	1	1	
								L. m3	h	r	r	1	1	
								R. p2	-	r	-	-	-	
								R. p3	-	s	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	
								R. m2	h	r	r	1	1	
								R. m3	h	s	s	0	0	

A-2 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	MS (m)	MS (m)	MS (d)	Note
HKD-0413	-	Hokkaido	-	F	-	-	UMUT	L. p2	-	-	-	-	-	left mandible absent
								L. p3	-	-	-	-	-	
								L. p4	-	-	-	-	-	
								L. m1	-	-	-	-	-	
								L. m2	-	-	-	-	-	
								L. m3	-	-	-	-	-	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	l	b	r	3	2	
								R. m2	h	r	r	1	1	
								R. m3	h	r	r	1	1	
HKD-0431	-	Hokkaido	-	F	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	r	-	-	-	
								L. p4	-	b	-	-	-	
								L. m1	l	b	b	3	3	
								L. m2	h	r	r	1	1	
								L. m3	h	r	r	1	1	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	b	-	-	-	
								R. m1	l	b	b	3	3	
								R. m2	h	r	r	1	1	distal cusp broken
								R. m3	h	r	r	1	1	

A-2 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	MS (m)	MS (m)	MS (d)	Note
HKD-0440	-	Hokkaido	-	M	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	r	-	-	-	
								L. p4	-	s	-	-	-	
								L. m1	l	b	b	3	3	
								L. m2	h	r	r	1	1	
								L. m3	h	r	r	1	1	
								R. p2	-	s	-	-	-	
								R. p3	-	s	-	-	-	
								R. p4	-	s	-	-	-	
								R. m1	l	r	b	2	3	
								R. m2	h	r	s	1	0	
								R. m3	h	r	r	1	1	
HKD-0444	-	Hokkaido	-	M	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	r	-	-	-	
								L. p4	-	r	-	-	-	
								L. m1	h	r	r	1	1	
								L. m2	h	r	r	1	1	
								L. m3	h	r	r	1	1	
								R. p2	-	s	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	mesial cusp broken
								R. m2	h	r	r	1	1	
								R. m3	h	r	r	1	1	

A-2 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	MS (m)	MS (m)	MS (d)	Note
HKD-0449	-	Hokkaido	-	M	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	r	-	-	-	
								L. p4	-	r	-	-	-	
								L. m1	h	b	b	3	3	
								L. m2	h	r	r	1	1	
								L. m3	l	r	r	2	2	
								R. p2	-	r	-	-	-	broken
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	l	b	b	3	3	
								R. m2	h	r	r	1	1	
								R. m3	h	r	r	1	1	
HKD-0457	-	Hokkaido	-	M	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	r	-	-	-	
								L. p4	-	r	-	-	-	
								L. m1	l	b	b	3	3	
								L. m2	h	r	r	1	1	mesial cusp broken
								L. m3	h	r	r	2	2	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	l	b	b	3	3	
								R. m2	h	r	r	1	1	
								R. m3	h	r	r	2	2	

A-2 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	MS (m)	MS (m)	MS (d)	Note
HKD-0460	-	Hokkaido	-	M	-	-	UMUT	L. p2	-	r	-	-	-	
								L. p3	-	b	-	-	-	
								L. p4	-	b	-	-	-	
								L. m1	l	b	b	3	3	
								L. m2	h	r	r	1	1	
								L. m3	h	r	r	1	1	
								R. p2	-	r	-	-	-	
								R. p3	-	b	-	-	-	
								R. p4	-	b	-	-	-	
								R. m1	l	b	b	3	3	
								R. m2	h	r	r	1	1	
								R. m3	h	r	r	1	1	

A-3. the Nikko population (buccal cusps).

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M160	Arazawa,	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Nikko city						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
	(Tochigi pref.)						L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	b	2	3	
							L.M2	h	r	r	1	1		L. m2	-	b	-	-	-	distal cusp broken
							L.M3	-	-	-	-	-	broken	L. m3	l	b	b	3	3	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	b	2	3	
							R.M2	h	s	r	0	1		R. m2	l	r	b	2	3	
							R.M3	h	r	s	1	0		R. m3	l	r	b	2	3	
M161	Yasurazawa,	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Nikko city						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
	(Tochigi pref.)						L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	broken
							L.M1	h	r	r	1	1		L. m1	l	-	r	-	-	mesial cusp broken
							L.M2	h	s	r	0	1		L. m2	-	-	r	-	-	mesial cusp broken
							L.M3	h	s	s	0	0		L. m3	l	-	b	-	-	mesial cusp broken
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	r	b	2	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M167	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	l	s	r	2.5	2	
M171	Nikko city	-	m	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	b	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	r	b	2	3	
							L.M2	l	r	s	2	2.5		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	l	b	b	3	3		R. m1	l	s	b	2.5	3	
							R.M2	l	r	s	2	2.5		R. m2	l	r	r	2	2	
							R.M3	l	s	s	2.5	2.5		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M172	Nikko city	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	l	r	b	2	3		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	r	3	2		R. m1	l	r	b	2	3	
							R.M2	l	r	b	2	3		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	
M180	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Tochigi pref.)						L. P3	-	d	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	l	r	r	1	1		L. m2	h	s	s	0	0	
							L.M3	-	s		-	-	distal cusp unworn	L. m3	l	s	s	2.5	2.5	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	0	
							R.M3	-	s	-	-	-	distal cusp unworn	R. m3	l	s	s	2.5	2.5	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M181	Nikko city	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	r	0	1		R. m1	l	b	r	3	2	
							R.M2	h	r	s	1	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M191	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	b	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	r	3	2		L. m1	l	b	b	3	3	
							L.M2	h	s	r	0	1		L. m2	h	b	r	3	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	b	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	r	3	2		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	h	b	r	3	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M192	Nikko city	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	-	-	s	-	-	mesial cusp broken	R. m1	l	b	b	3	3	
							R.M2	-	-	s	-	-	mesial cusp broken	R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	r	3	2	
M193	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	r	3	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	r	3	2		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	b	r	3	2	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M199	Nikko city	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	r				L. m1	h	r	b	1	3	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	b	2	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	b	3	3		R. m1	h	r	b	1	3	
							R.M2	h	s	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	0	0		R. m3	l	s	s	0	0	
M324	Nikko city	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	r	b	2	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	r	b	2	3	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M355	Nikko city	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	b	2	3		L. m1	l	r	b	2	3	
							L.M2	h	b	r	3	1		L. m2	-	r	-	-	-	distal cusp broken
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
							R.M2	l	b	b	3	3		R. m2	l	r	b	2	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
M363	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	b	2	3	
							L.M2	h	r	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	r	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1683	Kirifuri	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	Tokorono,						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
	Nikko city						L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
	(Tochigi pref.)						L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-		-	-	absent
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M1895	Chugushi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Nikko city						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
	(Tochigi pref.)						L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	b	0	1		L. m1	l	b	b	3	3	
							L.M2	h	r	b	1	1		L. m2	l	b	b	3	3	
							L.M3	-	-	s	-	-	mesial cusp broken	L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2357	Irohazaka	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	Nikko city						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
	(Tochigi pref.)						L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	b	1	3		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	-	r	-	-	-	distal cusp unworn	L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	r	2	2	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	-	s	-	-	-	distal cusp unworn	R. m3	l	b	b	3	3	
M2359	Senjogahara	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Nikko city						L. P3	-	-	-	-	-	absent	L. p3	-	s	-	-	-	
	(Tochigi pref.)						L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	b	r	3	1	
							L.M2	h	r	s	1	0		L. m2	h	r	b	1	3	
							L.M3	-	s	-	-	-	distal cusp unworn	L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	0	
							R.M3	-	s	-	-	-	distal cusp unworn	R. m3	l	s	s	2.5	2.5	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3648	Nikko city	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	r	r	3	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M3650	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	b	2	3	
							R. P2	-	-	-	-	-	irregular eruption	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	-	r	-	-	-	distal cusp unworn	R. m2	l	r	r	2	2	
							R.M3	-	-	s	-	-	mesial cusp broken	R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3773	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	b	0	3		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	right mandible absent
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	
							R.M2	h	r	s	1	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
M3788	Koutoku	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	s	-	-	-	
	Nikko city						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
	(Tochigi pref.)						L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	r	3	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	b	2	3	
							L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	-	-	r	-	-	mesial cusp broken	R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll. Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3796	Ashio town	-		-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-	plication worn out	L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	l	r	r	2	2		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	right
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	mandible
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	absent
							R.M1	l	b	b	3	3		R. m1	-	-	-	-	-	
							R.M2	l	-	b	-	-		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
M3863	Kiyotaki Arazawa	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	mandible
	Arazawa						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	absent
	Nikko city						L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
	(Tochigi pref.)						L.M1	h	r	r	1	1		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	-	s	-	-	-	distal cusp broken	L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	l	r	r	2	2		R. m1	-	-	-	-	-	
							R.M2	h	r	s	1	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	

A-3 continued.

Reg. No.	Locality	Body mass (kg)	Sex	Age	Coll. Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3862	(Tochigi pref.)	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
							L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0	mesial cusp broken	R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	s	s	2.5	2.5	
M3879	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3	worn out ?	L. m1	-	-	-	-	-	worn out
							L.M2	h	r	-	1	-	distal cusp broken	L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	b	3	3	worn out ?	R. m1	-	-	-	-	-	worn out
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll. Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3880	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	r	3	2	mesial cusp broken	L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0	mesial cusp broken	L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	b	3	3		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M3970	Kanuma city	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	h	r	s	1	0		L. m3	-	-	-	-	-	
							R. P2	-	-	-	-	-	broken	R. p2	-	-	-	-	-	
							R. P3	-	-	-	-	-	absent	R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	r	s	1	0		R. m3	-	-	-	-	-	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M4145	Nikko city	-	f	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Tochigi pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	r	1	1		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0	mesial cusp broken	L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1	distal cusp broken	R. m1	l	r	b	2	3	
							R.M2	h	r	s	1	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	b	2	3	
M4146	Nikko city	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	s	r	0	1		L. m2	l	b	r	3	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	b	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	s	2	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	r	3	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M4161	Nikko city	-	f	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	r	1	1		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	l	b	r	3	2	cusps broken ?	R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
M4164	Nikko city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	l	b	b	3	3	cusps broken ?	L. m1	-	-	-	-	-	
							L.M2	h	s	r	0	1		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	l	r	r	2	2		R. m1	-	-	-	-	-	
							R.M2	h	r	r	1	1		R. m2	-	-	-	-	-	
							R.M3	h	r	s	1	0		R. m3	-	-	-	-	-	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M4167	Nikko city	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	-	-	-	-	mandible absent
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	-	-	-	-	-	cusps broken	L. m1	-	-	-	-	-	
							L.M2	h	-	s	-	0	mesial cusp broken	L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	
							R. P3	-	-	-	-	-	absent	R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	
							R.M2	h	-	s	-	0	mesial cusp broken	R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
TG-0401	Ashio town	36.5	F-	3	21-Feb-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	0	1		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0404	Nikko city	40.2	F-	6	6-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	b	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	0		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	l	r	r	2	2		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	
TG-0405	Nikko city	56.5	Fm	6	6-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	b	3	3		R. m1	l	b	b	3	3	
							R.M2	-	-	-	-	-		R. m2	l	b	b	3	3	
							R.M3	-	-	b	-	-	broken	R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0406	Nikko city	45.8	Ff	6	6-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	-	r	-	-	-		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1	distal cusp broken	R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
TG-0408	Nikko city	53.3	Ff	10	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	b	2	3		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	b	2	3		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0409	Nikko city	45.6	Ff	5	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
TG-0410	Nikko city	43.8	Ff	7	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	l	r	r	2	2		L. m1	-	-	-	-	-	
							L.M2	h	r	r	1	1		L. m2	-	-	-	-	-	
							L.M3	h	r	s	1	0		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	b	3	3		R. m1	l	b	b	3	3	
							R.M2	h	-	r	-	1		R. m2	l	b	b	3	3	
							R.M3	h	-	s	-	0	mesial cusp broken	R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0411	Nikko city	45.6	Fm	10	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
TG-0412	Nikko city	-	F?	6	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	-	-	s	-	-		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0	mesial cusp broken	L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0413	Nikko city	42.2	Fm	8	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	-	s	-	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-	mesial cusp broken	R. p2	-	-	-	-	-	right mandible absent
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	-	-	-	-	
							R.M2	h	r	r	1	1		R. m2	l	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	l	-	-	-	-	
TG-0414	Nikko city	45.4	Fm	7	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0415	Nikko city	37	Fm	3	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	
TG-0416	Nikko city	38.5	Ff	7	10-Mar-04	UMUT	L. P2	-	-	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-	absent	L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0417	Nikko city	56.6	Fm	12	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	b	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	
TG-0418	Nikko city	41.6	Fm	5	10-Mar-04	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	r	3	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	b	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	b	r	3	2		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0422	Nikko city	50.9	Fm	11	10-Mar-04	UMUT	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	l	r	r	2	2		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	r	b	2	3		R. m1	l	b	b	3	3	
							R.M2	l	r	r	2	2		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
TG-0503	Ashio town	-	F?	8	24-Jan-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	l	r	r	2	2		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0504	Awano town	-	M	FA	21-Jan-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	broken
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	b	2	3	
							L.M2	h	r	r	1	1		L. m2	l	r	b	2	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	r	2	3	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	3	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
TG-0505	Kanuma city	-	F?	4	18-Jan-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0511	Ashio town	-	F?	3	28-Feb-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	r	0	1		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
TG-0512	Ashio town	-	F?	3	28-Feb-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	s	r	0	1	broken	L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	-	-	-	-		R. p4	-	r	-	-	-	
							R.M1	-	-	-	-	-	broken	R. m1	l	b	b	3	3	
							R.M2	-	-	-	-	-	broken	R. m2	l	r	r	2	2	
							R.M3	h	1	r	0	1	broken	R. m3	l	r	r	2	2	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0513	Ashio town	-	F?	6	27-Feb-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	
YG-0516	Awano town	-	F?	8	4-Jan-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	

A-3 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0517	Awano town	-	F?	4	15-Jan-05	UMUT	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	3	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	r	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
TG-0521	Ashio town	-	F?	8	7-Feb-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	-	1	-		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0	distal cusp broken	L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0		R. m3	l	b	b	3	3	

A-4. the Nikko population (lingual cusps).

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0401	Ashio town	36.5	F-	3	21-Feb-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	r	b	2	3	
							L. m2	l	b	r	3	2	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	s	1	0	
							R. m3	h	r	r	1	1	
TG-0404	Nikko city	40.2	F-	6	6-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	r	r	2	2	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	b	-	-	-	
							R. m1	l	r	r	2	2	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0405	Nikko city	56.5	Fm	6	6-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	
TG-0406	Nikko city	45.8	Ff	6	6-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	-	r	-	2	mesial cusp broken
							L. m2	l	r	r	2	2	
							L. m3	l	r	r	2	2	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	b	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0408	Nikko city	53.3	Ff	10	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	s	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	s	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	r	1	1	
							R. m3	l	r	r	2	2	broken
TG-0409	Nikko city	45.6	Ff	5	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	r	r	2	2	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	s	1	0	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0410	Nikko city	43.8	Ff	7	10-Mar-04	UMUT	L. p2	-	-	-	-	-	left mandible absent
	(Tochigi pref.)						L. p3	-	-	-	-	-	
							L. p4	-	-	-	-	-	
							L. m1	-	-	-	-	-	
							L. m2	-	-	-	-	-	
							L. m3	-	-	-	-	-	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	r	r	2	2	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	
TG-0411	Nikko city	45.6	Fm	10	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	r	r	2	2	
							R. m2	h	r	r	1	1	
							R. m3	h	s	s	0	0	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0412	Nikko city	-	F?	6	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	r	1	1	
							L. m3	h	r	s	1	0	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	r	r	2	2	
							R. m2	h	r	r	1	1	
							R. m3	h	s	s	0	0	
TG-0413	Nikko city	42.2	Fm	8	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	-	1	-	distal cusp absent
							L. m3	h	-	r	-	1	mesial cusp broken
							R. p2	-	-	-	-	-	right mandible absent
							R. p3	-	-	-	-	-	
							R. p4	-	-	-	-	-	
							R. m1	-	-	-	-	-	
							R. m2	-	-	-	-	-	
							R. m3	-	-	-	-	-	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0414	Nikko city	45.4	Fm	7	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	s	1	0	
							L. m3	h	r	s	1	0	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	-	r	1	1	mesial cusp broken
TG-0415	Nikko city	37	Fm	3	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	b	s	3	0	
							L. m3	h	s	s	0	0	
							R. p2	-	s	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	-	1	-	distal cusp absent
							R. m2	h	s	s	0	0	
							R. m3	h	s	s	0	0	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0416	Nikko city	38.5	Ff	7	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	r	1	1	
							L. m3	h	s	s	0	0	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	r	1	1	
							R. m3	h	r	s	1	0	
TG-0417	Nikko city	56.6	Fm	12	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	s	r	0	1	
							L. m3	h	s	r	0	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	b	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	b	r	3	1	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0418	Nikko city	41.6	Fm	5	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	r	b	2	3	
							L. m2	h	r	r	1	1	
							L. m3	h	s	s	0	0	
							R. p2	-	b	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	s	1	0	
							R. m3	h	s	s	0	0	
TG-0422	Nikko city	50.9	Fm	11	10-Mar-04	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	b	-	-	-	
							L. p4	-	b	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	b	-	-	-	
							R. p4	-	b	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0503	Ashio town	-	F?	8	24-Jan-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	
TG-0504	Awano town	-	M	FA	21-Jan-05	UMUT	L. p2	-	-	-	-	-	broken
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	-	1	-	distal cusp absent
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0505	Kanuma city	-	F?	4	18-Jan-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	r	s	1	0	
TG-0511	Ashio town	-	F?	3	28-Feb-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	s	s	0	0	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	mesial cusp broken
							R. m2	h	s	s	0	0	
							R. m3	h	s	s	0	0	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0512	Ashio town	-	F?	3	28-Feb-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	-	-	-	-	-	broken
							R. m3	-	-	-	-	-	broken
TG-0513	Ashio town	-	F?	6	27-Feb-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	l	r	b	2	3	
							L. m2	h	r	r	1	1	
							L. m3	h	s	r	0	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	l	r	r	2	2	
							R. m2	h	s	b	0	3	distal cusp absent
							R. m3	h	s	r	0	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
YG-0516	Awano town	-	F?	8	4-Jan-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	r	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	r	s	1	0	
TG-0517	Awano town	-	F?	4	15-Jan-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	s	-	-	-	
							L. p4	-	r	-	-	-	
							L. m1	h	r	r	1	1	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	r	-	-	-	
							R. p4	-	r	-	-	-	
							R. m1	h	r	r	1	1	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	

