

# BONE HEAD

Ever since Röntgen directed X-rays at his wife's left hand in 1895, we have been able to observe the skeleton of a living person. And when Sir Geoffrey Hounsfield invented computerised axial tomography (CAT scans) in the 1970s, and magnetic resonance imaging (MRI) came into use in the 1980s, we could also look at internal organs and soft tissue. Interpreting the images of a head produced by these technological marvels is hard for a lay person, though. You can make out the hollow sphere of the skull, with the sockets for the eyes, the nasal cavities and the movable jaw bone, but not much else. Even when you look at a real skull, or a model, the eye sockets and other features are easy to identify, as is the pattern of zig-zag sutures or fixed joint lines on the surface, but trying to establish the way the skull is built, to count the number of bones or understand the way the sutures work, is difficult.

It takes an image like this one, created in the 19th century, to see how the bones relate to one another. In this dissected skull, the different bones were first separated, and then reassembled slightly apart from each other, in order to show their relationship. The first three bones of the spine have been separated as well, to show how the skull articulates with the neck. The picture is one of 726 colour plates in a reprint of Bourguery and Jacob's *Atlas of Human Anatomy and Surgery*, the first volume of which was originally published in 1830. Jean Baptiste Marc Bourguery, an anatomist who studied under Lamarck, consulted two of the "biological science academic giants" of the age, Georges Cuvier and Claude Bernard, about the publication. The illustrator, Nicolas Henri Jacob, was a student of the French artist Jean-Louis David. It's no wonder the image is so clear and has, indeed, a certain aesthetic appeal.

The bones we see on the outside of the skull look dense and hard; in the intact skull these would lock together tightly, forming the protective case for the brain. Bones inside the skull look much more delicate: they support the membranes of the nasal pas-

Modern techniques enable us to visualise our internal organs, but to see how bones fit together an artist must work with actual dissections.

**Jackie Hardie** looks at a 19th-century illustration

THE HUMAN SKULL PICTURED IS ONE OF 726 COLOUR PLATES ILLUSTRATED BY NICOLAS HENRI JACOB IN A REPRINT OF JM BOURGUERY AND NH JACOB'S *ATLAS OF HUMAN ANATOMY AND SURGERY*, THE FIRST VOLUME OF WHICH WAS ORIGINALLY PUBLISHED IN 1830. TASCHEM £100 [www.taschen.com](http://www.taschen.com)

sages. Some of the facial bones have spaces inside them; these sinuses help to lighten the skull so we don't have to work too hard to hold up our head. When you have a cold, the lining of the sinuses swells and makes a lot of slimy mucus, giving you a runny nose and headaches. In really large animals, like elephants, the skull is honeycombed with these weight-saving holes.

The bony box protecting the brain, called the cranium, has eight bones, two of which are fused together to make our extra-strong forehead. When a baby develops in the womb, its skeleton is first made of cartilage, a soft material which gradually changes to bone by a process called ossification. In human beings, the process in the skull is not completed until several months after birth, so a young baby has soft parts, known as fontanelles, in its cranium, allowing the skull to be squashed slightly as the baby's head is squeezed through the cervix during birth.

This softness also makes the baby's skull malleable. Many civilisations have tampered with its natural proportions and moulded the shape without damaging the brain itself. The origin of such practices is a puzzle. A fashion for elongated heads arose in the art of Egypt during the reign of Akhenaten, husband of Nefertiti, in the 14th century BC. His skull, found in his tomb, was naturally elongated. Yet the frescoes, sculptures and carvings of the time depict not only him but also his queen and his daughters with elongated heads. The king's appearance was unusual, if not unique, but it seems as though the artistic representation of his royalty set an ancient standard. The Minoans of Crete were so impressed that they copied the fashion in real life: the earliest skulls known to have been artificially shaped are from the Minoan Bronze Age (believed to be around 1900BC). It is not known if the custom spread from one source or arose independently in several places, but it did become widespread and has been recorded in Asia, Europe,

Africa, Oceania and the Americas.

