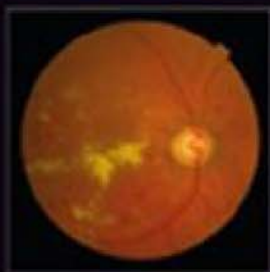
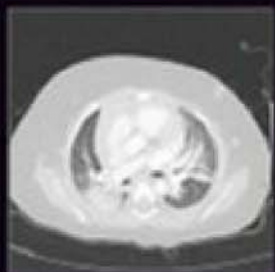




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CLINICAL ATLAS OF HUMAN ANATOMY



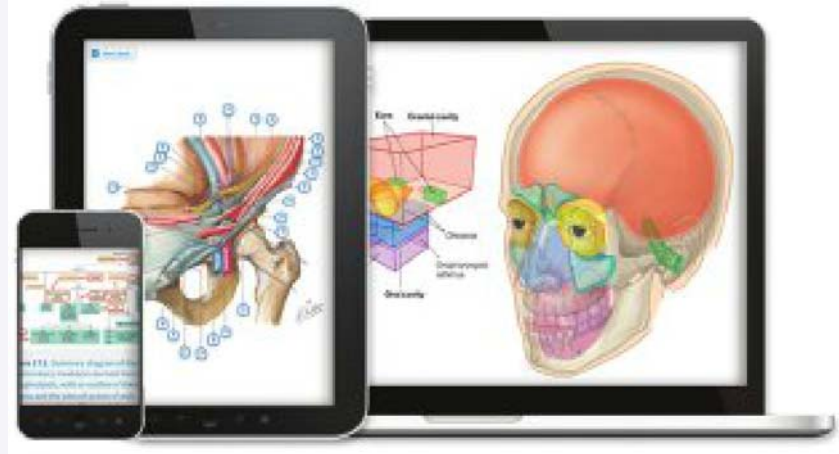
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Peter H. Abrahams
Jonathan D. Spratt
Marios Loukas
Albert N. van Schoor

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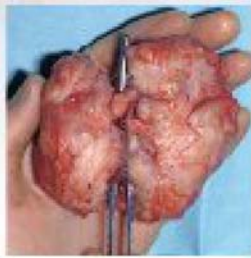


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EIGHTH EDITION

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Preface and Dedication

“To our patients and long-suffering families and spouses who do not see us enough and to our students on four continents who seem to see a bit too much of us!”

This new 8th edition based on the original McMinn Colour Atlas (1977) has now been updated and integrated with modern imaging anatomy, clinical case studies and 3D videos of most anatomical structures. Over the last 40 years (8 editions) the original book has moved with the times and benefited from the anatomical expertise of many international stars including Ralph Hutchings, Bari Logan and Professors John Pegington (UK), Sandy Marks (USA) and Hanno Boon (RSA) – all who made their own separate unique contributions (see the sixth and seventh edition dedications and prefaces in the Student Consult eBook (www.studentconsult.com)).



For over 25 years Peter Abrahams has been the driving force keeping the first ever full-colour photographic dissection atlas so relevant today; with updates on clinical practice and modern techniques, as well as the addition of numerous radiological modalities. This edition brings new coloured dissections, most of which were performed at the 3rd Hanno Boon Masterclass, held in 2016 at SGU, Grenada (see photo in the [Acknowledgements](#)). Marios Loukas from Grenada, WI and Albert van Schoor from Pretoria, RSA – two younger generation academic anatomists – have now been working with Jonathan Spratt, our consultant radiologist, to keep this atlas on the international cutting edge of anatomy as integrated into clinical medicine.

This is best illustrated by the clinical topics displayed as bullets at the bottom of each page as a guide to over 2000 clinical photographs and case vignettes plus 250+ 3D videos, all of which are in the Student Consult eBook (www.studentconsult.com). This unique feature for any anatomical dissection atlas is the combined cases from Abrahams and Spratt plus 120 clinical colleagues from across the globe – see the [acknowledgements](#) in the present edition and from the sixth and seventh edition in the Student Consult eBook (www.studentconsult.com). We are truly grateful to all our donors, patients and their doctors for this unique anatomical treasure trove from six continents spanning over 70 years. Another bonus in this 8th edition is a completely new 25-page neuroanatomy and cranial nerve section, with many new dissections and brain cross-sections matched with MR scans to show the cranial nerves in situ. Lastly, but not least, we have improved chapter 7 on Lymphatics – difficult to see in the dissection room but essential to the clinical understanding of disease, especially cancer spread. We have expanded and coloured much of the lymphatic section to illustrate this most important system clinically but which is rarely actually dissected in atlases and texts.