A-4 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
TG-0521	Ashio town	-	F?	8	7-Feb-05	UMUT	L. p2	-	r	-	-	-	
	(Tochigi pref.)						L. p3	-	b	-	-	-	
							L. p4	-	b	-	-	-	
							L. m1	l	b	b	3	3	
							L. m2	h	r	r	1	1	
							L. m3	h	r	r	1	1	
							R. p2	-	r	-	-	-	
							R. p3	-	b	-	-	-	
							R. p4	-	b	-	-	-	
							R. m1	l	b	b	3	3	
							R. m2	h	r	r	1	1	
							R. m3	h	r	r	1	1	

A-5. the Tsushima population (buccal cusps)

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M381	Tsushima city	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M382	Tsushima city	-	f	-	-	TPM	L. P2	-	-	-	-	-	unerupted	L. p2	-	-	-	-	-	absent
	(Nagasaki pref.)						L. P3	-	-	-	-	-	unerupted	L. p3	-	s	-	-	-	
							L. P4	-	-	-	-	-	absent	L. p4	-	-	-	-	-	unerupted
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	r	0	1		L. m2	h	r	r	1	1	
							L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
							R. P2	-	s	-				R. p2	-	-	-	-	-	absent
							R. P3	-	-	-	-	-	unerupted	R. p3	-	s	-	-		
							R. P4	-	-	-	-	-	unerupted	R. p4	-	-	-	-	-	unerupted
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	r	0	1		R. m2	h	r	s	1	0	
							R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M383	Tsushima city	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	s	1	0	
							L.M2	h	s	r	0	1		L. m2	h	s	s	0	0	
							L.M3	-	-	-	-	-	unworn	L. m3	-	-	-	-	-	unerupted
							R. P2	-	-	-	-	-	absent	R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	absent
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	absent
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	-	-	-	-	-	unworn	R. m3	-	-	-	-	-	unerupted
M384	Tsushima city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	-	-		-	-	absent
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	s	1	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M385	Tsushima city	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1		r	s	1	0		R. m1	l	r	r	2	2	
							R.M2		r	s	1	0		R. m2	h	r	s	1	0	
							R.M3		-	s	-	-	mesial cusp broken	R. m3	h	s	s	0	0	
M386	Tsushima city	-	m	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Nagasaki pref.)						L.DP3	h	r	s	1	0	*1	L. dp3	-	r	-	-	-	
							L.DP4	h	r	s	1	0	*1	L. dp4	l	r	r	2	2	*2
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	s	0	0	
							R.DP2	-	r	-	-	-		R. dp2	-	s	-	-	-	
							R.DP3	h	s	s	0	0	*1	R. dp3	-	s	-	-	-	
							R.DP4	h	r	s	1	0	*1	R. dp4	l	r	r	2	2	*2
							R.M1	h	r	r	1	1		R. m1	l	r	b	2	3	
							R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	r	0	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M387	Tsushima city	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. dp2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. dp3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. dp4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. dp2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. dp3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. dp4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M388	Tsushima city	-	m	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Nagasaki pref.)						L.DP3	l	s	s	2.5	2.5	*1	L. dp3	-	s	-	-	-	
							L.DP4	h	r	s	1	0	*1	L. dp4	l	r	s	1	0	*2
							L.M1	h	r	s	1	0		L. m1	h	s	s	0	0	
							R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
							R.DP3	l	s	s	2.5	2.5	*1	R. dp3	-	s	-	-	-	
							R.DP4	h	r	r	1	1	*1	R. dp4	h	r	s	1	0	*2
							R.M1	h	r	s	1	0		R. m1	h	r	s	1	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M389	Tsushima city	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	l	r	s	2	2.5		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	l	r	b	2	3	
M390	Tsushima city	-	m	-	-	TPM	L. P2	-	-	-	-	-	unerupted	L. p2	-	-	-	-	-	absent
	(Nagasaki pref.)						L. P3	-	-	-	-	-	unerupted	L. p3	-	-	-	-	-	absent
							L. P4	-	-	-	-	-	unerupted	L. p4	-	-	-	-	-	absent
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	absent
							L.M2	h	s	r	0	1		L. m2	h	s	s	0	0	
							L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
							R. P2	-	-	-	-	-	unerupted	R. p2	-	-	-	-	-	absent
							R. P3	-	-	-	-	-	unerupted	R. p3	-	-	-	-	-	absent
							R. P4	-	-	-	-	-	absent	R. p4	-	-	-	-	-	absent
							R.M1	h	s	s	0	0		R. m1	h	s	s	0	0	
							R.M2	h	s	r	0	1		R. m2	h	s	s	0	0	
							R.M3	-	-	-	-	-	absent	R. m3	-	-	-	-	-	unerupted

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M391	Tsushima city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	b	2	3	
							L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	s	2	2.5		R. m1		-	-	-	-	absent
							R.M2	h	r	s	1	0		R. m2	l	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	2	2	
M392	Tsushima city	-	f	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	-	-	-	-	absent
	(Nagasaki pref.)						L.DP3	h	s	r	0	1	*1	L. dp3	-	s	-	-	-	
							L.DP4	h	s	s	0	0	*1	L. dp4	l	s	s	2.5	2.5	*2
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	-	s	-	-	-	dital cusp unworn	L. m2	h	s	s	0	0	
							R.DP2	-	s	-	-	-		R. dp2	-	-	-	-	-	absent
							R.DP3	h	s	r	0	1	*1	R. dp3	-	s	-	-	-	
							R.DP4	h	r	s	1	0	*1	R. dp4	l	r	r	2	2	*2
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	-	s	-	-	-	dital cusp unworn	R. m2	h	s	s	0	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M393	Tsushima city	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	b	2	3	
							L.M2	h	r	s	1	0		L. m2	l	r	s	2	2.5	
							L.M3	h	s	s	0	0		L. m3	h	r	s	1	0	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	b	2	3	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	1	
							R.M3	h	r	s	1	0		R. m3	h	r	s	1	1	
M394	Tsushima city	-	m	-	-	TPM	L. P2	-	r	-	-	-	unerupted	L. p2	-	-	-	-	-	absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-	unerupted	L. p3	-	-	-	-	-	absent
							L. P4	-	r	-	-	-	absent	L. p4	-	-	-	-	-	absent
							L.M1	h	s	s	0	0		L. m1	h	r	s	1	0	
							L.M2	h	s	s	0	0		L. m2	h	s	s	0	0	
							L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	unerupted
							R. P2	-	-	-	-	-	unerupted	R. p2	-	-	-	-	-	absent
							R. P3	-	-	-	-	-	unerupted	R. p3	-	-	-	-	-	absent
							R. P4	-	-	-	-	-	absent	R. p4	-	-	-	-	-	absent
							R.M1	h	s	s	0	0		R. m1	-	-	s	-	-	mesial cusp broken
							R.M2	h	s	s	0	0		R. m2	h	b	s	3	0	
							R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	unerupted

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M397	Tsushima city	-	m	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
M398	Tsushima city	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	s	1	0		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M399	Tsushima city	-	m	-	-	TPM	L. P2	-	r	-	-	-	mandible absent	L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	s	1	0		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	h	r	r	1	1		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
M1119	Tsushima city	-	m	-	-	TPM	L. P2	-	s	-	-	-	mandible absent	L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂9	Tsushima city	-	m	4y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	r	0	1		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	h	s	s	0	0	
							R.M3	h	s	-	0	-	distal cusp unworn	R. m3	l	r	r	2	2	
T81♂10	Tsushima city	-	m	4y	-	HUM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	s	1	0	
							L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	t	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	t	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	t	s	1	0	
							R.M2	h	s	s	0	0		R. m2	h	t	s	1	0	
							R.M3	h	s	s	0	0		R. m3	h	s	-	0	-	distal cusp broken

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂11	Tsushima city	-	m	7y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	t	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	s	s	0	0	
							L.M3	h	s	s	0	0		L. m3	h	t	s	1	0	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	broken
							R. P3	-	s	-	-	-		R. p3	-	t	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	t	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	t	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	s	s	0	0	
T81♂12	Tsushima city	-	m	7y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	s	s	0	0	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	0	
							R.M3	h	s	s	0	0		R. m3	h	s	s	0	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂13	Tsushima city	-	m	7y	-	HUM	L. P2	-	b	-	-	-		L. p2	-	-	-	-	-	absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	h	s	-	0	-	distal cusp broken	L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
							R.M2	h	s	s	0	0		R. m2	h	s	s	0	0	
							R.M3	h	s	s	0	0		R. m3	h	s	s	0	0	
T81♂14	Tsushima city	-	m	8y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂15	Tsushima city	-	m	9y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	s	1	0	
							L.M3	h	-	s	-	0	mesial cusp broken	L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	
T81♂16	Tsushima city	-	m	9y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	broken
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	b	2	3	
							L.M2	h	r	r	1	1		L. m2	h	r	s	1	0	
							L.M3	h	r	r	1	1		L. m3	h	r	r	1	1	
							R. P2	-	-	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	-	-	-	-	broken
							R.M1	h	r	r	1	1		R. m1	l	b	b	2	3	
							R.M2	h	r	s	1	0		R. m2	-	b	s	-	-	broken
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂17	Tsushima city	-	m	10y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	-	-	-	-	broken	L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	b	b	3	3	
							L.M2	h	s	r	0	1		L. m2	h	r	r	1	1	
							L.M3	h	r	-	1	-	distal cusp broken	L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	broken
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	r	r	1	1		R. m3	h	r	r	1	1	
T81♀5	Tsushima city	-	f	4y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	s	1	0	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	s	s	0	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♀6	Tsushima city	-	f	4y	-	HUM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	broken
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	r	0	1		L. m3	h	s	s	0	0	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	broken
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	h	s	s	0	0	
T81♀7	Tsushima city	-	f	4y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	s	1	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♀8	Tsushima city	-	f	7y	-	HUM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	
12	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	b	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	h	r	s	1	0		L. m3	l	r	s	2	2.5	
							R. P2	-	b	-	-	-		R. p2	-	b	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	r	b	2	3	
							R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
13	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	b	2	3	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	2	2	
14	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	s	s	0	0	
							L.M3	h	s	s	0	0		L. m3	l	s	s	2.5	2.5	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	s	s	0	0	
							R.M3	h	s	s	0	0		R. m3	l	s	s	2.5	2.5	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
21	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	l	s	s	2.5	2.5	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	s	1	0	
							R.M3	h	s	s	0	0		R. m3	l	s	s	2.5	2.5	
22	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	b	2	3	
							L.M2	h	r	s	1	0		L. m2	l	b	r	3	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	b	2	3	
							R.M2	h	r	s	1	0		R. m2	l	b	r	3	2	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	3	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
27	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	s	s	0	0	
							L.M3	h	s	s	0	0		L. m3	l	s	s	2.5	2.5	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
43	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	s	s	0	0	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
53	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	-	-	-	-	absent	R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	
55	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	h	r	s	1	0	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	0	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
57	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	s	1	0		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	absent
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	
60	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	-	-	-	-	absent	R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
76	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	s	1	0	
							R.M2	h	r	s	1	0		R. m2	h	r	s	1	0	
							R.M3	h	s	s	0	0		R. m3	h	s	s	0	0	
78	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	-	s	-	0	mesial cusp broken
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	broken
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	broken
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	-	0	-	distal cusp broken	R. m1	h	s	s	0	0	
							R.M2	h	s	s	0	0		R. m2	h	s	s	0	0	
							R.M3	h	s	-	0	-	distal cusp unworn	R. m3	l	s	b	2.5	3	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
79	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	s	1	0		L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	-	-	-	-	-	absent	R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	r	s	1	0		R. m3	-	-	-	-	-	
84	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
87	Tsushima city	-	m	-	-	HUM	L. P2	-	b	-	-	-		L. p2	-	-	-	-	-	absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	r	r	1	1		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	h	s	r	0	1	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	s	1	0		R. m1	-	-	-	-	-	absent
							R.M2	h	r	r	1	1		R. m2	h	r	s	1	0	
							R.M3	h	s	-	0	-	distal cusp broken	R. m3	h	s	s	0	0	
88	Tsushima city	-	m	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	s	1	0	
							L.M2	-	-	-	-	-	broken	L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	s	r	0	1	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
89	Tsushima city	-	f	-	-	HUM	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	-	-	-	-	broken	R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	-	-	-	-	-	absent
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	s	1	0	
なし	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	absent
							R.M2	h	-	s	0	0	mesial cusp broken	R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
92	Tsushima city	-	m	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	s	1	-	distal cusp broken	R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	
94	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	s	1	0	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	s	1	0	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	h	r	s	1	0	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
95	Tsushima city	-	f	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	r	s	1	0		L. m2	l	r	s	2	2.5	
							L.M3	h	s	s	0	0		L. m3	l	b	r	3	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	broken
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	broken
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	absent
							R.M2	h	s	s	0	0		R. m2	h	-	r	-	2	mesial cusp broken
							R.M3	h	s	s	0	0		R. m3	h	r	s	2	2.5	
96	Tsushima city	-	m	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	absent
							R.M2	h	-	s	-	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
100	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
103	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
104	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	s	1	0	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	r	r	1	1		R. m2	h	r	s	1	0	
							R.M3	h	r	r	1	1		R. m3	h	s	s	0	0	
106	Tsushima city	-	m	-	-	HUM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	-	-	-	-	-	absent	L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	-	-	-	-	absent	R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-	-	-	-	absent
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
110	Tsushima city	-	m	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	-	s	-	0	mesial cusp broken	L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	absent
111	Tsushima city	-	m	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	b	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	-	s	-	0	mesial cusp broken	L. m1	l	r	r	2	2	
							L.M2	h	-	-	-	-	broken	L. m2	h	s	s	0	0	
							L.M3	h	s	s	0	0		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	b	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	s	s	0	0	
							R.M3	h	s	s	0	0		R. m3	l	s	s	2.5	2.5	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
不明 1	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	-	-	-	-	-	absent	L. m1	-	-	-	-	-	
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	s	0	0		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	r	s	1	0		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	-	-	-	-	-		R. m3	-	-	-	-	-	
不明 2	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	s	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-5 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
不明 3	Tsushima city	-	f	-	-	HUM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Nagasaki pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	r	3	2	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	0	
							R.M3	h	s	s	0	0		R. m3	h	s	s	0	0	

A-6. the Tsushima population (lingual cusps).

