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SUPPLEMENT TO

DESCRIPTION OF A NEW LATE MIOCENE AMERICAN BADGER (TAXIDIINAE) UTILIZING HIGH-RESOLUTION X-RAY COMPUTED TOMOGRAPHY

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HIGH-RESOLUTION X-RAY COMPUTED TOMOGRAPHY OF F:AM 27458:

Scan and processing details

Data acquisition. The specimen was scanned by M. Colbert and T. Rowe in January, 1999. It was scanned in air, held in position with florist foam in a clear plastic cylinder. The scanner was set to 0·3 mA and 100 kV energy potential. To reduce beam-hardening artefacts in the output images, a 1·59 mm aluminum filter was used to diminish lower energy X-rays. An air wedge was used in the calibration of the scanner. The X-ray source to skull distance was 102 mm. The skull was positioned occiput-down and scanned in the coronal (YZ) plane with 2400 views, three samples per view. The skull was scanned in one-pass overlapped 3-slice mode, deleting the third of each set of three. The field of reconstruction was 44·5 mm. The slice images produced by the HRXCT are two-dimensional images of the skull in the coronal plane from occiput to snout. Each slice has a thickness of 0·24 mm and the interslice spacing is 0·18 mm (i.e. 0·06 mm slice overlap). The scan data were exported as 512 by 512 pixel images in both 8-bit and 16-bit format.

Data processing. Tonal contrasts within the 16-bit images were adjusted to enhance the appearance of the osseous structures without increasing the visibility of artefacts. I specifically looked for contrasts between thin bones, sinuses, and delicate structures in the otic region. Numerous 'starburst' artefacts, which are oxide and sulfide products of diagenesis, appear as bright white spots and were 'toned down' by adjusting levels using Adobe Photoshop® version 4.01. I also adjusted to compromise among the fractures, matrix, and fossilized bone. By working with the 16-bit images first and then dropping them to 8-bit, I improved the 8-bit output and thus had more control of the digital information.

To create digital images in the sagittal and horizontal planes, the adjusted coronal data were digitally 'resliced' using NIH Image version 1·62b17/ppc. The interslice distance in pixels/mm was required by NIH Image to reslice the coronal stack in the horizontal (XY) and sagittal (XZ) planes. The interslice distance was calculated by dividing the image resolution (512 pixels) by the field of reconstruction (44·5 mm) and then multiplying that quotient (11·5056 pixels/mm) by the interslice spacing (0·18 mm). The interslice distance was 2·07 mm.

To ease navigation through the slice planes, each image has a number in the upper left-hand corner. Labels were added to every fifth slice of the dataset for each plane using Adobe Photoshop® version 4.01. Given the differences in positional relationships and preservation of anatomical structures, some features are not labelled in all three slice planes. In each slice, one of each paired structure (e.g. left and right nasals) was labelled; the selection based on clarity of detail and the spacing of labels. Upon completion of labeling, the labelled images were flattened and all slices were saved as TIFF-formatted files. The images were reduced in size to a maximum width of 640 pixels (512 for the coronal set) and loaded into QuickTime Movie Player Pro® version 3.0 to create animations with labelled images.