We, the authors – all of whom teach on a daily basis to both anatomical science students and clinical postgraduate medics – feel that the understanding of the human body is best retained by learning anatomical structures in a clinical context. Hence the inclusion on almost every dissection page of this atlas of radiology, endoscopy and real clinical cases backed up by 3D angiograms, scans and some pathological cases to emphasise the normal anatomy within its clinical context.

For additional electronic content (at www.studentconsult.com) look out for the following throughout the book:

-  Go online to view 200+ video loops and 3D rotations
-  Clinical images: Go online to view 2000+ clinical cases

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Acknowledgements

Dissections

Heartfelt thanks to all our **donors and their families** for the ultimate donation to benefit mankind and future generations of medical knowledge. This supreme gift to society educates and enriches the human experience for generations to come, for today's medical students are tomorrow's clinicians worldwide.

The production of this atlas and accompanying Student Consult eBook (www.studentconsult.com) has been a huge team effort over 5 years and has involved prosectors, professors, teachers and students from across five continents. We, the four authors, would like to thank all those who worked with us to deliver this new exciting clinical anatomy atlas and accompanying linked clinical Student Consult eBook.

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User Guide

This book is arranged in the general order 'head to toe'. The Head and Neck section (including neuroanatomy and cranial nerves) is followed by the Vertebral column and spinal cord, then Upper limb, Thorax, Abdomen and pelvis, Lower limb and finally a special section on Lymphatics. In each section, skeletal elements are shown first followed by dissections, with surface anatomy views and correlated imaging included for orientation. All structures are labelled by numbers, and these are identified in lists beside each image. Text has been limited to that needed to understand each preparation, and is not intended to be comprehensive. All clinical bullets at the bottom of most pages lead to the topics in the Student Consult eBook (www.studentconsult.com) with over 2000 images and video loops as illustration of these conditions.



The 3rd Hanno Boon memorial dissection masterclass participants, Grenada, 2016.

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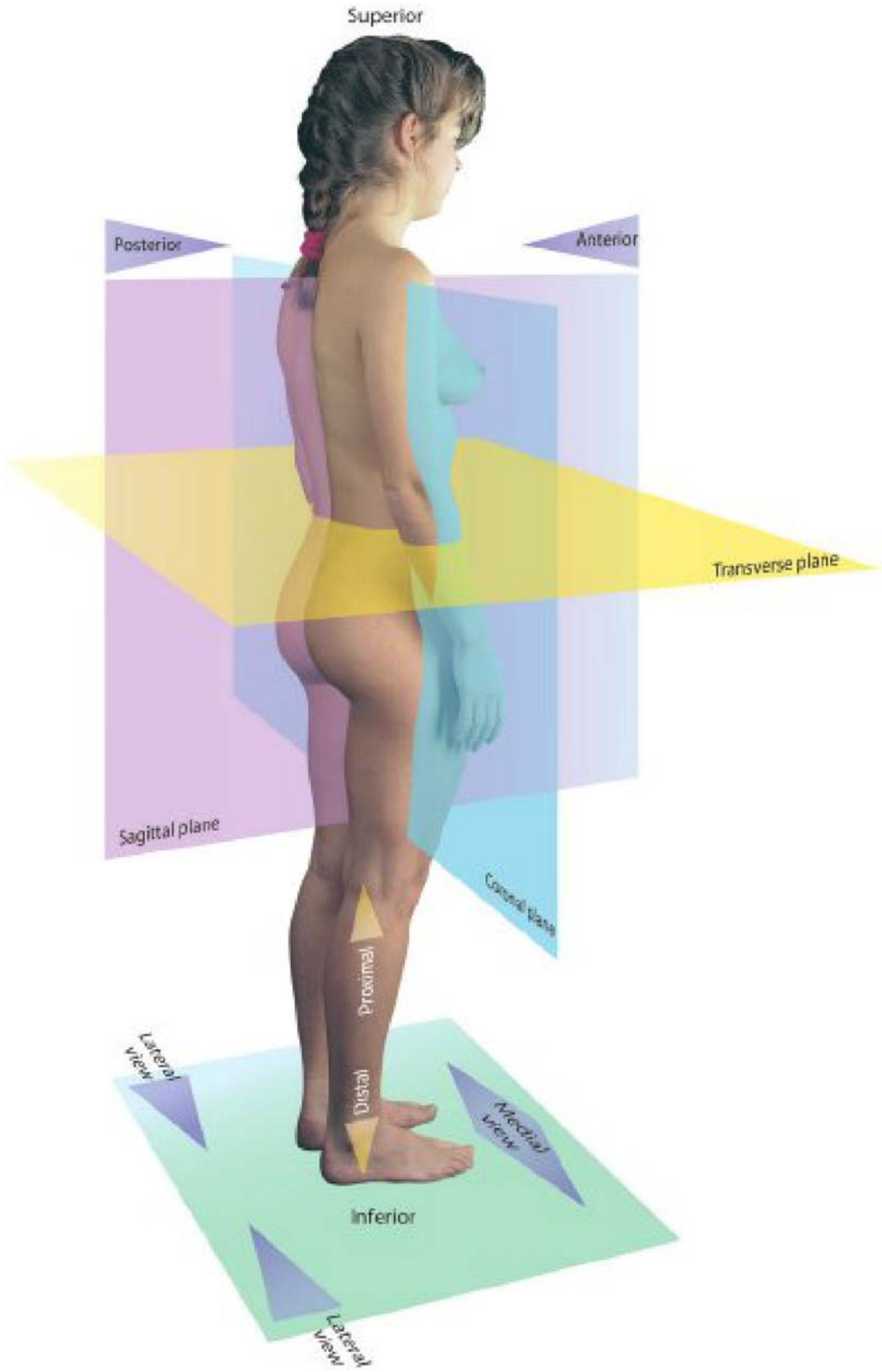
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Orientation