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂9	Tsushima city	-	m	4y	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	r	0	1	
							M3	h	s	r	0	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	s	-	0	-	distal cusp unworn
T81♂10	Tsushima city	-	m	4y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	-	s	-	0	mesial cusp broken
							M3	h	s	r	0	1	distal cusp broken

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂11	Tsushima city	-	m	7y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	r	s	1	0	
							M3	h	r	r	1	1	
							P2	-	-	-	-	-	broken
							P3	-	s	-	-	-	
							P4	-	s	-	-	-	
							M1	h	r	s	1	0	
							M2	h	r	r	1	1	
							M3	h	s	r	0	1	
T81♂12	Tsushima city	-	m	7y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
							P2	-	r	-	-	-	
							P3	-	b	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂13	Tsushima city	-	m	7y	-	HUM	P2	-	-	-	-	-	absent
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	2	2	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
T81♂14	Tsushima city	-	m	8y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	b	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	s	1	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	b	-	-	-	
							P4	-	b	-	-	-	
							M1	h	-	r	-	1	mesial cusp broken
							M2	h	-	r	-	1	mesial cusp broken
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂15	Tsushima city	-	m	9y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	0	r	1	1	
T81♂16	Tsushima city	-	m	9y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	-	-	-	-	broken
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	s	1	0	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	-	-	-	-	broken
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♂17	Tsushima city	-	m	10y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	-	s	-	0	
							M3	h	r	r	1	1	
							P2	-	-	-	-	-	broken
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	1	1	
							M2	h	-	-	-	-	broken
							M3	h	-	-	-	-	broken
T81♀5	Tsushima city	-	f	4y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♀6	Tsushima city	-	f	4y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
							P2	-	s	-	-	-	
							P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
T81♀7	Tsushima city	-	f	4y	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	r	r	1	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
T81♀8	Tsushima city	-	f	7y	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	r	s	1	0	
12	Tsushima city	-	f	-	-	HUM	P2	-	b	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	2	2	
							M2	h	r	s	1	0	
							M3	h	r	s	0	0	
							P2	-	b	-	-	-	
							P3	-	b	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	b	2	3	
							M2	h	r	s	1	0	
							M3	h	r	s	1	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
13	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	s	s	0	0	
14	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	s	-	-	-	
							P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
21	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
22	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	2	2	
							M2	h	r	s	1	0	
							M3	h	-	s	-	0	mesial cusp broken
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	2	2	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
27	Tsushima city	-	f	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
							P2	-	s	-	-	-	
							P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	s	r	0	1	
43	Tsushima city	-	f	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	s	-	0	-	distal cusp broken
							M3	h	s	s	0	0	
							P2	-	s	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	
							M2	h	s	r	0	1	
							M3	h	s	r	0	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
53	Tsushima city	-	f	-	-	HUM	P2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
							P2	-	-	-	-	-	
							P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
55	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
57	Tsushima city	-	f	-	-	HUM	P2	-	-	-	-	-	left mandible absent
	(Nagasaki pref.)						P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
							P2	-	s	-	-	-	
							P3	-	s	-	-	-	
							P4	-	s	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	-	r	-	1	mesial cusp broken
							M3	h	s	r	0	1	
60	Tsushima city	-	f	-	-	HUM	P2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
							P2	-	-	-	-	-	
							P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
76	Tsushima city	-	f	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
							P2	-	s	-	-	-	
							P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	s	1	0	
							M3	h	s	s	0	0	
78	Tsushima city	-	f	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	s	0	0	
							M2	h	r	s	1	0	
							M3	h	s	s	0	0	
							P2	-	s	-	-	-	
							P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	r	s	1	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
79	Tsushima city	-	f	-	-	HUM	P2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
							P2	-	-	-	-	-	
							P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
84	Tsushima city	-	f	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	s	1	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	s	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
87	Tsushima city	-	m	-	-	HUM	P2	-	-	-	-	-	absent
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	s	r	0	1	
							P2	-	b	-	-	-	
							P3	-	b	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
88	Tsushima city	-	m	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	-	r	-	1	mesial cusp broken
							M3	h	r	r	1	1	
							P2	-	s	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
89	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
							P2	-	s	-	-	-	
							P3	-	r	-	-	-	
							P4	-	s	-	-	-	
							M1	-	-	-	-	-	absent
							M2	-	-	-	-	-	broken
							M3	h	s	s	0	0	
なし	Tsushima city	-	f	-	-	HUM	P2	-	b	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	r	0	1	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	0	r	1	1	
							M3	h	-	r	-	1	mesial cusp broken

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
92	Tsushima city	-	m	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
94	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	s	-	-	-	
							M1	h	r	s	1	0	
							M2	h	s	s	0	0	
							M3	h	s	r	0	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	s	-	-	-	
							M1	h	s	-	0	-	distal cusp broken
							M2	h	s	s	0	0	
							M3	h	r	s	1	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
95	Tsushima city	-	f	-	-	HUM	P2	-	s	-	-	-	
	(Nagasaki pref.)						P3	-	-	-	-	-	broken
							P4	-	r	-	-	-	
							M1	h	-	r	-	1	mesial cusp broken
							M2	h	-	-	-	-	broken
							M3	h	r	r	1	1	
							P2	-	s	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	r	s	1	0	
							M3	h	r	s	1	0	
96	Tsushima city	-	m	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	s	1	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	s	r	0	1	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
100	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	-	s	-	0	mesial cusp broken
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
103	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
							P2	-	-	-	-	-	absent
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	s	r	0	1	
							M3	h	s	r	0	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
104	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	s	1	0	
							M2	-	-	-	-	-	broken
							M3	h	s	r	0	1	
106	Tsushima city	-	m	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	-	r	-	1	
							M2	h	s	s	0	0	
							M3	-	-	-	-	-	broken
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	-	-	-	-	-	absent
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
110	Tsushima city	-	m	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	-	-	-	-	broken
							M3	h	s	s	0	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	-	r	-	1	mesial cusp broken
							M2	h	s	-	0	-	distal cusp broken
							M3	h	-	-	-	-	absent
111	Tsushima city	-	m	-	-	HUM	P2	-	b	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	s	-	0	-	distal cusp broken
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	
							P2	-	b	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
不明 1	Tsushima city	-	f	-	-	HUM	P2	-	-	-	-	-	mandible absent
	(Nagasaki pref.)						P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
							P2	-	-	-	-	-	
							P3	-	-	-	-	-	
							P4	-	-	-	-	-	
							M1	-	-	-	-	-	
							M2	-	-	-	-	-	
							M3	-	-	-	-	-	
不明 2	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	r	r	1	1	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	h	r	r	1	1	
							M2	h	r	r	1	1	
							M3	h	s	r	0	1	

A-6 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
不明 3	Tsushima city	-	f	-	-	HUM	P2	-	r	-	-	-	
	(Nagasaki pref.)						P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	2	2	
							M2	h	r	r	1	1	
							M3	h	r	s	1	0	
							P2	-	r	-	-	-	
							P3	-	r	-	-	-	
							P4	-	r	-	-	-	
							M1	l	r	r	2	2	
							M2	h	s	s	0	0	
							M3	h	s	s	0	0	

A-7. the Yakushima population (buccal cusps).

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M301	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	h	r	s	1	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
							R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
							R.M3	h	r	r	1	1		R. m3	h	r	r	1	1	
M302	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Kagoshima pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	r	s	1	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	-	-		-	-	absent
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M303	Yakushima town	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	(Kagoshima pref.)	-					L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	h	s	r	0	1		L. m3	h	s	s	0	0	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	-	-	-	-	absent
							R.M2	h	s	r	0	1		R. m2	h	r	r	1	1	
							R.M3	l	r	r	2	2		R. m3	l	r	r	2	2	
M304	Yakushima town	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	l	s	r	2.5	2		L. m3	l	s	s	2.5	2.5	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	-	-	r	-	-	mesial cusp broken	R. m1	-	-	-	-	-	absent
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	l	s	r	2.5	2		R. m3	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M305	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-	mandible absent		-	-	-	-	-	
	(Kagoshima pref.)						L. P3	-	s	-	-	-			-	-	-	-	-	
							L. P4	-	r	-	-	-			-	-	-	-	-	
							L.M1	h	r	r	1	1			-	-	-	-	-	
							L.M2	h	r	s	1	0			-	-	-	-	-	
							L.M3	h	s	s	0	0			-	-	-	-	-	
							R. P2	-	s	-	-	-			-	-	-	-	-	
							R. P3	-	s	-	-	-			-	-	-	-	-	
							R. P4	-	r	-	-	-			-	-	-	-	-	
							R.M1	h	r	s	1	0			-	-	-	-	-	
							R.M2	h	s	s	0	0			-	-	-	-	-	
							R.M3	h	s	s	0	0			-	-	-	-	-	
M306	Yakushima town	-	m	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	s	-	-	-	
	(Kagoshima pref.)						L.DP3	l	r	b	2	3	*1	L. dp3	-	s	-	-	-	
							L.DP4	h	r	r	1	1	*1	L. dp4	l	r	r	2	2	*2
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	s	0	0	
							L.M3	-	-	-	-	-	unerupted	L. m3	-	-	-	-	-	
							R.DP2	-	r	-	-	-		R. dp2	-	s	-	-	-	
							R.DP3	l	r	s	2	2.5	*1	R. dp3	-	s	-	-	-	
							R.DP4	h	r	r	1	1	*1	R. dp4	l	r	r	2	2	*2
							R.M1	h	r	r	1	1		R. m1	h	r	r	1	1	
							R.M2	-	r	-	-	-	distal cusp unworn	R. m2	h	r	r	1	1	
							R.M3	-	-	-	-	-	unerupted	R. m3	-	-	-	-	-	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M307	Yakushima town	-	f	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Kagoshima pref.)						L.DP3	h	s	s	0	0	*1	L. dp3	-	r	-	-	-	
							L.DP4	h	s	s	0	0	*1	L. dp4	l	r	r	2	2	
							L.M1	h	s	r	0	1		L. m1	l	r	r	2	2	
							L.M2	-	-	-	-	-	unerupted	L. m2	-	-	-	-	-	unerupted
							R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
							R.DP3	h	s	s	0	0	*1	R. dp3	-	r	-	-	-	
							R.DP4	h	s	s	0	0	*1	R. dp4	l	r	r	2	2	
							R.M1	h	s	r	0	1		R. m1	l	r	r	2	2	
							R.M2	-	-	-	-	-	unerupted	R. m2	-	-	-	-	-	unerupted
M308	Yakushima town	-	f	-	-		L. P2	-	b	-	-	-		L. p2	-	b	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
						TPM	L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	r	b	2	3	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	b	-	-	-		R. p2	-	b	-	-	-	
							R. P3	-	b	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M309	Yakushima town	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Kagoshima pref.)						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
							L.M2	h	s	r	0	1		L. m2	h	r	r	1	1	
							L.M3	h	s	r	0	1		L. m3	h	s	s	0	0	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	r	r	1	1	
							R.M2	h	s	r	0	1		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	h	r	r	1	1	
M310	Yakushima town	-	f	-	-	TPM	L.DP2	-	s	-	-	-		L. dp2	-	s	-	-	-	
	(Kagoshima pref.)						L.DP3	h	s	s	0	0	*1	L. dp3	-	s	-	-	-	
							L.DP4	h	s	s	0	0	*1	L. dp4	l	r	r	2	2	
							L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
							L.M2	-	-	-	-	-	unerupted	L. m2	-	-	-	-	-	unerupted
							R.DP2	-	s	-	-	-		R. dp2	-	s	-	-	-	
							R.DP3	h	s	s	0	0	*1	R. dp3	-	s	-	-	-	
							R.DP4	h	s	s	0	0	*1	R. dp4	l	r	r	2	2	
							R.M1	h	s	r	0	1		R. m1	h	r	r	1	1	
							R.M2	-	-	-	-	-	unerupted	R. m2	-	-	-	-	-	unerupted

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M311	Yakushima town	-	f	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	b	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	r	r	2	2	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	-	-	-	-	-	unworn	L. m3	-	-	-	-	-	unerupted
							R. P2	-	r	-	-	-		R. p2	-	b	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	r	2	2	
							R.M2	h	s	r	0	1		R. m2	l	r	r	2	2	
							R.M3	-	-	-	-	-	unworn	R. m3	-	-	-	-	-	unerupted
M312	Yakushima town	-	f	-	-	TPM	L.DP2	-	b	-	-	-		L. dp2	-	r	-	-	-	
	(Kagoshima pref.)						L.DP3	l	r	s	2	2.5		L. dp3	-	r	-	-	-	
							L.DP4	h	r	s	1	0		L. dp4	l	b	b	3	3	
							L.M1	-	r	-	-	-	distal cusp unworn	L. m1	l	r	r	2	2	
							R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
							R.DP3	l	r	s	2	2.5		R. dp3	-	r	-	-	-	
							R.DP4	h	r	s	1	0		R. dp4	l	b	b	3	3	
							R.M1	-	r	-	-	-	distal cusp unworn	R. m1	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M313	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	(Kagoshima pref.)						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	-	s	-	-	-	distal cusp unworn	L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	-	-	-	-	-	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	-	s	-	-	-	distal cusp unworn	R. m3	h	r	r	1	1	
M314	Yakushima town	-	m	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	-	-	-	-	absent
	(Kagoshima pref.)						L.DP3	l	r	r	2	2		L. dp3	-	r	-	-	-	
							L.DP4	h	s	r	0	1		L. dp4	l	b	r	3	2	
							L.M1	h	r	r	1	1		L. m1	l	r	r	2	2	
							L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	r	r	1	1	
							R.DP2	-	r	-	-	-		R. dp2	-	-	-	-	-	absent
							R.DP3	l	r	r	2	2		R. dp3	-	r	r	-	-	
							R.DP4	h	s	r	0	1		R. dp4	l	r	r	2	2	
							R.M1	h	s	r	0	1		R. m1	h	r	r	1	1	
							R.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	r	r	1	1	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M315	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	r	b	2	3	
							L.M2	h	r	s	1	0		L. m2	l	b	r	3	2	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	-	-	-	-	-	absent
							R.M2	h	s	s	0	0		R. m2	l	b	r	3	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M316	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	-	s	-	-	-	distal cusp broken	L. m3	l	s	r	2.5	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	r	0	1		R. m1	l	r	r	2	2	
							R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M317	Yakushima town	-	f	-	-	TPM	L.DP2	-	b	-	-	-		L. dp2	-	s	-	-	-	
	(Kagoshima pref.)						L.DP3	h	r	s	1	0		L. dp3	-	r	-	-	-	
							L.DP4	h	s	r	0	1		L. dp4	l	b	r	3	2	
							L.M1	h	s	r	0	1		L. m1	h	s	r	0	1	
							L.M2	-	s	-	-	-	distal cusp unworn	L. m2	h	s	s	0	0	
							R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
							R.DP3	h	r	r	1	1		R. dp3	-	r	-	-	-	
							R.DP4	h	s	s	0	0		R. dp4	l	b	r	3	2	
							R.M1	h	s	r	0	1		R. m1	h	r	r	1	1	
							R.M2	-	s	-	-	-	distal cusp unworn	R. m2	h	s	s	0	0	
M318	Yakushima town	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	b	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	r	r	2	2	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	r	3	2		R. m1	-	-	-	-	-	absent
							R.M2	h	s	r	0	1		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M319	Yakushima town	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	absent
							R.M2	h	r	r	1	1		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
M320	Yakushima town	-	-	-	-	TPM	L.DP2	-	r	-	-	-		L. dp2	-	r	-	-	-	
	(Kagoshima pref.)						L.DP3	h	r	r	1	1	*1	L. dp3	-	r	-	-	-	
							L.DP4	h	r	s	1	0	*1	L. dp4	l	r	r	2	2	*2
							L.M1	-	-	-	-	-	unerupted	L. m1	-	-	-	-	-	unerupted
							R.DP2	-	r	-	-	-		R. dp2	-	r	-	-	-	
							R.DP3	h	r	r	1	1	*1	R. dp3	-	r	-	-	-	
							R.DP4	h	r	s	1	0	*1	R. dp4	l	r	r	2	2	*2
							L.M1	-	-	-	-	-	unerupted	R. m1	-	-	-	-	-	unerupted

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0401	Yakushima town	-	F?	-	unkn.(2002)	UMUT	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	h	r	b	1	3	
							L.M3	h	s	r	0	1		L. m3	l	r	b	2	3	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	b	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	r	b	2	3	
							R.M3	h	r	s	1	0		R. m3	h	r	r	1	1	
KGSY-0504	Yakushima town	-	M	3	28-Aug-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	r	1	1		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	h	r	r	1	1		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	r	0	1		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0508	Yakushima town	-	F?	4	28-Aug-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	r	1	0		L. m1	-	-	-	-	-	
							L.M2	h	s	r	0	0		L. m2	-	-	-	-	-	
							L.M3	h	s	r	0	0		L. m3	-	-	-	-	-	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-	abnormal eruption	R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	r	0	1		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	h	r	r	1	1	
KGSY-0509	Yakushima town	-	F?	4	28-Aug-05	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	s	0	0		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	h	s	r	0	1		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	b	b	3	3	
							R.M2	h	r	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	r	r	0	1		R. m3	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0511	Yakushima town	-	M	4	?	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	r	s	1	0		L. m1	-	-	-	-	-	
							L.M2	h	r	s	1	0		L. m2	-	-	-	-	-	
							L.M3	h	r	s	1	0		L. m3	-	-	-	-	-	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	r	r	2	2	
							R.M3	h	r	s	1	0		R. m3	h	r	r	1	1	
KGSY-0513	Yakushima town	-	F?	4	?	UMUT	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	left mandible absent
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	
							L.M1	h	s	r	0	1		L. m1	-	-	-	-	-	
							L.M2	h	s	r	0	1		L. m2	-	-	-	-	-	
							L.M3	h	s	r	0	1		L. m3	-	-	-	-	-	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	-	-	-	-	absent	R. p4	-	r	-	-	-	absent
							R.M1	h	s	r	0	1		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	

A-7 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0517	Yakushima town	-	F?	3	?	UMUT	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	(Kagoshima pref.)						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	right mandible absent
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	
							R.M3	h	s	r	0	1		R. m3	-	-	-	-	-	

A-8. the Yakushima population (lingual cusps).