Elongated skulls formed by wrapping the head in bandages were common throughout much of Africa until recent times and similar techniques have been found in the Americas and Oceania. Other cultures made use of boards to flatten and broaden the head. The Chinook tribe of the Pacific North West, for instance, placed a new-born baby on a plank and then fixed a board obliquely over the forehead. After about a year of this treatment the child would have a flattened crown, broadened head and receding forehead (the first expedition to report head flattening in the Chinook took place in 1805). In the Caucasus, flattening a child's forehead was done by binding the head in a cap lined with pads. Polynesians used heavy stones, while in Europe, Dutch boys, up to the age of seven or eight, and Dutch women throughout their lives, wore tightly fitting caps, a practice which pressed the forehead down. Bandeaux worn in different ways by French children from AD1000 flattened and lengthened their heads so that their province of origin could be identified. Among the Minoans and peoples around the Greek part of the Mediterranean, as well as the South Americas, a sculpted skull marked nobility and so served as a physical sign of social rank. Apparently in Ancient Peru, there was a wide variety of "deformed skull" shapes, including the elongated ones marking nobility.

The custom of skull-shaping has long since disappeared, but its modern equivalent could be in the hands of the hairstylist. The current fashion for closely shaved, or even bald heads on actors like Ross Kemp and Patrick Stewart, singers like Sinéad O'Connor, footballers like Thierry Henry and veteran athletes such as Colin Jackson, allows us to appreciate the shape of the skull in all its variety. No wonder the Victorians were fascinated by the shape of the skull – they even devised an elaborate system to link the pattern of bumps on it with certain personality traits – but that's another story.

## Lesson ideas

### Science

**KS2** Get pupils to look at and feel their own heads and a model skull. Ask them to identify as many parts as possible. Look at photos of the heads of newborn babies and

observe the "soft spots" (fontanelles).

**KS3** Look at the human skull and compare it with those of dogs, cats, cows or sheep.

Observe the jaw articulation and the positions of the eye and ear sockets and ask students to relate these to the mode of life of the animals.

**KS4** Look at the places where the different bones of the skull meet. Consider the way the jawbone articulates with the

cranium and the way in which the structure of the joints between the first three bones of the neck permits the different movements of the head on the neck. Compare the different joint surfaces and work out how structure and function are linked.

**KS5** Look at real X-rays of different parts of the body and identify as many as you can. Research the way CAT and MRI scans have helped in the diagnosis of disorders and in our knowledge

of the way the body works.

● The Science Museum website is a useful starting point for CAT scans [www.sciencemuseum.org.uk/exhibitions/brain](http://www.sciencemuseum.org.uk/exhibitions/brain) For MRI, look at [www.cancerhelp.org.uk](http://www.cancerhelp.org.uk) and [hcd2.bupa.co.uk/fact\\_sheets/html/MRI.html](http://hcd2.bupa.co.uk/fact_sheets/html/MRI.html)

JACKIE HARDIE

### Art

**KS 2-3** Using clay, build a skull in sections that can be opened from the top,

revealing winding stairs leading to different rooms, each a separate part of the brain, containing weird figures, machinery and furniture.

Alternatively, build a skull from coils and, when leather-hard, apply pressure from flat boards to distort its shape; then light it from the interior for dramatic effect.

**KS4** The human skull has been regularly used in art as a symbol of death, as in the distorted skull in "The Ambassadors" by Hans

Holbein, or a photograph by Jodie Coston where the skull is juxtaposed with a pile of pills.

Use these works as stimulus for a graphic project designing a poster which contains a symbolic skull as part of the subject matter.

Alternatively, produce surrealistic paintings where ambiguous skulls merge with other imagery as in "Ballerina in the Head of Death" and "Skull of Zurbaran", both by Salvador Dali.

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