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Dissections

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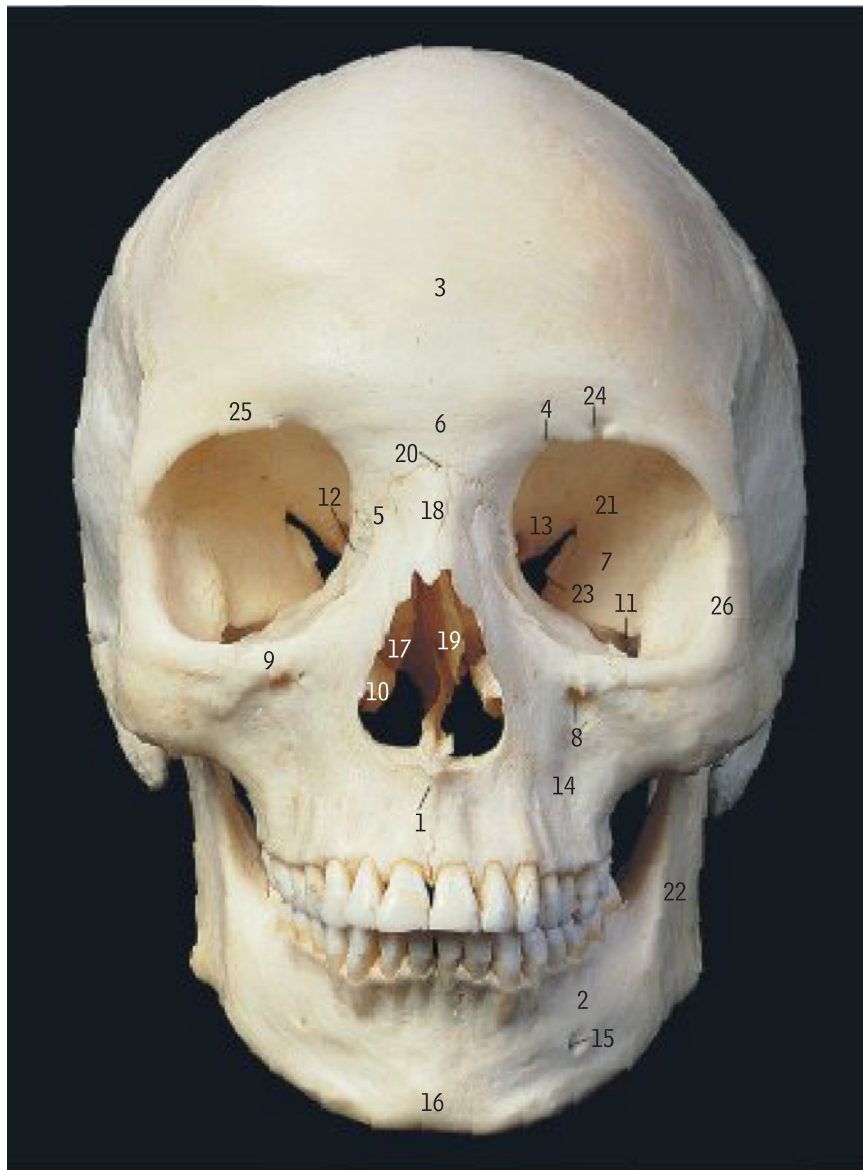
Pretoria, South Africa; Dr. PS Levay and Prof. D van Zyl, Department of Internal Medicine, Kalafong Hospital, University of Pretoria, South Africa; Dr. AK Mynhardt, University of Pretoria, South Africa; Dr. MY Gamielien, Oral & Dental Hospital, University of Pretoria, South Africa; Members of the Department of Plastic and Reconstructive Surgery, University of Limpopo (Medunsa campus), South Africa; Dr. Richard Wellings, Consultant Radiologist and Hon Associate Professor, UHCW Trust and Warwick Medical School, United Kingdom; Ms. Kavita Singh and Mr. Janos Balega, Consultant