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0401	-	Yakushima town	-	F?	-	unkn.(2002)	UMUT	L. p2	-	r	-	-	-	
		(Kagoshima pref.)						L. p3	-	b	-	-	-	
								L. p4	-	r	-	-	-	
								L. m1	h	r	r	1	1	
								L. m2	h	r	r	1	1	
								L. m3	h	r	r	1	1	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	
								R. m2	h	s	r	0	1	
								R. m3	h	s	r	0	1	
KGSY-0504	4	Yakushima town	-	M	3	28-Aug-05	UMUT	L. p2	-	-	-	-	-	
		(Kagoshima pref.)						L. p3	-	-	-	-	-	
								L. p4	-	-	-	-	-	
								L. m1	-	-	-	-	-	
								L. m2	-	-	-	-	-	
								L. m3	-	-	-	-	-	
								R. p2	-	-	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	
								R. m2	h	s	s	0	0	
								R. m3	-	-	-	-	-	

A-8 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0508	8	Yakushima town	-	F?	4	28-Aug-05	UMUT	L. p2	-	-	-	-	-	
		(Kagoshima pref.)						L. p3	-	-	-	-	-	
								L. p4	-	-	-	-	-	
								L. m1	-	-	-	-	-	
								L. m2	-	-	-	-	-	
								L. m3	-	-	-	-	-	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	s	r	0	1	
								R. m2	h	s	r	0	1	
								R. m3	h	s	r	0	1	
KGSY-0509	9	Yakushima town	-	F?	4	28-Aug-05	UMUT	L. p2	-	-	-	-	-	
		(Kagoshima pref.)						L. p3	-	-	-	-	-	
								L. p4	-	-	-	-	-	
								L. m1	-	-	-	-	-	
								L. m2	-	-	-	-	-	
								L. m3	-	-	-	-	-	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	
								R. m2	h	r	r	1	1	
								R. m3	h	s	r	0	1	

A-8 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0511	-	Yakushima town	-	M	4	?	UMUT	L. p2	-	-	-	-	-	
		(Kagoshima pref.)						L. p3	-	-	-	-	-	
								L. p4	-	-	-	-	-	
								L. m1	-	-	-	-	-	
								L. m2	-	-	-	-	-	
								L. m3	-	-	-	-	-	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	
								R. m2	h	r	r	1	1	
								R. m3	h	r	r	1	1	
KGSY-0513	A-2	Yakushima town	-	F?	4	?	UMUT	L. p2	-	-	-	-	-	
		(Kagoshima pref.)						L. p3	-	-	-	-	-	
								L. p4	-	-	-	-	-	
								L. m1	-	-	-	-	-	
								L. m2	-	-	-	-	-	
								L. m3	-	-	-	-	-	
								R. p2	-	r	-	-	-	
								R. p3	-	r	-	-	-	
								R. p4	-	r	-	-	-	
								R. m1	h	r	r	1	1	
								R. m2	h	r	r	1	1	
								R. m3	h	s	s	0	0	

A-8 continued.

Reg.No.	Prev.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
KGSY-0517	B-3	Yakushima town	-	F?	3	?	UMUT	L. p2	-	r	-	-	-	
		(Kagoshima pref.)						L. p3	-	r	-	-	-	
								L. p4	-	r	-	-	-	
								L. m1	h	r	r	1	1	
								L. m2	h	s	s	0	0	
								L. m3	h	s	r	0	1	
								R. p2	-	-	-	-	-	
								R. p3	-	-	-	-	-	
								R. p4	-	-	-	-	-	
								R. m1	-	-	-	-	-	
								R. m2	-	-	-	-	-	
								R. m3	-	-	-	-	-	

A-9. the Japanese Serow populations (Nikko and Gifu).

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M402	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	b	r	3	2	mesial cusp broken ?	L. m1	l	b	b	3	3	
							L.M2	l	r	r	2	2	cusps broken ?	L. m2	l	b	b	3	3	
							L.M3	h	d	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
M403	Ashio-machi	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	-	-	-	-	absent	L. p3	-	r	-	-	-	
							L. P4	-	-	-	-	-	absent	L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0	mesial cusp broken ?	L. m1	l	r	b	2	3	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	b	2	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M405	Ashio-machi	-	f	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	b	r	3	2	mesial cusp broken ?	L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	h	r	r	1	1	
							L.M3	h	r	r	1	1		L. m3	h	r	r	1	1	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
M406	Ashio-machi	-	m	-	-	TPM	L. P2	-	b	-	-	-	broken ?	L. p2	-	s	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	s	r	2.5	2		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0	mesial cusp broken ?	R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1664	Fujihara-machi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	r	2	2		L. m1	-	-	-	-	-	worn out
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	r	2	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	r	r	2	2		R. m1	-	-	-	-	-	worn out
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
M1740	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	broken
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	s	r	2.5	2		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1795	Kuroiso-shi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2	worn out ?	L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	abnormal wear
							R.M2	h	s	s	0	0		R. m2	-	-	-	-	-	abnormal wear
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
M1843	Kuroiso-shi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0	mesial cusp broken ?	L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2174	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
M2253	Kuriyama-mura	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-	abnormal wear	L. p4	-	r	-	-	-	
							L.M1	-	-	-	-	-	abnormal wear	L. m1	-	-	-	-	-	worn out
							L.M2	l	r	r	2	2		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	worn out
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	absent
							R. P4	-	b	-	-	-	abnormal wear	R. p4	-	-	-	-	-	worn out
							R.M1	-	-	-	-	-	abnormal wear	R. m1	-	-	-	-	-	worn out
							R.M2	l	r	r	2	2		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2562	Shiobara-machi	-	f	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	r	3	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	-	-	-	-	broken	R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	b	2	3	
M2564	Ashio-machi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	broken ?
							L. P4	-	b	-	-	-	broken ?	L. p4	-	b	-	-	-	
							L.M1	h	-	-	-	-	broken	L. m1	h	b	r	3	1	
							L.M2	-	r	-	-	-	distal cusp broken	L. m2	l	r	r	2	2	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	-	-	-	-	broken	R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2578	Ashio-machi	-	f	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	s	b	2.5	3		L. m1	-	-	-	-	-	worn out
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	-	-	-	-	-	worn out
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
M2746	Ashio-machi	-	m	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	b	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-		-	-	-	
							L.M1	l	s	r	2.5	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	2	3	2	
							L.M3	h	s	s	0	0		L. m3	l	r	2	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	r	2.5	2		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2799	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	
M2805	Fujihara-machi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	s	b	0	3		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	b	2	3	distal cusp broken ?	R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	h	s	b	0	3		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2912	Ashio-machi	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
							L.M3	h	s	r	0	0		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
M2975	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	l	s	s	2.5	2.5	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3100	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	b	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	b	-	-	-		R. p3	-	-	-	-	-	absent
							R. P4	-	b	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	b	b	3	3		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	r	-	1	-	distal cusp broken	R. m3	l	b	b	3	3	
M3385	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	b	b	3	3	broken ?	L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	r	r	2	2	
							R.M3	l	b	b	3	3		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3386	Ashio-machi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	-	-	-	-	absent	L. p4	-	r	-	-	-	
							L.M1	-	-	-	-	-	absent	L. m1	-	-	-	-	-	worn out
							L.M2	-	-	-	-	-	absent	L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	-	-	-	-	absent	R. p4	-	r	-	-	-	
							R.M1	-	-	-	-	-	absent	R. m1	-	-	-	-	-	worn out
							R.M2	l	r	s	2	2.5		R. m2	l	b	b	3	3	
							R.M3	l	s	r	2.5	2		R. m3	l	b	b	3	3	
M3404	Ashio-machi	-	m	-	-	TPM	L. P2	-	-	-	-	-	worn out	L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	-	-	-	-	absent	L. p3	-	-	-	-	-	absent
							L. P4	-	-	-	-	-	absent	L. p4	-	b	-	-	-	
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	absent
							R. P3	-	-	-	-	-	abnormal eruption	R. p3	-	r	-	-	-	
							R. P4	-	-	-	-	-	absent	R. p4	-	-	-	-	-	absent
							R.M1	-	-	-	-	-	absent	R. m1	-	-	-	-	-	absent
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3774	Ashio-machi	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	s	s	2.5	2.5		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	r	s	2	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	
M3775	Ashio-machi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	absent
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	r	b	2	3	
							L.M3	l	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	absent
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	r	b	2	3	
							R.M3	l	s	r	0	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3790	Ashio-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	s	s	2.5	2.5		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
M3792	Nikko-shi	-	f	-	-	TPM	L. P2	-	-	-	-	-	worn out	L. p2	-	-	-	-	-	mandible absent
	Tochigi Pref.						L. P3	-	-	-	-	-	worn out	L. p3	-	-	-	-	-	
							L. P4	-	-	-	-	-	absent	L. p4	-	-	-	-	-	
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	
							L.M2	l	b	r	3	2	worn out ?	L. m2	-	-	-	-	-	
							L.M3	h	r	r	1	1		L. m3	-	-	-	-	-	
							R. P2	-	b	-	-	-		R. p2	-	-	-	-	-	
							R. P3	-	-	-	-	-	absent	R. p3	-	-	-	-	-	
							R. P4	-	-	-	-	-	absent	R. p4	-	-	-	-	-	
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	
							R.M2	l	b	s	3	2.5	worn out ?	R. m2	-	-	-	-	-	
							R.M3	h	s	s	0	0		R. m3	-	-	-	-	-	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3793	Kanuma-shi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-	broken ?	L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M3798	Nikko-shi	-	m	-	-	TPM	L. P2	-	-	-	-	-	left cheeck teeth absent	L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	-	-	-	-		L. p3	-	-	-	-	-	absent
							L. P4	-	-	-	-	-		L. p4	-	-	-	-	-	absent
							L.M1	-	-	-	-	-		L. m1	-	-	-	-	-	absent
							L.M2	l	r	r	2	2	isolated	L. m2	-	-	-	-	-	absent
							L.M3	-	-	-	-	-		L. m3	-	-	-	-	-	worn out
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	absent
							R. P3	-	-	-	-	-	absent	R. p3	-	-	-	-	-	absent
							R. P4	-	s	-	-	-	broken ?	R. p4	-	-	-	-	-	absent
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	absent
							R.M2	l	b	r	2	3		R. m2	-	-	-	-	-	worn out
							R.M3	l	b	b	3	3		R. m3	-	-	-	-	-	absent

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3813	Kuriyama-mura	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	b	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	b	2	3	
M3849	Shiobara-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	b	3	3		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	-	-	-	-	-	absent	L. m3	-	-	-	-	-	abnormal wear
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	h	r	b	1	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	-	-	-	-	-	absent	R. m3	-	-	-	-	-	abnormal wear

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3867	Fujihara-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	-	-	-	-	abnormal eruption	L. p3	-	b	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	r	s	1	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	b	r	3	2		R. m1	-	-	-	-	-	worn out
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	r	s	1	0	mesial cusp broken ?	R. m3	l	b	b	3	3	
M3868	Ashio-machi	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2		R. m1	l	r	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	r	3	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3870	Ashikaga-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	r	r	1	1		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	-	-	-	-	no data
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	no data
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	no data
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	r	s	1	0		R. m3	l	r	r	2	2	
M3871	Ashio-machi	-	m	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	r	2	2		L. m1	-	-	-	-	-	worn out
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	-	-	-	-	-	broken and worn out ?	R. m1	-	-	-	-	-	worn out
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3876	Kuroiso-shi	-	m	-	-	TPM	L. P2	-	-	-	-	-	worn out	L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	l	r	r	2	2		L. m2	l	b	b	3	3	
							L.M3	-	-	s	-	-	mesial cusp broken	L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	worn out	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	worn out
							R.M2	l	r	r	2	2		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
M3944	Kuroiso-shi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	l	s	b	2.5	3		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	right mandible absent
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	-	-	-	-	
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	
							R.M2	h	r	r	1	1		R. m2	-	-	-	-	-	
							R.M3	h	r	r	1	1		R. m3	-	-	-	-	-	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3947	Sano-shi	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	s	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	h	r	r	1	1	
							L.M2	h	s	r	0	1		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	h	r	r	1	1	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M3964	Nikko-shi	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	r	b	2	3	
							L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	-	-	-	-	abnormal eruption	R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	b	2	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3981	Nasushiobara-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	b	2	3	
							L.M2	h	s	s	0	0		L. m2	l	b	r	3	2	
							L.M3	h	s	r	0	1		L. m3	l	r	b	2	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
M3988	Sano-shi	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	-	-	-	-	abnormal eruption	L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	l	r	r	2	2		L. m3	l	r	b	2	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	-	-	-	-	abnormal eruption	R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M4011	Ashio-machi	-	f	-	-	TPM	L. P2	-	-	-	-	-	worn out	L. p2	-	-	-	-	-	worn out
	Tochigi Pref.						L. P3	-	-	-	-	-	worn out	L. p3	-	-	-	-	-	worn out
							L. P4	-	-	-	-	-	worn out	L. p4	-	-	-	-	-	worn out
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	-	-	-	-	-	worn out	L. m2	-	-	-	-	-	worn out
							L.M3	h	r	r	1	1		L. m3	-	-	-	-	-	worn out
							R. P2	-	-	-	-	-	worn out	R. p2	-	-	-	-	-	worn out
							R. P3	-	-	-	-	-	worn out	R. p3	-	-	-	-	-	worn out
							R. P4	-	-	-	-	-	absent	R. p4	-	-	-	-	-	worn out
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	worn out
							R.M2	-	-	-	-	-	worn out	R. m2	-	-	-	-	-	worn out
							R.M3	h	r	r	1	1		R. m3	-	-	-	-	-	worn out
M4035	Nasushiobara-machi	-	m	-	-	TPM	L. P2	-	-	-	-	-	worn out	L. p2	-	-	-	-	-	absent
	Tochigi Pref.						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	worn out
							L. P4	-	r	-	-	-		L. p4	-	-	-	-	-	worn out
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	-	-	-	-	-	worn out	L. m2	-	-	-	-	-	worn out
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	worn out	R. p2	-	-	-	-	-	worn out
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	worn out
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	worn out
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	worn out
							R.M2	-	-	-	-	-	worn out	R. m2	l	b	b	3	3	
							R.M3	-	-	-	-	-	absent	R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M4048	Nasushiobara-machi	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Tochigi Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	abnormal wear
							R.M2	h	s	r	0	1		R. m2	-	-	-	-	-	abnormal wear
							R.M3	-	-	-	-	-	absent	R. m3	-	-	-	-	-	abnormal wear
M4065	Ashio-machi	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	-	-	-	-	worn out
	Tochigi Pref.						L. P3	-	-	-	-	-	absent	L. p3	-	-	-	-	-	worn out
							L. P4	-	-	-	-	-	absent	L. p4	-	-	-	-	-	worn out
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	-	-	-	-	-	absent	L. m2	-	-	-	-	-	worn out
							L.M3	-	-	-	-	-	absent	L. m3	-	-	-	-	-	worn out
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	worn out
							R. P3	-	-	-	-	-	absent	R. p3	-	-	-	-	-	worn out
							R. P4	-	-	-	-	-	absent	R. p4	-	-	-	-	-	worn out
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	worn out
							R.M2	-	-	-	-	-	absent	R. m2	-	-	-	-	-	worn out
							R.M3	-	-	-	-	-	absent	R. m3	-	-	-	-	-	worn out

