Remarkable preservation of brain tissues in an Early Cretaceous iguanodontian dinosaur


Specimen details for the iguanodontian endocast and associated material

Registration details at the Oxford University Museum of Natural History:

**OUMNH K.59010/1-3**: *Iguanodon* sp., three brain endocast fragments.
Upper Tunbridge Wells Fm., Wealden Group, Valanginian, Lower Cretaceous.
Cooden Beach, near Bexhill-on-Sea, East Sussex.

**OUMNH K.59010/4-5**: *Iguanodon* sp., two vertebrae within sediment matrix.
Upper Tunbridge Wells Fm., Wealden Group, Valanginian, Lower Cretaceous.
Cooden Beach, near Bexhill-on-Sea, East Sussex.

**OUMNH K.59010/6-7**: *Iguanodon* sp., two vertebrae.
Upper Tunbridge Wells Fm., Wealden Group, Valanginian, Lower Cretaceous.
Cooden Beach, near Bexhill-on-Sea, East Sussex.

**OUMNH K.59010/8**: *Iguanodon* sp., portion of tarsal bone with putative preserved ligament tissue.
Upper Tunbridge Wells Fm., Wealden Group, Valanginian, Lower Cretaceous.
Cooden Beach, near Bexhill-on-Sea, East Sussex.

**OUMNH K.59010/p1**: *Iguanodon* sp., brain endocast fragment on SEM stub.
Cooden Beach, near Bexhill-on-Sea, East Sussex.

**OUMNH K.59010/p2**: *Iguanodon* sp., brain endocast fragment on SEM stub.
Cooden Beach, near Bexhill-on-Sea, East Sussex (see SEM images archived in Zenodo).

**OUMNH K.59010/p3-p4**: Two sets of brain endocast CT scan slices, each scan comprises slices from one half of the natural endocast.
Upper Tunbridge Wells Fm., Wealden Group, Valanginian, Lower Cretaceous.
Cooden Beach, near Bexhill-on-Sea, East Sussex.

The iguanodontian endocast is currently in the private collection of Jamie Hiscocks, who is actively negotiating to have it housed in a public museum. In the meantime, access to the specimen can be arranged by contacting JH via email: auriga777@btinternet.com
Supplementary Figures

Supplementary Fig. 1. (a) Plaster replica of a *Mantellisaurus cf. atherfieldensis* braincase recovered from the Isle of Wight (Barremian; OUMNH K.59015a/p) (Original specimen is NHMUK R2501). Right half, viewed laterally from the left side, together with a plaster endocranial cast (OUMNH K.59015c/p) digitally superimposed within it. (b) Ditto, but with an image of the natural endocranial cast from Bexhill discussed herein superimposed upon the braincase. Scale bars = 10 mm.
Supplementary Fig. 2. (a) Plaster replica of a *Mantellisaurus cf. atherfieldensis* braincase recovered from the Isle of Wight (Barremian; OUMNH K.59015b/p). The original specimen is NHMUK R2501. Left half viewed laterally from the right side, together with a plaster endocranial cast (OUMNH K.59015c/p) digitally superimposed within it. (b) Ditto, but with an image of the natural endocranial cast from Bexhill discussed herein superimposed upon the braincase. Scale bars = 10 mm.
Supplementary Fig. 3. Photographic images of the iguanodontian natural cranial endocast from Bexhill. (a) Lateral view from the left side. (b) Lateral view from the right side. Scale bars = 10 mm.
Supplementary Fig. 4. Photographic images of the iguanodontian natural cranial endocast from Bexhill. (a) Dorsal view. (b) Ventral view. Scale bars = 10 mm.
Supplementary Fig. 5. (a) Environmental SEM of the eroded bone fragment (BF) preserved within the natural endocranial cast, containing openings interpreted as Haversian canals or trabeculae (HC) lined with microcrystalline siderite. (b) Environmental SEM showing deeper layers of natural cranial endocast (suspected as representing part of the cerebellar cortex; Gm-CC) showing abundant microcrystals of pseudo-triangular siderite locally surrounded by a matrix of amorphous calcium phosphate (collophane). Both images in this figure were obtained from scans of the uncoated complete brain endocast.
Supplementary Fig. 6. Representative mineralogy of the endocast. (a) Digital photograph of part of the endocast surface showing dark brown collophane and platy to acicular crystals of reddish-brown siderite. (b) Typical EDS spectrum from the platy crystals interpreted to be siderite. (c) Typical EDS spectrum from the phosphatic material interpreted to be collophane. (d) Typical EDS spectrum of rare iron silicates found scattered throughout the specimen.
Supplementary Fig. 7. Digital image of the surface of the natural cranial endocast. (a) Mineralised collagen bundles of the dura mater (DM). (b) Additional mineralised collagen bundles with meningeal blood vessel lumen visible (BV). Scale bars = 1 mm.
Supplementary Fig. 8. Structures on and within the iguanodontian natural cranial endocast, viewed laterally from the left. Sketch by MDB with false colours indicating the distribution of the sagittal sinuses: Superior Sagittal Sinus (SSS); Occipital Sinus (OS); and the oblique Transverse Sinus (TVS), which have been partially preserved as siderite moulds (pink) of the internal wall of the braincase. Green flecks indicate the position of collagen-like bundles and ribbons as well as tubular features that are distributed across the flanks of the endocast.