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Head, neck and brain



Skull from the front



- 1 Anterior nasal spine
- 2 Body of mandible
- 3 Frontal bone
- 4 Frontal notch
- 5 Frontal process of maxilla
- 6 Glabella
- 7 Greater wing of sphenoid bone
- 8 Infra-orbital foramen
- 9 Infra-orbital margin
- 10 Inferior nasal concha
- 11 Inferior orbital fissure
- 12 Lacrimal bone
- 13 Lesser wing of sphenoid bone
- 14 Maxilla
- 15 Mental foramen
- 16 Mental protuberance
- 17 Middle nasal concha
- 18 Nasal bone
- 19 Nasal septum
- 20 Nasion
- 21 Orbit (orbital cavity)
- 22 Ramus of mandible
- 23 Superior orbital fissure
- 24 Supra-orbital foramen
- 25 Supra-orbital margin
- 26 Zygomatic bone



The term 'skull' includes the mandible, and 'cranium' refers to the skull without the mandible.

The calvarium is the skull (cranial vault or skull-cap) and is the upper part of the cranium that encloses the brain.

The front part of the skull forms the facial skeleton.

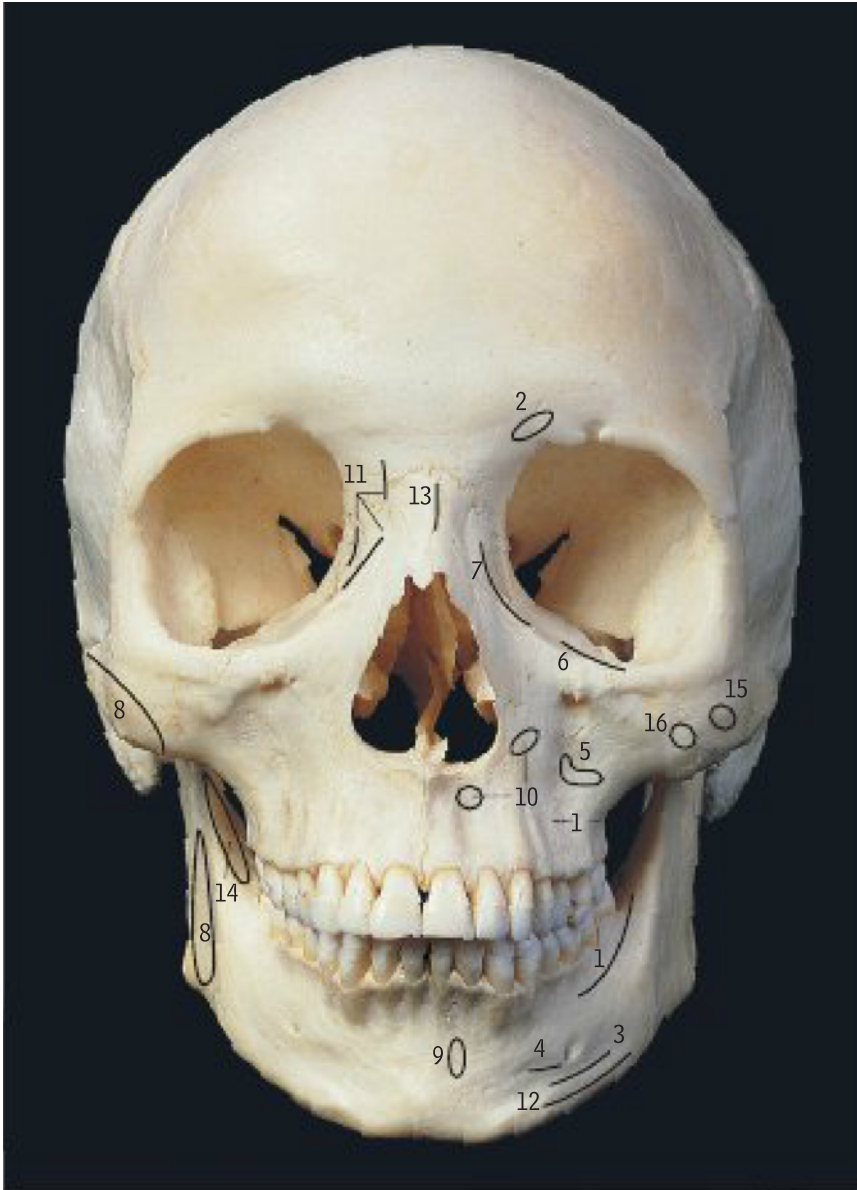
The supra-orbital, infra-orbital and mental foramina (24, 8 and 15) lie in approximately the same vertical plane.