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M635	Hagiwara-cho	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	s	s	2.5	2.5		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
M640	Osaka-cho	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M641	Osaka-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	r	-	-	-	
							L.M1	-	-	-	-	-	broken	L. m1	l	b	b	3	3	
							L.M2	-	r	-	-	-	distal cusp broken	L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	-	-	-	-	absent
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	r	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	r	r	2	2	
M645	Osaka-cho	-	f	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M649	Takane-mura	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	r	3	2	
							L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	b	2	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	r	2	2	
							R.M2	h	r	s	1	0		R. m2	-	r	-	-	-	distal cusp broken
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
M1913	Kashimo-mura	-	f	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	1	1	
							L.M2	h	s	r	0	1		L. m2	l	b	b	3	3	
							L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	r	2	2	
							R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1915	Hagiwara-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	b	1	3	
							L.M2	h	r	s	1	0		L. m2	l	r	b	2	3	
							L.M3	h	s	s	1	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	r	b	1	3	
							R.M2	h	s	s	0	1		R. m2	l	r	r	2	2	
							R.M3	h	r	r	0	1		R. m3	l	r	r	2	2	
M1916	Takane-mura	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	b	1	3	
							L.M2	h	r	r	1	1	cusps broken?	L. m2	h	b	r	3	1	
							L.M3	h	s	s	0	0		L. m3	l	r	b	2	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-	broken?	R. p4	-	r	-	-	-	
							R.M1	l	b	s	3	2.5	mesial cusp broken?	R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	b	2	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1917	Hagiwara-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0	mesial cusp broken?	L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1	mesial cusp broken?	R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M1918	Tsuketi-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	h	r	s	1	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	-	-	-	-	-	worn out
							R.M2	h	r	r	1	1		R. m2	l	b	r	3	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1920	Gero-cho	-	f	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	s	1	0		L. m2	l	r	b	2	3	
							L.M3	h	s	s	0	0		L. m3	l	r	b	2	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	b	s	3	0	mesial cusp broken?	R. m2	l	b	b	3	3	
							R.M3	h	1	s	0	0		R. m3	l	b	b	3	3	
M1921	Kawaue-mura	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	b	r	3	2	worn out	L. m1	l	b	b	3	3	
							L.M2	h	-	r	-	1	mesial cusp broken	L. m2	l	b	b	3	3	
							L.M3	-	-	-	-	-	broken	L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	l	r	r	2	2	worn out	R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1923	Osaka-cho	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	h	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	-	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	h	r	r	1	1	
							R.M2	h	s	s	0	0		R. m2	h	r	r	1	1	
							R.M3	h	s	r	0	1		R. m3	l	r	r	2	2	
M1944	Gero-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1945	Kamiyahagi-mura	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	s	-	-	-	
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	b	2	3	distal cusp broken?	L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	s	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	b	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	b	2	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
M1946	Hagiwara-cho	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	r	0	1		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	s	r	0	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1948	Kamiyahagi-mura	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	-	-	-	-	-	worn out	L. m1	-	-	-	-	-	worn out
							L.M2	h	s	s	0	0		L. m2	-	-	-	-	-	worn out
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	-	-	-	-	
							R.M1	-	-	-	-	-	worn out	R. m1	-	-	-	-	-	worn out
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
M1950	Kamiyahagi-mura	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	r	b	2	3	
							L.M2	h	s	s	0	0		L. m2	l	r	b	2	3	
							L.M3	h	s	r	0	1		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	s	s	2.5	2.5	
							R.M3	h	s	s	0	0		R. m3	l	s	s	2.5	2.5	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M1951	Takane-mura	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	r	1	1	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	s	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	b	2	3	
							R.M2	h	s	s	0	0		R. m2	h	r	s	1	0	
							R.M3	h	s	r	0	1		R. m3	l	r	b	2	3	
M1952	Hagiwara-cho	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	b	b	3	3	
							L.M2	h	s	r	0	1		L. m2	l	r	r	2	2	
							L.M3	h	s	r	0	1		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	s	-	-	-	
							R.M1	l	s	s	2.5	2.5		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	s	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2192	Hagiwara-cho	-	m	-	-	TPM	L. P2	-	s	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	r	b	2	3	
							L.M2	h	r	r	1	1		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	b	2	3	
							R.M2	h	s	s	0	0		R. m2	l	r	b	2	3	
							R.M3	h	s	s	0	0		R. m3	l	r	-	2	-	distal cusp broken
M2193	Gero-cho	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	b	b	3	3	worn out?
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	r	r	1	1		L. m3	l	b	b	3	3	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	b	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	worn out?
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2194	Osaka-cho	-	m	-	-	TPM	L. P2	-	-	-	-	-	broken	L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	l	r	b	2	3	
							L.M2	h	r	s	1	0		L. m2	l	r	r	2	2	
							L.M3	h	r	b	1	3		L. m3	l	r	r	2	2	
							R. P2	-	-	-	-	-	absent	R. p2	-	-	-	-	-	broken
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	r	1	1		R. m1	l	r	b	2	3	
							R.M2	-	-	-	-	-	buccal cusps broken	R. m2	l	r	b	2	3	
							R.M3	h	s	b	0	3		R. m3	l	r	b	2	3	
M2259	Kamiyahagi-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	s	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	r	r	2	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	s	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	b	b	3	3	
							R.M2	h	s	s	0	0		R. m2	l	r	r	2	2	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2265	Kashimo-mura	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1	mesial cusp broken ?	L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	r	3	2	
							L.M3	h	s	-	0	-	distal cusp abnormal wear	L. m3	l	r	r	2	2	
							R. P2	-	-	-	-	-	broken	R. p2	-	r	-	-	-	
							R. P3	-	-	-	-	-	broken	R. p3	-	s	-	-	-	
							R. P4	-	-	-	-	-	broken	R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	r	b	2	3	
							R.M3	h	r	-	1	-	distal cusp abnormal wear	R. m3	l	b	r	3	2	
M2320	Takane-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	-	-	-	-	absent
							L. P4	-	s	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	s	r	0	1		L. m1	h	r	r	1	1	
							L.M2	h	s	s	0	0		L. m2	h	r	s	1	0	
							L.M3	h	s	s	0	0		L. m3	l	s	r	0	1	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	r	b	2	3	
							R.M2	h	s	-	0	-	distal cusp broken?	R. m2	h	b	r	3	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M2321	Nakatsugawa-shi	-	m	-	-	TPM	L. P2	-	-	-	-	-	absent	L. p2	-	-	-	-	-	absent
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	h	r	r	1	1	
							L.M2	h	r	s	1	0		L. m2	h	r	r	1	1	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	-	-	-	-	absent	R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	h	r	r	1	1	
							R.M2	h	r	s	1	0		R. m2	h	r	r	1	1	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	
M3248	Tsuketi-cho	-	f	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	r	1	1		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	r	b	2	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	s	r	0	1		R. m2	l	b	r	3	2	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3249	Osaka-cho	-	f	-	-	TPM	L. P2	-	b	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	b	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	r	-	-	-	
							L.M1	h	r	s	1	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	l	r	r	2	2		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	s	1	0		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	b	b	3	3	
							R.M3	h	r	r	1	1		R. m3	l	b	b	3	3	
M3398	Osaka-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	s	-	-	-		L. p4	-	b	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	r	r	2	2	
							L.M2	h	s	s	0	0		L. m2	l	s	r	2.5	2	
							L.M3	h	s	s	0	0		L. m3	l	r	r	2	2	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	s	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	s	s	0	0		R. m1	l	r	b	2	3	
							R.M2	h	s	s	0	0		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	r	2	2	

A-9 continued.

Reg.No.	Locality	Body mass (kg)	Sex	Age	Coll.Date	Museum	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	Note
M3399	Kashimo-mura	-	m	-	-	TPM	L. P2	-	-	-	-	-	broken	L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	s	-	-	-	
							L. P4	-	r	-	-	-		L. p4	-	b	-	-	-	
							L.M1	h	s	s	0	0		L. m1	l	b	b	3	3	
							L.M2	h	s	s	0	0		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	r	-	-	-	
							R. P3	-	r	-	-	-		R. p3	-	s	-	-	-	
							R. P4	-	r	-	-	-		R. p4	-	s	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	s	1	0		R. m2	l	r	b	2	3	
							R.M3	h	s	s	0	0		R. m3	l	b	b	3	3	
M3400	Gero-cho	-	m	-	-	TPM	L. P2	-	r	-	-	-		L. p2	-	r	-	-	-	
	Gifu Pref.						L. P3	-	r	-	-	-		L. p3	-	r	-	-	-	
							L. P4	-	b	-	-	-		L. p4	-	b	-	-	-	
							L.M1	l	r	r	2	2		L. m1	l	b	b	3	3	
							L.M2	h	r	r	1	1		L. m2	l	b	b	3	3	
							L.M3	h	s	s	0	0		L. m3	l	b	b	3	3	
							R. P2	-	r	-	-	-		R. p2	-	-	-	-	-	absent
							R. P3	-	r	-	-	-		R. p3	-	r	-	-	-	
							R. P4	-	b	-	-	-		R. p4	-	r	-	-	-	
							R.M1	h	r	r	1	1		R. m1	l	b	b	3	3	
							R.M2	h	r	r	1	1		R. m2	l	b	b	3	3	
							R.M3	h	s	s	0	0		R. m3	l	r	b	2	3	

APPENDIX B

MESOWEAR VALUABLES OF MARAGHEH FOSSIL UNGULATES

Abbreviations: No = catalogue number of Tochigi prefectural museum, OR = Occlusal relief, CS (m) = Cusp shape of mesial cusp, CS (d) = Cusp shape of distal cusp, MS (m) = mesowear score of mesial cusp, MS (d) = mesowear score of distal cusp, m = male, f = female, L. P2 = left upper 2nd premolar, L. P3 = left upper 3rd premolar, L. P4 = left upper 4th premolar, L. M1 = left upper 1st molar, L. M2 = left upper 2nd molar, L. M3 = left upper 3rd molar, L. DP2 =left upper 2nd deciduous premolar, L. DP3 = left upper 3rd deciduous premolar, L. DP4 = left upper 4th deciduous premolar, L. p2 = left lower 2nd premolar, L. p3 = left lower 3rd premolar, L. p4 = left lower 4th premolar, L. m1 = left lower 1st molar, L. m2 = left lower 2nd molar, L. m3 = left lower 3rd molar, L. dp2 =left lower 2nd deciduous premolar, L. dp3 = left lower 3rd deciduous premolar, L. dp4 = left lower 4th deciduous premolar, R. P2 = right upper 2nd premolar, R. P3 = right upper 3rd premolar, R. P4 = right upper 4th premolar, R. M1 = right upper 1st molar, R. M2 = right upper 2nd molar, R. M3 = left upper 3rd molar, R. DP2 = right upper 2nd deciduous premolar, R. DP3 = right upper 3rd deciduous premolar, R. DP4 = right upper 4th deciduous premolar, R. p2 = right lower 2nd premolar, R. p3 = right lower 3rd premolar, R. p4 = right lower 4th premolar, R. m1 = right lower 1st molar, R. m2 = right lower 2nd molar, R. m3 = right lower 3rd molar, R. dp2 = right lower 2nd deciduous premolar, R. dp3 = right lower 3rd deciduous premolar, R. dp4 = right lower 4th deciduous premolar, - = no data. *1 = scored mesial two cusps of three cusps.

B-1. the Maragheh ungulates (buccal cusps).

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
87002	Perissodactyla	Equidae	Hipparion	L. P2	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	L. P4	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	L. M1	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	L. M2	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	L. M3	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	R. P3	l	r	-	2	-	-	distal cusp broken
87002	Perissodactyla	Equidae	Hipparion	R. P4	l	r	r	2	2	-	
87002	Perissodactyla	Equidae	Hipparion	R. M1	l	s	r	2.5	2	-	
87002	Perissodactyla	Equidae	Hipparion	R. M2	l	r	b	2	3	-	
87002	Perissodactyla	Equidae	Hipparion	R. M3	l	r	b	2	3	-	
87003	Perissodactyla	Equidae	Hipparion	L. DP2	l	r	r	2	2	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
87003	Perissodactyla	Equidae	Hipparion	L. DP3	l	r	r	2	2	-	
87003	Perissodactyla	Equidae	Hipparion	L. DP4	h	r	r	1	1	-	
87003	Perissodactyla	Equidae	Hipparion	L. M1	h	s	r	0	1	-	erupting
87003	Perissodactyla	Equidae	Hipparion	L. M2	-	-	-	-	-	-	unerupted
87003	Perissodactyla	Equidae	Hipparion	R. DP3	h	r	r	1	1	-	
87003	Perissodactyla	Equidae	Hipparion	R. DP4	h	r	r	1	1	-	
87003	Perissodactyla	Equidae	Hipparion	R. M1	l	r	r	2	2	-	erupting
87003	Perissodactyla	Equidae	Hipparion	R. M2	-	-	-	-	-	-	unerupted
87005	Perissodactyla	Equidae	Hipparion	L. P2	l	r	r	2	2	-	
87005	Perissodactyla	Equidae	Hipparion	L. P3	h	r	r	1	1	-	
87005	Perissodactyla	Equidae	Hipparion	L. P4	-	-	-	-	-	-	erupting
87200	Perissodactyla	Equidae	Hipparion	L. p2	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	L. p3	l	r	b	2	3	-	
87200	Perissodactyla	Equidae	Hipparion	L. p4	l	r	b	2	3	-	
87200	Perissodactyla	Equidae	Hipparion	L. m1	l	r	b	2	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. p3	l	r	b	2	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. p4	l	r	b	2	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. m1	l	b	b	3	3	-	
95025	Perissodactyla	Equidae	Hipparion	L. m3	-	-	-	-	-	-	unworn? Mesial cusp broken
95026	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95026	Perissodactyla	Equidae	Hipparion	L. m3	l	r	r	2	2	b	
95026	Perissodactyla	Equidae	Hipparion	R. m1	l	r	r	2	2	-	
95026	Perissodactyla	Equidae	Hipparion	R. m2	l	b	r	3	2	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95026	Perissodactyla	Equidae	Hipparion	R. m3	l	r	r	2	2	b	
95028	Perissodactyla	Equidae	Hipparion	L. dp2	l	b	b	3	3	-	
95028	Perissodactyla	Equidae	Hipparion	L. dp3	l	b	b	3	3	-	
95028	Perissodactyla	Equidae	Hipparion	L. dp4	l	r	r	2	2	-	
95028	Perissodactyla	Equidae	Hipparion	L. m1	-	-	-	-	-	-	unerupted
95030	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95030	Perissodactyla	Equidae	Hipparion	L. m3	h	r	r	1	1	-	
95030	Perissodactyla	Equidae	Hipparion	L. dp	l	b	b	3	3	-	
95032	Perissodactyla	Equidae	Hipparion	L. dp2	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	L. dp3	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	L. dp4	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	R. dp2	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	R. dp3	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	R. dp4	h	r	r	1	1	-	
95034	Perissodactyla	Equidae	Hipparion	L. p2	l	r	r	2	2	-	
95034	Perissodactyla	Equidae	Hipparion	L. p3	h	r	r	1	1	-	
95034	Perissodactyla	Equidae	Hipparion	L. p4	-	-	-	-	-	-	erupting
95034	Perissodactyla	Equidae	Hipparion	L. m1	h	r	r	1	1	-	
95034	Perissodactyla	Equidae	Hipparion	L. m2	h	r	r	1	1	-	
95034	Perissodactyla	Equidae	Hipparion	R. lower cheek teeth	h	r	r	1	1	-	p3?
95035	Perissodactyla	Equidae	Hipparion	L. p2	l	b	b	3	3	-	
95035	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
95035	Perissodactyla	Equidae	Hipparion	L. p4	l	r	r	2	2	-	
95035	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95035	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95035	Perissodactyla	Equidae	Hipparion	R. p3	l	b	b	3	3	-	
95035	Perissodactyla	Equidae	Hipparion	R. p4	h	r	r	1	1	-	
95036	Perissodactyla	Equidae	Hipparion	L. p2	-	-	-	-	-	-	broken
95036	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
95036	Perissodactyla	Equidae	Hipparion	L. p4	-	-	-	-	-	-	broken
95036	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95036	Perissodactyla	Equidae	Hipparion	R. p3	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	R. p4	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	R. m1	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	R. m2	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	L. dp2	l	b	b	3	3	-	
95037	Perissodactyla	Equidae	Hipparion	L. dp3	l	b	b	3	3	-	
95037	Perissodactyla	Equidae	Hipparion	L. dp4	l	b	b	3	3	-	
95037	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	L. m2	h	r	r	1	1	-	unworn
95037	Perissodactyla	Equidae	Hipparion	L. m3	-	-	-	-	-	-	unerupted
95037	Perissodactyla	Equidae	Hipparion	R. dp2	l	b	b	3	3	-	
95037	Perissodactyla	Equidae	Hipparion	R. dp3	l	b	b	3	3	-	
95037	Perissodactyla	Equidae	Hipparion	R. dp4	h	r	r	1	1	-	
95037	Perissodactyla	Equidae	Hipparion	R. m1	h	r	r	1	1	-	
95037	Perissodactyla	Equidae	Hipparion	R. m2	-	-	-	-	-	-	unworn

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95037	Perissodactyla	Equidae	Hipparion	R. m3	l	-	-	-	-	-	unerupted
95038	Perissodactyla	Equidae	Hipparion	L. dp2	l	s	r	3	2	-	
95038	Perissodactyla	Equidae	Hipparion	L. dp3	l	r	r	2	2	-	
95038	Perissodactyla	Equidae	Hipparion	L. dp4	h	s	r	0	1	-	
95038	Perissodactyla	Equidae	Hipparion	L. m1	-	-	-	-	-	-	erupting
95038	Perissodactyla	Equidae	Hipparion	R. dp2	l	r	r	2	2	-	
95038	Perissodactyla	Equidae	Hipparion	R. dp3	l	r	r	2	2	-	
95038	Perissodactyla	Equidae	Hipparion	R. dp4	h	r	r	2	2	-	
95038	Perissodactyla	Equidae	Hipparion	R. m1	-	-	-	-	-	-	erupting
95039	Perissodactyla	Equidae	Hipparion	L. p2	l	b	b	3	3	-	
95039	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
95039	Perissodactyla	Equidae	Hipparion	L. p4	l	r	b	2	3	-	
95039	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	
95039	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95039	Perissodactyla	Equidae	Hipparion	L. m3	-	-	-	-	-	-	unworn
95039	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95039	Perissodactyla	Equidae	Hipparion	R. p3	l	r	r	2	2	-	
95039	Perissodactyla	Equidae	Hipparion	R. p4	h	r	r	1	1	-	
95039	Perissodactyla	Equidae	Hipparion	R. m1	l	r	r	2	2	-	
95039	Perissodactyla	Equidae	Hipparion	R. m2	h	r	r	1	1	-	
95039	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unworn
95040	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	l	r	r	2	2	-	
95040	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	h	r	r	1	1	-	
95040	Perissodactyla	Equidae	Hipparion	L. P2	l	r	b	2	3	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95040	Perissodactyla	Equidae	Hipparion	L. P3	l	s	r	2	2	-	
95040	Perissodactyla	Equidae	Hipparion	L. P4	l	r	r	2.5	2.5	-	
95040	Perissodactyla	Equidae	Hipparion	L. M1	h	r	r	1	1	-	
95040	Perissodactyla	Equidae	Hipparion	L. M2	h	r	r	1	1	-	
95040	Perissodactyla	Equidae	Hipparion	L. M3	h	r	r	1	1	-	
95042	Perissodactyla	Equidae	Hipparion	R. P3	l	s	r	2.5	2	-	
95042	Perissodactyla	Equidae	Hipparion	R. P4	l	s	r	2.5	2	-	
95042	Perissodactyla	Equidae	Hipparion	R. M1	l	s	r	2.5	2	-	
95042	Perissodactyla	Equidae	Hipparion	R. M3	l	s	r	2.5	2	-	
95043	Perissodactyla	Equidae	Hipparion	L. DP2	-	-	-	-	-	-	
95043	Perissodactyla	Equidae	Hipparion	L. P2	-	-	-	-	-	-	erupting
95043	Perissodactyla	Equidae	Hipparion	L. DP3	-	-	r	-	-	-	mesial cusp broken
95043	Perissodactyla	Equidae	Hipparion	L. DP4	h	r	r	1	1	-	
95043	Perissodactyla	Equidae	Hipparion	L. M1	h	s	r	0	1	-	
95043	Perissodactyla	Equidae	Hipparion	L. M2	-	s	-	-	-	-	distal cusp broken
95044	Perissodactyla	Equidae	Hipparion	L. P2	-	-	-	-	-	-	unworn
95044	Perissodactyla	Equidae	Hipparion	L. P3	h	r	r	1	1	-	erupting
95044	Perissodactyla	Equidae	Hipparion	L. DP4	h	r	r	1	1	-	
95044	Perissodactyla	Equidae	Hipparion	L. M1	h	s	r	0	1	-	distal cusp broken
95044	Perissodactyla	Equidae	Hipparion	L. M2	-	-	-	-	-	-	erupting
95045	Perissodactyla	Equidae	Hipparion	R. DP2	l	r	r	2	2	-	
95045	Perissodactyla	Equidae	Hipparion	R. DP3	l	r	-	2	-	-	distal cusp broken
95045	Perissodactyla	Equidae	Hipparion	R. DP4	h	s	r	0	1	-	
95045	Perissodactyla	Equidae	Hipparion	R. M1	h	r	r	1	1	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95045	Perissodactyla	Equidae	Hipparion	R. M2	h	r	r	1	1	-	
95046	Perissodactyla	Equidae	Hipparion	L. DP2	l	r	r	2	2	-	
95046	Perissodactyla	Equidae	Hipparion	L. DP3	h	s	r	0	1	-	
95046	Perissodactyla	Equidae	Hipparion	L. DP4	h	s	r	0	1	-	
95046	Perissodactyla	Equidae	Hipparion	R. DP2	-	-	-	-	-	-	broken
95046	Perissodactyla	Equidae	Hipparion	R. DP3	h	-	r	-	1	-	mesial cusp broken
95046	Perissodactyla	Equidae	Hipparion	R. DP4	l	r	r	2	2	-	
95071	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	
95071	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95071	Perissodactyla	Equidae	Hipparion	L. m3	l	r	r	2	2	-	
95072	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	l	b	r	3	2	-	mesial cusp broken
95072	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	l	r	r	2	2	-	
95072	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	-	-	-	-	-	-	unworn
95073	Perissodactyla	Equidae	Hipparion	L. DP4?	-	-	-	-	-	-	
95077	Perissodactyla	Equidae	Hipparion	R. p2	l	b	r	3	2	-	
95077	Perissodactyla	Equidae	Hipparion	R. p3	l	r	r	2	2	-	
95077	Perissodactyla	Equidae	Hipparion	R. p4	h	r	r	1	1	-	
95077	Perissodactyla	Equidae	Hipparion	R. m1	l	r	r	2	2	-	
95077	Perissodactyla	Equidae	Hipparion	R. m2	l	r	r	2	2	-	
95077	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unworn
95078	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	L. p4	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	L. m1	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	L. m2	l	b	b	3	3	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95078	Perissodactyla	Equidae	Hipparion	L. m3	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	R. p3	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	R. p4	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	R. m1	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	R. m2	l	b	b	3	3	-	
95079	Perissodactyla	Equidae	Hipparion	R. dp2	l	b	b	3	3	-	
95079	Perissodactyla	Equidae	Hipparion	R. dp3	l	b	r	3	2	-	
95079	Perissodactyla	Equidae	Hipparion	R. dp4	h	r	r	1	1	-	
95079	Perissodactyla	Equidae	Hipparion	L. dp2	l	b	b	3	3	-	
95079	Perissodactyla	Equidae	Hipparion	L. dp3	-	-	r	-	-	-	
95079	Perissodactyla	Equidae	Hipparion	L. dp4	h	r	r	1	1	-	
95080	Perissodactyla	Equidae	Hipparion	L. P3	h	s	r	0	1	-	
95081	Perissodactyla	Equidae	Hipparion	R. DP3	-	-	r	-	-	-	mesial cusp broken
95081	Perissodactyla	Equidae	Hipparion	R. DP4	h	s	r	0	1	-	
95083	Perissodactyla	Equidae	Hipparion	R. DP	h	s	r	0	1	-	DP3 or DP4
95084	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	h	s	r	0	1	-	
95086	Perissodactyla	Equidae	Hipparion	L. P2	l	r	b	2	3	-	
95086	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	
95086	Perissodactyla	Equidae	Hipparion	L. P4	l	r	s	2	2.5	-	
95086	Perissodactyla	Equidae	Hipparion	L. M1	h	r	r	1	1	-	
95086	Perissodactyla	Equidae	Hipparion	L. M2	h	r	r	1	1	-	
95086	Perissodactyla	Equidae	Hipparion	L. M3	h	r	r	1	1	-	
95086	Perissodactyla	Equidae	Hipparion	R. P2	l	b	b	3	3	-	
95086	Perissodactyla	Equidae	Hipparion	R. P4 or M1	l	r	r	2	2	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95086	Perissodactyla	Equidae	Hipparion	R. M1or M2	h	s	s	0	0	-	
95086	Perissodactyla	Equidae	Hipparion	L. P2	l	r	r	2	2	-	
95086	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	
95086	Perissodactyla	Equidae	Hipparion	L. P4	l	r	s	2	2.5	-	
95086	Perissodactyla	Equidae	Hipparion	L. M1	h	r	r	1	1	-	
95086	Perissodactyla	Equidae	Hipparion	L. M2	h	r	r	1	1	-	
95086	Perissodactyla	Equidae	Hipparion	L. M3	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	R. M1	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	R. M2	l	s	r	2.5	2	-	
95089	Perissodactyla	Equidae	Hipparion	R. M3	l	s	-	2.5	-	-	distal cusp broken
95089	Perissodactyla	Equidae	Hipparion	L. P2	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	L. P4	l	s	-	2.5	2.5	-	distal cusp broken
95089	Perissodactyla	Equidae	Hipparion	L. M1	l	s	s	2.5	2.5	-	
95089	Perissodactyla	Equidae	Hipparion	L. M2	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	L. M3	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	R. P2	l	-	r	-	-	-	mesial cusp broken
95089	Perissodactyla	Equidae	Hipparion	R. P3	l	r	r	2	2	-	
95089	Perissodactyla	Equidae	Hipparion	R. P4	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	L. P2	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	L. P4	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	L. M1	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	L. M2	l	r	r	2	2	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95090	Perissodactyla	Equidae	Hipparion	L. M3	h	r	r	1	1	-	
95090	Perissodactyla	Equidae	Hipparion	R. P2	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	R. P3	l	b	r	3	2	-	
95090	Perissodactyla	Equidae	Hipparion	R. P4	l	b	r	3	2	-	
95090	Perissodactyla	Equidae	Hipparion	R. M1	l	r	r	2	2	-	
95090	Perissodactyla	Equidae	Hipparion	R. M2	h	r	r	1	1	-	
95090	Perissodactyla	Equidae	Hipparion	R. M3	h	r	r	1	1	-	
870001	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	broken
870001	Perissodactyla	Equidae	Hipparion	L. P4	-	-	-	-	-	-	broken
870001	Perissodactyla	Equidae	Hipparion	L. M1	h	s	r	0	1	-	
870001	Perissodactyla	Equidae	Hipparion	L. M2	h	r	r	1	1	-	
870001	Perissodactyla	Equidae	Hipparion	L. M3	l	s	-	0	-	-	distal cusp broken
870001	Perissodactyla	Equidae	Hipparion	R. M1	h	r	r	1	1	-	
870001	Perissodactyla	Equidae	Hipparion	R. M2	h	s	-	0	-	-	distal cusp broken
870001	Perissodactyla	Equidae	Hipparion	R. M3	-	-	-	-	-	-	broken
2009102008	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unworn
2009102008	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	-	-	-	-	-	-	unworn
"0030	Perissodactyla	Equidae	Hipparion	L. p2	l	b	r	3	2	-	
"0030	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
"0030	Perissodactyla	Equidae	Hipparion	L. p4	l	b	b	3	3	-	
"0030	Perissodactyla	Equidae	Hipparion	L. m1	l	b	b	3	3	-	
"0030	Perissodactyla	Equidae	Hipparion	L. m2	l	b	b	3	3	-	
"0123	Perissodactyla	Equidae	Hipparion	L. P2	l	b	s	3	2.5	-	
KAG0002	Perissodactyla	Equidae	Hipparion	R. m1	h	r	r	1	1	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KAG0002	Perissodactyla	Equidae	Hipparion	R. m2	l	r	r	2	2	-	
KAG0002	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unerupted
KAG0007	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	l	r	r	2	2	-	mesial cusp broken
KAG0010	Perissodactyla	Equidae	Hipparion	L. upper cheeck teeth	l	-	s	-	2.5	-	
KAG0013	Perissodactyla	Equidae	Hipparion	R. cheeck teeth	-	-	-	-	-	-	unworn
KAG0013	Perissodactyla	Equidae	Hipparion	R. m3?	-	-	-	-	-	-	unworn
KAG0015	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	-	-	-	-	-	-	unworn
KAG0017	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	h	s	r	0	1	-	
KAG0017	Perissodactyla	Equidae	Hipparion	R. P2	l	r	r	2	2	-	
KAG0020	Perissodactyla	Equidae	Hipparion	L. DP?	l	s	r	2.5	2	-	
KAG0020	Perissodactyla	Equidae	Hipparion	L. DP?	l	-	r	-	2	-	mesial cusp broken
KAG0021	Perissodactyla	Equidae	Hipparion	L. upper cheeck teeth	h	s	r	0	1	-	
KAG0022	Perissodactyla	Equidae	Hipparion	L. DP2	l	r	r	2	2	-	
KAG0022	Perissodactyla	Equidae	Hipparion	L. upper cheeck teeth	h	r	s	1	0	-	
KAG0022	Perissodactyla	Equidae	Hipparion	L. upper cheeck teeth	h	s	r	0	1	-	
KAG0022	Perissodactyla	Equidae	Hipparion	L. upper cheeck teeth	-	-	-	-	-	-	unworn
KAG0022	Perissodactyla	Equidae	Hipparion	R. DP2	l	r	r	2	2	-	
KAG0022	Perissodactyla	Equidae	Hipparion	R. upper cheeck teeth	-	-	-	-	-	-	unworn
KAG0031	Perissodactyla	Equidae	Hipparion	L. dp2	-	-	-	-	-	-	
KAG0031	Perissodactyla	Equidae	Hipparion	L. dp3	-	-	-	-	-	-	
KAG0031	Perissodactyla	Equidae	Hipparion	R, dp4?	-	-	-	-	-	-	
KAG0057	Perissodactyla	Equidae	Hipparion	L. m2?	h	r	r	1	1	-	
KAG0057	Perissodactyla	Equidae	Hipparion	L. m3?	l	r	r	2	2	-	distal cusp broken
KAG0058	Perissodactyla	Equidae	Hipparion	L. DP3	h	s	r	0	1	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KAG0058	Perissodactyla	Equidae	Hipparion	L. DP4	h	s	r	0	1	-	
KAG0110	Perissodactyla	Equidae	Hipparion	R. DP2	h	r	r	1	1	-	
KAG0110	Perissodactyla	Equidae	Hipparion	R. DP3	h	r	r	1	1	-	
KAG0110	Perissodactyla	Equidae	Hipparion	R. DP4	h	r	r	1	1	-	
KAG0114	Perissodactyla	Equidae	Hipparion	R. DP2	l	r	r	2	2	-	
KAG0114	Perissodactyla	Equidae	Hipparion	R. DP3	h	s	r	0	1	-	
KAG0114	Perissodactyla	Equidae	Hipparion	R. DP4	h	s	r	0	1	-	
KAG0136	Perissodactyla	Equidae	Hipparion	R. lower cheek teeth	-	-	-	-	-	-	unworn
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	r	-	-	-	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	r	-	-	-	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. m1	l	b	b	3	3	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. m2	l	b	b	3	3	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. m3	l	b	b	3	3	b	
KU101	Artiodactyla	bovidae	*Miotragocerus*	R. M1	l	b	b	3	3	-	
KU101	Artiodactyla	bovidae	*Miotragocerus*	R. M2	l	r	r	1	1	-	
KU101	Artiodactyla	bovidae	*Miotragocerus*	R. M3	l	r	r	1	1	r	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. p2	-	r	-	-	-	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	r	-	-	-	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	r	-	-	-	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. m1	l	b	b	3	3	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. m2	l	b	b	3	3	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. m3	l	b	b	3	3	b	
KU104	Artiodactyla	bovidae	unknown	R. dp2	-	r	-	-	-	-	
KU104	Artiodactyla	bovidae	unknown	R. dp3	-	r	-	-	-	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KU104	Artiodactyla	bovidae	unknown	R. dp4	l	b	b	3	3	b	*2
KU113	Artiodactyla	bovidae?	unknown	R. P2	-	r	-	-	-	-	
KU113	Artiodactyla	bovidae?	unknown	R. P3	-	r	-	-	-	-	
KU113	Artiodactyla	bovidae?	unknown	R. P4	-	r	-	-	-	-	
KU113	Artiodactyla	bovidae?	unknown	R. M1	h	-	r	-	1	-	mesial cusp broken
KU113	Artiodactyla	bovidae?	unknown	R. M2	h	s	r	0	1	-	
KU113	Artiodactyla	bovidae?	unknown	R. M3	h	r	s	1	0	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	L. P2	-	r	-	-	-	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	L. P3	-	r	-	-	-	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	L. P4	-	r	-	-	-	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	L. M1	h	r	r	1	1	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	L. M2	h	r	r	1	1	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	L. M3	h	r	s	1	0	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	R. P2	-	r	-	-	-	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	R. P3	-	r	-	-	-	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	R. P4	-	r	-	-	-	-	
KU147	Artiodactyla	bovidae	*Miotragocerus*	R. M1	h	-	r	-	1	-	mesial cusp broken
KU147	Artiodactyla	bovidae	*Miotragocerus*	R. M2	h	-	r	-	1	-	mesial cusp broken
KU147	Artiodactyla	bovidae	*Miotragocerus*	R. M3	h	-	r	-	1	-	mesial cusp broken
KU150	Artiodactyla	bovidae	unknown	L. p4	-	r	-	-	-	-	
KU150	Artiodactyla	bovidae	unknown	L. m1	l	b	b	3	3	-	worn out
KU150	Artiodactyla	bovidae	unknown	L. m2	l	b	b	3	3	-	
KU150	Artiodactyla	bovidae	unknown	L. m3	l	b	b	3	3	b	
KU166	Artiodactyla	bovidae	unknown	R. p4	-	r	-	-	-	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KU166	Artiodactyla	bovidae	unknown	R. m1	l	b	b	3	3	-	
KU166	Artiodactyla	bovidae	unknown	R. m2	l	b	b	3	3	-	
KU166	Artiodactyla	bovidae	unknown	R. m3	l	b	b	3	3	b	
KU170-2	Artiodactyla	bovidae	unknown	R. M1	h	-	r	-	1	-	mesial cusp broken
KU170-2	Artiodactyla	bovidae	unknown	R. M2	h	s	r	0	1	-	
KU191	Artiodactyla	bovidae	*Miotragocerus*	L. p2	-	r	-			-	
KU191	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	r	-			-	
KU191	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	-	-			-	broken
KU220-1	Artiodactyla	bovidae	unknown	L. m1	l	b	b	3	3	-	
KU220-1	Artiodactyla	bovidae	unknown	L. m2	l	b	b	3	3	-	
KU4	Artiodactyla	bovidae	*Miotragocerus*	L. P2	-	s	-	-	-	-	
KU4	Artiodactyla	bovidae	*Miotragocerus*	L. P3	-	s	-	-	-	-	
KU4	Artiodactyla	bovidae	*Miotragocerus*	L. P4	-	r	-	-	-	-	
KU4	Artiodactyla	bovidae	*Miotragocerus*	L. M1	h	r	r	1	1	-	
KU89	Artiodactyla	bovidae	*Miotragocerus*	L. M2	l	b	r	3	2		
KU89	Artiodactyla	bovidae	*Miotragocerus*	L. M3	l	r	r	2	2		
KU89	Artiodactyla	bovidae	*Miotragocerus*	L. m3	l	r	r	2	2	b	distal cusp unworn
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	s	-	-	-	-	m2 absent
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	s	-	-	-	-	
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. m1	l	r	r	2	2	-	
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. m2	h	r	r	1	1	-	
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. m3	l	r	r	2	2	b	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. p2	-	r	-	-	-	-	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	s	-	-	-	-	

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	s	-	-	-	-	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. m1	-	-	-	-	-	-	worn out
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. m2	l	b	r	3	3	-	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. m3	l	b	b	3	3	-	
KU94	Artiodactyla	bovidae	unknown	L. dp2	-	r	-	-	-	-	
KU94	Artiodactyla	bovidae	unknown	L. dp3	-	r	-	-	-	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	s	-	-	-	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	r	-	-	-	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. m2	h	r	r	1	1	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. m3	h	r	r	1	1	r	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	-	-	-	-	-	broken
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	s	-	-	-	-	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. m1	h	r	r	1	1	-	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. m2	l	b	r	3	3	-	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. m3	l	b	b	3	3	b	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	r	-	-	-	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	s	-	-	-	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. m1	l	b	b	3	3	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. m2	l	r	r	2	2	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. m3	l	r	r	2	2	b	
KU99	Artiodactyla	bovidae	*Miotragocerus*	L. m3	l	r	r	2	2	b	m2 broken
KY87000	Perissodactyla	Equidae	Hipparion	R. P2	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	R. P3	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	R. P4	l	s	-	0	-	-	distal cusp broken

B-1 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KY87000	Perissodactyla	Equidae	Hipparion	R. M1	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	R. M2	l	s	r	2.5	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	R. M3	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	L. P2	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	L. P3	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	L. P4	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	L. M1	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	L. M2	l	r	r	2	2	-	
KY87000	Perissodactyla	Equidae	Hipparion	L. M3	h	r	r	1	1	-	
MAR 194-1（R)	Artiodactyla	bovidae?	unknown	R. M1	h	r	r	1	1	-	
MAR 194-1（R)	Artiodactyla	bovidae?	unknown	R. M2	h	r	r	1	1	-	
MAR 194-2(R)	Artiodactyla	bovidae?	unknown	R. M3	h	r	r	1	1	-	distal cusp unworn
MAR1-1	Artiodactyla	bovidae?	unknown	R. m1 or m2	h	r	r	1	1	-	
MAR178	Perissodactyla	Equidae	Hipparion	R. DP2	l	s	r	2.5	2	-	
MAR178	Perissodactyla	Equidae	Hipparion	R. DP3	h	r	r	1	1	-	
MAR178	Perissodactyla	Equidae	Hipparion	R. DP4	h	r	r	1	1	-	
MAR8=9	Artiodactyla	bovidae?	unknown	L. P4	-	r	-	-	-	-	
MAR8=9	Artiodactyla	bovidae?	unknown	L. M1	l	r	r	2	2	-	
MAR8=9	Artiodactyla	bovidae?	unknown	L. M2	h	r	r	1	1	-	
MAR8=9	Artiodactyla	bovidae?	unknown	L. M3	h	r	r	1	1	-	
MAR8=9	Artiodactyla	bovidae?	unknown	R. M1	l	r	r	2	2	-	
MAR8=9	Artiodactyla	bovidae?	unknown	R. M2	h	r	s	1	0	-	
MAR8=9	Artiodactyla	bovidae?	unknown	R. M3	h	r	s	1	0	-	

B-2. the Maragheh ungulates (lingual cusps).

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
87200	Perissodactyla	Equidae	Hipparion	L. p2	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	L. p4	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	L. m1	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. p3	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. p4	l	b	b	3	3	-	
87200	Perissodactyla	Equidae	Hipparion	R. m1	l	b	b	3	3	-	
95025	Perissodactyla	Equidae	Hipparion	L. m3	-	-	-	-	-	-	
95026	Perissodactyla	Equidae	Hipparion	L. m2	h	r	r	1	1	-	
95026	Perissodactyla	Equidae	Hipparion	L. m3	l	r	r	2	2	b	
95026	Perissodactyla	Equidae	Hipparion	R. m1	h	r	r	1	1	-	
95026	Perissodactyla	Equidae	Hipparion	R. m2	l	r	r	2	2	-	
95026	Perissodactyla	Equidae	Hipparion	R. m3	l	r	r	2	2	b	
95028	Perissodactyla	Equidae	Hipparion	L. dp2	-	-	-	-	-	-	
95028	Perissodactyla	Equidae	Hipparion	L. dp3	-	-	-	-	-	-	
95028	Perissodactyla	Equidae	Hipparion	L. dp4	-	-	-	-	-	-	
95028	Perissodactyla	Equidae	Hipparion	L.m1	-	-	-	-	-	-	
95030	Perissodactyla	Equidae	Hipparion	L. m2	h	r	r	1	1	-	
95030	Perissodactyla	Equidae	Hipparion	L. m3	l	r	r	2	2	-	
95030	Perissodactyla	Equidae	Hipparion	L. dp	l	b	b	3	3	-	
95032	Perissodactyla	Equidae	Hipparion	L. dp2	l	r	r	2	2	-	
95032	Perissodactyla	Equidae	Hipparion	L. dp3	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	L. dp4	h	r	r	1	1	-	

B-2 continue.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95032	Perissodactyla	Equidae	Hipparion	R. dp2	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	R. dp3	h	r	r	1	1	-	
95032	Perissodactyla	Equidae	Hipparion	R. dp4	l	r	r	2	2	-	
95034	Perissodactyla	Equidae	Hipparion	L. p2	-	-	r	-	-	-	mesial cusp broken
95034	Perissodactyla	Equidae	Hipparion	L. p3	h	-	r	-	-	-	mesial cusp broken
95034	Perissodactyla	Equidae	Hipparion	L. p4	-	-	-	-	-	-	erupting
95034	Perissodactyla	Equidae	Hipparion	L. m1	h	r	r	1	1	-	
95034	Perissodactyla	Equidae	Hipparion	L. m2	h	-	r	-	1	-	mesial cusp broken
95034	Perissodactyla	Equidae	Hipparion	R. lower cheek teeth	h	r	r	1	1	-	p3?
95035	Perissodactyla	Equidae	Hipparion	L. p2	-	-	-	-	-	-	
95035	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
95035	Perissodactyla	Equidae	Hipparion	L. p4	l	r	r	2	2	-	
95035	Perissodactyla	Equidae	Hipparion	L. m1	h	r	r	1	1	-	
95035	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95035	Perissodactyla	Equidae	Hipparion	R. p3	l	r	b	2	3	-	
95035	Perissodactyla	Equidae	Hipparion	R. p4	h	r	r	1	1	-	
95036	Perissodactyla	Equidae	Hipparion	L. p2	l	b	b	3	3	-	
95036	Perissodactyla	Equidae	Hipparion	L. p3	l	b	b	3	3	-	
95036	Perissodactyla	Equidae	Hipparion	L. p4	l	b	b	3	3	-	
95036	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95036	Perissodactyla	Equidae	Hipparion	R. p3	l	r	b	2	3	-	
95036	Perissodactyla	Equidae	Hipparion	R. p4	l	r	r	2	2	-	

B-2 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95036	Perissodactyla	Equidae	Hipparion	R. m1	l	r	r	2	2	-	
95036	Perissodactyla	Equidae	Hipparion	R. m2	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	L. dp2	l	b	b	3	3	-	
95037	Perissodactyla	Equidae	Hipparion	L. dp3	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	L. dp4	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	L. m1	h	r	r	1	1	-	
95037	Perissodactyla	Equidae	Hipparion	L. m2	h	r	r	1	1	-	unworn
95037	Perissodactyla	Equidae	Hipparion	L. m3	-	-	-	-	-	-	unerupted
95037	Perissodactyla	Equidae	Hipparion	R. dp2	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	R. dp3	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	R. dp4	l	r	r	2	2	-	
95037	Perissodactyla	Equidae	Hipparion	R. m1	h	r	r	1	1	-	
95037	Perissodactyla	Equidae	Hipparion	R. m2	-	-	-	-	-	-	unworn
95037	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unerupted
95038	Perissodactyla	Equidae	Hipparion	L. dp2	-	-	-	-	-	-	
95038	Perissodactyla	Equidae	Hipparion	L. dp3	-	-	-	-	-	-	
95038	Perissodactyla	Equidae	Hipparion	L. dp4	-	-	-	-	-	-	
95038	Perissodactyla	Equidae	Hipparion	L. m1	-	-	-	-	-	-	
95038	Perissodactyla	Equidae	Hipparion	R. dp2	h	r	r	1	1	-	
95038	Perissodactyla	Equidae	Hipparion	R. dp3	-	r	-	1	-	-	distal cusp broken
95038	Perissodactyla	Equidae	Hipparion	R. dp4	h	r	r	1	1	-	
95038	Perissodactyla	Equidae	Hipparion	R. m1	-	-	-	-	-	-	erupting
95039	Perissodactyla	Equidae	Hipparion	L. p2	-	-	-	-	-	-	
95039	Perissodactyla	Equidae	Hipparion	L. p3	-	-	-	-	-	-	

B-2 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95039	Perissodactyla	Equidae	Hipparion	L. p4	-	-	-	-	-	-	
95039	Perissodactyla	Equidae	Hipparion	L. m1	-	-	-	-	-	-	
95039	Perissodactyla	Equidae	Hipparion	L. m2	-	-	-	-	-	-	
95039	Perissodactyla	Equidae	Hipparion	L. m3	-	-	-	-	-	-	
95039	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95039	Perissodactyla	Equidae	Hipparion	R. p3	l	b	b	3	3	-	distal cusp broken
95039	Perissodactyla	Equidae	Hipparion	R. p4	l	r	r	2	2	-	
95039	Perissodactyla	Equidae	Hipparion	R. m1	h	r	r	1	1	-	
95039	Perissodactyla	Equidae	Hipparion	R. m2	h	r	r	1	1	-	
95039	Perissodactyla	Equidae	Hipparion	R. m3	h	r	-	1	-	-	
95071	Perissodactyla	Equidae	Hipparion	L. m1	h	r	r	1	1	-	
95071	Perissodactyla	Equidae	Hipparion	L. m2	h	r	r	1	1	-	
95071	Perissodactyla	Equidae	Hipparion	L. m3	l	r	r	2	2	-	
95072	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	-	-	r	-	-	-	
95072	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	l	r	r	2	2	-	
95072	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	-	-	-	-	-	-	unworn
95073	Perissodactyla	Equidae	Hipparion	L. DP4?	-	-	-	-	-	-	
95077	Perissodactyla	Equidae	Hipparion	R. p2	l	b	b	3	3	-	
95077	Perissodactyla	Equidae	Hipparion	R. p3	h	r	r	1	1	-	
95077	Perissodactyla	Equidae	Hipparion	R. p4	h	r	r	1	1	-	
95077	Perissodactyla	Equidae	Hipparion	R. m1	h	r	r	1	1	-	
95077	Perissodactyla	Equidae	Hipparion	R. m2	h	r	r	1	1	-	
95077	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unworn
95078	Perissodactyla	Equidae	Hipparion	L. p3	l	r	r	2	2	-	

B-2 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
95078	Perissodactyla	Equidae	Hipparion	L. p4	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	L. m1	l	r	r	2	2	-	
95078	Perissodactyla	Equidae	Hipparion	L. m2	l	r	r	2	2	-	
95078	Perissodactyla	Equidae	Hipparion	L. m3	l	r	r	2	2	-	
95078	Perissodactyla	Equidae	Hipparion	R. p3	l	r	b	2	3	-	
95078	Perissodactyla	Equidae	Hipparion	R. p4	l	b	b	3	3	-	
95078	Perissodactyla	Equidae	Hipparion	R. m1	l	b	r	3	2	-	
95078	Perissodactyla	Equidae	Hipparion	R. m2	-	-	-	-	-	-	
95079	Perissodactyla	Equidae	Hipparion	R. dp2	-	-	-	-	-	-	
95079	Perissodactyla	Equidae	Hipparion	R. dp3	-	-	-	-	-	-	
95079	Perissodactyla	Equidae	Hipparion	R. dp4	-	-	-	-	-	-	
95079	Perissodactyla	Equidae	Hipparion	L. dp2	l	b	b	3	3	-	
95079	Perissodactyla	Equidae	Hipparion	L. dp3	h	r	r	1	1	-	
95079	Perissodactyla	Equidae	Hipparion	L. dp4	h	r	r	1	1	-	
2009102008	Perissodactyla	Equidae	Hipparion	L. lower cheeck teeth	-	-	-	-	-	-	unworn
"0030	Perissodactyla	Equidae	Hipparion	L. p2	l	b	b	3	3	-	
"0030	Perissodactyla	Equidae	Hipparion	L. p3	l	r	b	2	3	-	
"0030	Perissodactyla	Equidae	Hipparion	L. p4	l	r	r	2	2	-	
"0030	Perissodactyla	Equidae	Hipparion	L. m1	l	r	b	2	3	-	
"0030	Perissodactyla	Equidae	Hipparion	L. m2	l	b	b	3	3	-	
"0123	Perissodactyla	Equidae	Hipparion	L. P2	-	-	-	-	-	-	
KAG0002	Perissodactyla	Equidae	Hipparion	R. m1	h	s	r	0	1	-	
KAG0002	Perissodactyla	Equidae	Hipparion	R. m2	h	r	r	1	1	-	
KAG0002	Perissodactyla	Equidae	Hipparion	R. m3	-	-	-	-	-	-	unerupted

B-2 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KAG0031	Perissodactyla	Equidae	Hipparion	L. dp2	-	-	-	-	-	-	
KAG0031	Perissodactyla	Equidae	Hipparion	L. dp3	-	-	-	-	-	-	
KAG0031	Perissodactyla	Equidae	Hipparion	R, dp4?	-	-	-	-	-	-	
KAG0057	Perissodactyla	Equidae	Hipparion	L. m2?	h	r	r	1	1	-	
KAG0057	Perissodactyla	Equidae	Hipparion	L. m3?	l	r	r	2	2	-	distal cusp broken
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	r	-	-	-	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	r	-	-	-	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. m1	h	r	r	1	1	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. m2	h	r	r	1	1	-	
KU100	Artiodactyla	bovidae	*Miotragocerus*	L. m3	h	r	r	1	1	b	
KU101	Artiodactyla	bovidae	*Miotragocerus*	R. M1	h	r	r	1	1	-	
KU101	Artiodactyla	bovidae	*Miotragocerus*	R. M2	h	-	r	-	1	-	mesila cusp broken
KU101	Artiodactyla	bovidae	*Miotragocerus*	R. M3	h	s	s	0	0	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. p2	-	r	-	-	-	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	r	-	-	-	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	r	-	-	-	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. m1	l	r	r	2	2	-	
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. m2	h	r	-	1	-	-	distal cusp broken
KU103	Artiodactyla	bovidae	*Miotragocerus*	R. m3	h	r	r	1	1	r	
KU104	Artiodactyla	bovidae	unknown	R. dp2	-	r	-	-	-	-	
KU104	Artiodactyla	bovidae	unknown	R. dp3	-	r	-	-	-	-	
KU104	Artiodactyla	bovidae	unknown	R. dp4	h	r	r	1	1	s	*1
KU150	Artiodactyla	bovidae	unknown	L. p4	-	r	-	-	-	-	
KU150	Artiodactyla	bovidae	unknown	L. m1	h	r	r	1	1	-	

B-2 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KU150	Artiodactyla	bovidae	unknown	L. m2	h	r	r	1	1	-	
KU150	Artiodactyla	bovidae	unknown	L. m3	h	s	-	0	-	b	distal cusp broken
KU166	Artiodactyla	bovidae	unknown	R. p4	-	r	-	-	-	-	
KU166	Artiodactyla	bovidae	unknown	R. m1	h	r	r	1	1	-	
KU166	Artiodactyla	bovidae	unknown	R. m2	h	r	r	1	1	-	
KU166	Artiodactyla	bovidae	unknown	R. m3	h	r	s	1	0	r	
KU191	Artiodactyla	bovidae	*Miotragocerus*	L. p2	-	r	-	-	-	-	
KU191	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	r	-	-	-	-	
KU191	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	r	-	-	-	-	
KU220-1	Artiodactyla	bovidae	unknown	L. m1	h	-	r	-	1		mesial cusp broken
KU220-1	Artiodactyla	bovidae	unknown	L. m2	h	r	-	1	-		distal cusp broken
KU89	Artiodactyla	bovidae	*Miotragocerus*	L. m1	h	r	r	1	1	-	
KU89	Artiodactyla	bovidae	*Miotragocerus*	L. m2	h	r	r	1	1	-	
KU89	Artiodactyla	bovidae	*Miotragocerus*	L. m3	h	r	r	1	1	b	distal cusp unworn
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	s	-	-	-	-	m2 absent
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	s	-	-	-	-	
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. m1	h	s	s	0	0	-	
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. m2	h	s	r	0	1	-	distal cusp broken?
KU91	Artiodactyla	bovidae	*Miotragocerus*	R. m3	h	s	s	0	0	b	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. p2	-	r	-	-	-	-	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	r	-	-	-	-	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	r	-	-	-	-	
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. m1	-	-	-	-	-	-	worn out
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. m2	h	r	r	1	1	-	

B-2 continued.

KU No.	Order	Familly	Genus	Material	OR	CS (m)	CS (d)	MS (m)	MS (d)	CS (hypoconulid)	Notes
KU92	Artiodactyla	bovidae	*Miotragocerus*	R. m3	h	r	r	1	1	-	
KU94	Artiodactyla	bovidae	unknown	L. dp2	-	r	-	-	-	-	
KU94	Artiodactyla	bovidae	unknown	L. dp3	-	r	-	-	-	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	s	-	-	-	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	r	-	-	-	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. m2	h	r	r	1	1	-	
KU96	Artiodactyla	bovidae	*Miotragocerus*	L. m3	h	s	r	0	1	r	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. p3	-	-	-	-	-	-	broken
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. p4	-	s	-	-	-	-	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. m1	h	r	r	1	1	-	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. m2	h	r	r	1	1	-	
KU97	Artiodactyla	bovidae	*Miotragocerus*	R. m3	h	r	s	1	0	r	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. p3	-	r	-	-	-	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. p4	-	r	-	-	-	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. m1	h	r	r	1	1	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. m2	h	r	s	1	0	-	
KU98	Artiodactyla	bovidae	*Miotragocerus*	L. m3	h	s	r	0	1	b	
KU99	Artiodactyla	bovidae	*Miotragocerus*	L. m3	h	r	r	1	1	r	m2 broken
MAR1-1	Artiodactyla	bovidae?	unknown	R. m1 or m2	-	-	-	-	-	-	

APPENDIX C

R (ver. 2.11.0) CONSOLE OF STATISTICAL ANALYSIS (using left upper M2)

Table C-1. Hierarchical cluster analysis.

```
> x<-read.delim("clipboard",header=T,row.names=1)
> x
```

	X..low	X..high	X..sharp	X..round	X..blunt
Aepyceros melampus	0.0	100.0	35.2	64.8	0.0
Alcelaphus buselaphus	43.0	57.0	3.2	68.8	28.0
Alces alces	0.0	100.0	100.0	0.0	0.0
Bison bison	100.0	0.0	0.0	26.7	73.3
Capricornis sumatraensis	0.0	100.0	45.4	50.1	4.5
Ceratotherium simum	100.0	0.0	0.0	72.0	28.0
Cervus canadensis	0.0	100.0	47.3	52.7	0.0
Connochaetes taurinus	45.0	55.0	15.3	55.9	28.8
Damaliscus lunatus	80.0	20.0	20.0	60.0	20.0
Dicerorhinus sumatrensis	0.0	100.0	80.0	20.0	0.0
Diceros bicornis	0.0	100.0	94.1	5.9	0.0
Equus burchelli	100.0	0.0	27.0	39.4	33.6
Equus grevyi	100.0	0.0	34.4	41.5	24.1
Eudorcas thomsoni	12.0	88.0	55.4	43.3	1.3
Giraffa camelopardalis	6.0	94.0	73.7	26.3	0.0
Hippotragus equinus	15.0	85.0	3.8	96.2	0.0
Hippotragus niger	15.0	85.0	0.0	85.0	15.0
Kobus ellipsiprymnus	4.0	96.0	0.0	100.0	0.0
Nanger granti	12.0	88.0	50.0	50.0	0.0
Odocoileus hemionus	0.0	100.0	72.7	27.3	0.0
Odocoileus virginianus	0.0	100.0	88.8	11.2	0.0
Okapia johnstoni	0.0	100.0	87.5	12.5	0.0
Ovibos moschatus	19.0	81.0	57.6	42.4	0.0
Redunca redunca	9.0	91.0	6.4	91.1	2.5
Rhinoceros sondaicus	0.0	100.0	100.0	0.0	0.0
Taurotragus oryx	0.0	100.0	50.0	50.0	0.0
Tragelaphus scriptus	0.0	100.0	51.0	49.0	0.0
Eastern Hokkaido	0.0	100.0	38.1	61.9	0.0
Nikko area	9.1	90.9	45.5	54.5	0.0
Tsushima Islands	0.0	100.0	92.9	7.1	0.0
Yakushima Island	0.0	100.0	70.0	30.0	0.0

Table C-1 continued.

```
> dissimilarity <- dist(x, method = "euclidean")
> dissimilarity
```

	A. melampus	A. buselaphus	A, alces	B, bison	C. sumatraensis
Alcelaphus buselaphus	74.31				
Alces alces	91.64	136.33			
Bison bison	167.52	101.65	189.96		
Capricornis sumatraensis	18.45	79.88	74.24	165.35	
Ceratotherium simum	148.58	80.74	189.65	64.06	151.96
Cervus canadensis	17.11	81.77	74.53	168.18	5.53
Connochaetes taurinus	73.18	17.93	123.20	95.48	74.70
Damaliscus lunatus	115.99	56.23	152.32	71.76	117.40
Dicerorhinus sumatrensis	63.36	112.97	28.28	178.38	46.08
Diceros bicornis	83.30	129.23	8.34	186.17	65.92
Equus burchelli	147.79	89.22	167.36	49.66	145.94
Equus grevyi	145.34	90.73	163.11	61.83	143.45
Eudorcas thomsoni	34.06	77.52	64.45	154.97	21.08
Giraffa camelopardalis	55.10	101.48	38.15	168.75	38.20
Hippotragus equinus	49.21	55.71	137.69	157.06	65.77
Hippotragus niger	48.19	44.83	133.79	145.77	61.96
Kobus ellipsiprymnus	50.10	69.35	141.53	170.82	67.85
Nanger granti	26.95	72.45	72.72	154.61	18.15
Odocoileus hemionus	53.03	105.05	38.61	175.10	35.85
Odocoileus virginianus	75.80	122.99	15.84	183.03	58.46
Okapia johnstoni	73.96	121.48	17.68	182.29	56.63
Ovibos moschatus	41.54	74.78	65.71	148.52	30.83
Redunca redunca	41.10	58.90	131.26	160.51	58.03
Rhinoceros sondaicus	91.64	136.33	0.00	189.96	74.24
Taurotragus oryx	20.93	83.82	70.71	168.57	6.44
Tragelaphus scriptus	22.34	84.61	69.30	168.73	7.27
Eastern Hokkaido	4.10	75.81	87.54	167.52	14.59
Nikko area	19.44	71.25	78.14	157.29	14.33
Tsushima Islands	81.60	127.81	10.04	185.44	64.23
Yakushima Island	49.21	102.22	42.43	174.02	32.08

Table C-1. Continued.

	C. simum	*C. canadensis*	*C. taurinus*	*D. lunatus*	*D. sumatrensis*
Alcelaphus buselaphus					
Alces alces					
Bison bison					
Capricornis sumatraensis					
Ceratotherium simum					
Cervus canadensis	152.95				
Connochaetes taurinus	80.89	76.90			
Damaliscus lunatus	37.52	118.32	50.66		
Dicerorhinus sumatrensis	172.88	46.24	101.76	135.65	
Diceros bicornis	184.41	66.19	116.57	147.03	19.94
Equus burchelli	42.70	147.37	80.51	38.19	155.93
Equus grevyi	46.14	144.47	81.51	36.97	152.06
Eudorcas thomsoni	141.75	21.06	68.56	105.50	37.92
Giraffa camelopardalis	161.17	38.29	90.32	123.98	12.30
Hippotragus equinus	125.83	65.07	66.23	102.09	109.83
Hippotragus niger	121.61	62.89	55.42	97.47	106.30
Kobus ellipsiprymnus	141.42	67.13	79.81	118.12	113.28
Nanger granti	138.77	17.39	65.16	103.19	45.69
Odocoileus hemionus	167.53	35.92	94.83	130.56	10.32
Odocoileus virginianus	179.91	58.69	110.81	142.53	12.45
Okapia johnstoni	178.83	56.85	109.43	141.47	10.61
Ovibos moschatus	134.54	30.56	64.44	97.80	41.54
Redunca redunca	132.73	57.58	67.84	107.43	103.15
Rhinoceros sondaicus	189.65	74.53	123.20	152.32	28.28
Taurotragus oryx	154.17	3.82	78.22	119.16	42.43
Tragelaphus scriptus	154.64	5.23	78.75	119.51	41.01
Eastern Hokkaido	149.46	13.01	73.72	116.32	59.26
Nikko area	140.31	13.12	65.73	105.52	50.46
Tsushima Islands	183.38	64.49	115.25	145.99	18.24
Yakushima Island	165.674379	32.102648	92.42478	128.840987	14.142136

Table C-1 continued.

	D. bicornis	E. burchelli	E. grevyi	E. thomsoni	G. camelopardalis
Alcelaphus buselaphus					
Alces alces					
Bison bison					
Capricornis sumatraensis					
Ceratotherium simum					
Cervus canadensis					
Connochaetes taurinus					
Damaliscus lunatus					
Dicerorhinus sumatrensis					
Diceros bicornis					
Equus burchelli	163.57				
Equus grevyi	159.41	12.22			
Eudorcas thomsoni	56.45	131.73	128.27		
Giraffa camelopardalis	30.07	145.44	141.52	26.41	
Hippotragus equinus	129.45	139.08	137.69	74.03	99.67
Hippotragus niger	125.64	132.68	132.70	70.81	96.25
Kobus ellipsiprymnus	133.20	154.80	153.68	80.09	104.27
Nanger granti	64.63	131.37	128.00	8.70	34.57
Odocoileus hemionus	30.26	152.85	149.16	29.07	8.60
Odocoileus virginianus	7.50	160.45	156.39	49.35	22.98
Okapia johnstoni	9.33	159.73	155.70	47.63	21.28
Ovibos moschatus	58.19	123.27	119.34	10.26	29.26
Redunca redunca	122.96	143.62	142.38	68.60	93.56
Rhinoceros sondaicus	8.34	167.36	163.11	64.45	38.15
Taurotragus oryx	62.37	147.55	144.56	19.07	34.57
Tragelaphus scriptus	60.95	147.64	144.61	18.48	33.21
Eastern Hokkaido	79.20	147.51	144.95	30.58	51.06
Nikko area	69.93	135.00	131.90	15.56	40.12
Tsushima Islands	1.70	162.83	158.70	54.83	28.45
Yakushima Island	34.08	151.88	148.26	26.07	9.97

Table C-1 continued.

	H. equinus	*H. niger*	*K. ellipsiprymnus*	*N. granti*	*O. hemionus*
Alcelaphus buselaphus					
Alces alces					
Bison bison					
Capricornis sumatraensis					
Ceratotherium simum					
Cervus canadensis					
Connochaetes taurinus					
Damaliscus lunatus					
Dicerorhinus sumatrensis					
Diceros bicornis					
Equus burchelli					
Equus grevyi					
Eudorcas thomsoni					
Giraffa camelopardalis					
Hippotragus equinus					
Hippotragus niger	19.10				
Kobus ellipsiprymnus	16.46	26.31			
Nanger granti	65.47	62.99	71.61		
Odocoileus hemionus	99.72	96.38	102.97	36.31	
Odocoileus virginianus	122.07	118.35	125.71	57.44	22.77
Okapia johnstoni	120.26	116.57	123.87	55.68	20.93
Ovibos moschatus	76.29	73.41	84.18	14.61	34.32
Redunca redunca	10.54	17.50	13.28	60.12	92.92
Rhinoceros sondaicus	137.69	133.79	141.53	72.72	38.61
Taurotragus oryx	68.69	66.33	70.94	16.97	32.10
Tragelaphus scriptus	70.04	67.62	72.35	17.03	30.69
Eastern Hokkaido	52.94	51.58	54.18	23.90	48.93
Nikko area	59.56	57.40	64.75	7.57	40.56
Tsushima Islands	127.78	123.99	131.50	63.00	28.57
Yakushima Island	95.99	92.74	99.16	32.98	3.82

Table C-1 continued.

	O. virginianus	*O. johnstoni*	*O. moschatus*	*R. redunca*	*R. sondaicus*
Alcelaphus buselaphus					
Alces alces					
Bison bison					
Capricornis sumatraensis					
Ceratotherium simum					
Cervus canadensis					
Connochaetes taurinus					
Damaliscus lunatus					
Dicerorhinus sumatrensis					
Diceros bicornis					
Equus burchelli					
Equus grevyi					
Eudorcas thomsoni					
Giraffa camelopardalis					
Hippotragus equinus					
Hippotragus niger					
Kobus ellipsiprymnus					
Nanger granti					
Odocoileus hemionus					
Odocoileus virginianus					
Okapia johnstoni	1.84				
Ovibos moschatus	51.66	50.10			
Redunca redunca	115.51	113.68	72.11		
Rhinoceros sondaicus	15.84	17.68	65.71	131.26	
Taurotragus oryx	54.87	53.03	28.94	61.31	70.71
Tragelaphus scriptus	53.46	51.62	28.45	62.69	69.30
Eastern Hokkaido	71.70	69.86	38.50	45.01	87.54
Nikko area	62.57	60.78	22.11	53.62	78.14
Tsushima Islands	5.80	7.64	56.69	121.27	10.04
Yakushima Island	26.59	24.75	32.09	89.14	42.43

Table C-1 continued.

	T. oryx	*T. scriptus*	*Eastern Hokkaido*	*Nikko area*	*Tsushima Islands*
Alcelaphus buselaphus					
Alces alces					
Bison bison					
Capricornis sumatraensis					
Ceratotherium simum					
Cervus canadensis					
Connochaetes taurinus					
Damaliscus lunatus					
Dicerorhinus sumatrensis					
Diceros bicornis					
Equus burchelli					
Equus grevyi					
Eudorcas thomsoni					
Giraffa camelopardalis					
Hippotragus equinus					
Hippotragus niger					
Kobus ellipsiprymnus					
Nanger granti					
Odocoileus hemionus					
Odocoileus virginianus					
Okapia johnstoni					
Ovibos moschatus					
Redunca redunca					
Rhinoceros sondaicus					
Taurotragus oryx					
Tragelaphus scriptus	1.41				
Eastern Hokkaido	16.83	18.24			
Nikko area	14.36	15.04	16.59		
Tsushima Islands	60.67	59.26	77.50	68.26	
Yakushima Island	28.28	26.87	45.11	36.96	32.39

```
>  clusterResult <- hclust(dissimilarity, method=″complete″)
> plot(clusterResult, hang=-1)
```

Table C-2. Principal component analysis.

Appendix B-2

R console of PCA

```
> result1<-prcomp(x, scale=TRUE)
> result1
Standard deviations:
[1] 1.691608e+00 1.339594e+00 5.864708e-01 1.933579e-16 1.025009e-16

Rotation:
                PC1          PC2          PC3          PC4          PC5
X..low      0.5455765    0.2328608    0.3848663    0.4542748   -0.5418804
X..high    -0.5455765   -0.2328608   -0.3848663    0.4542748   -0.5418804
X..sharp   -0.3444580    0.6042913    0.1226722   -0.5424936   -0.4547888
X..round    0.1496233   -0.7156825    0.2209168   -0.4946316   -0.4146646
X..blunt    0.5134726    0.1190891   -0.7999394   -0.2197933   -0.1842594
> biplot(result1)
> fc.l <- sweep(result1$rotation, MARGIN=2, result1$sdev, FUN="*")
> fc.l
                PC1          PC2          PC3            PC4             PC5
X..low      0.9229018    0.3119390    0.22571288    8.783762e-17   -5.554322e-17
X..high    -0.9229018   -0.3119390   -0.22571288    8.783762e-17   -5.554322e-17
X..sharp   -0.5826880    0.8095053    0.07194367   -1.048954e-16   -4.661625e-17
X..round    0.2531041   -0.9587243    0.12956125   -9.564093e-17   -4.250349e-17
X..blunt    0.8685945    0.1595311   -0.46914112   -4.249877e-17   -1.888675e-17
> summary(result1)
Importance of components:
                          PC1     PC2     PC3      PC4       PC5
Standard deviation        1.692   1.340   0.5865   1.93e-16  1.03e-16
Proportion of Variance    0.572   0.359   0.0688   0.00e+00  0.00e+00
Cumulative Proportion     0.572   0.931   1.0000   1.00e+00  1.00e+00
>
```

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