Details of individual skull bones are given on [pages 18–27](#), of the bones of the orbit and nose on [page 12](#), and of the teeth on [pages 13 and 16–19](#).



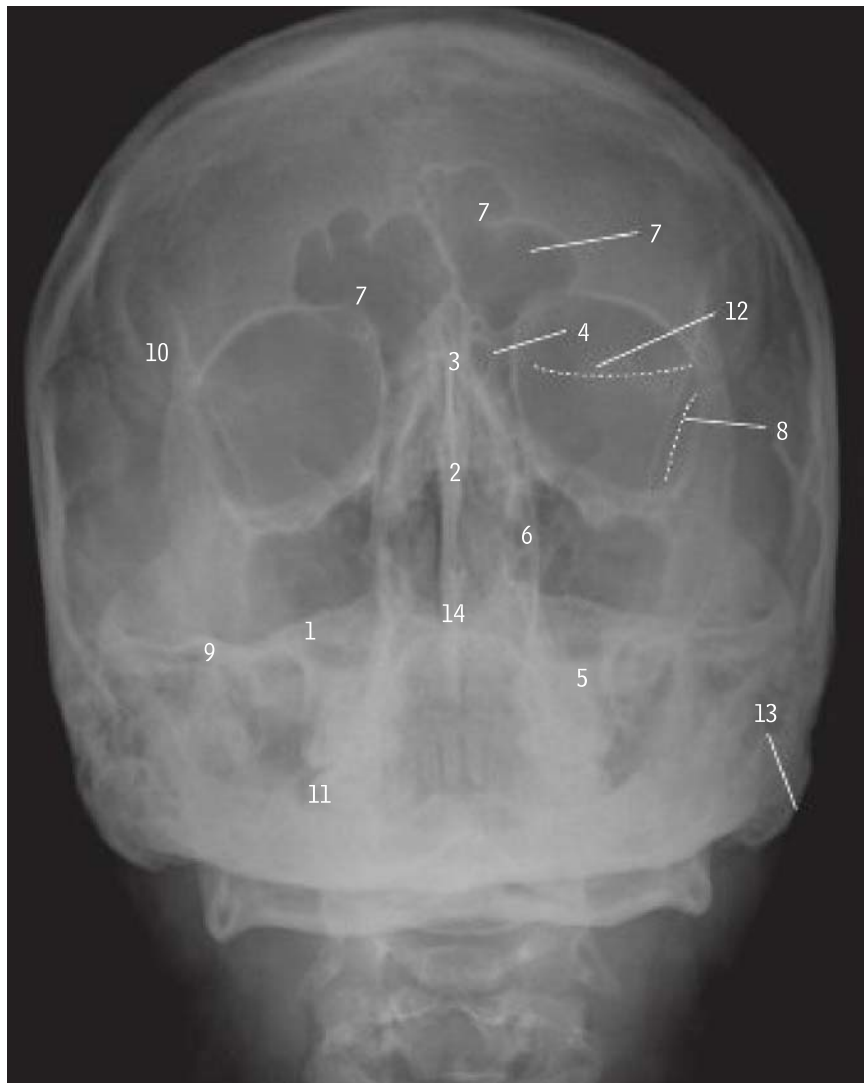
Tripod fracture

Skull muscle attachments, from the front



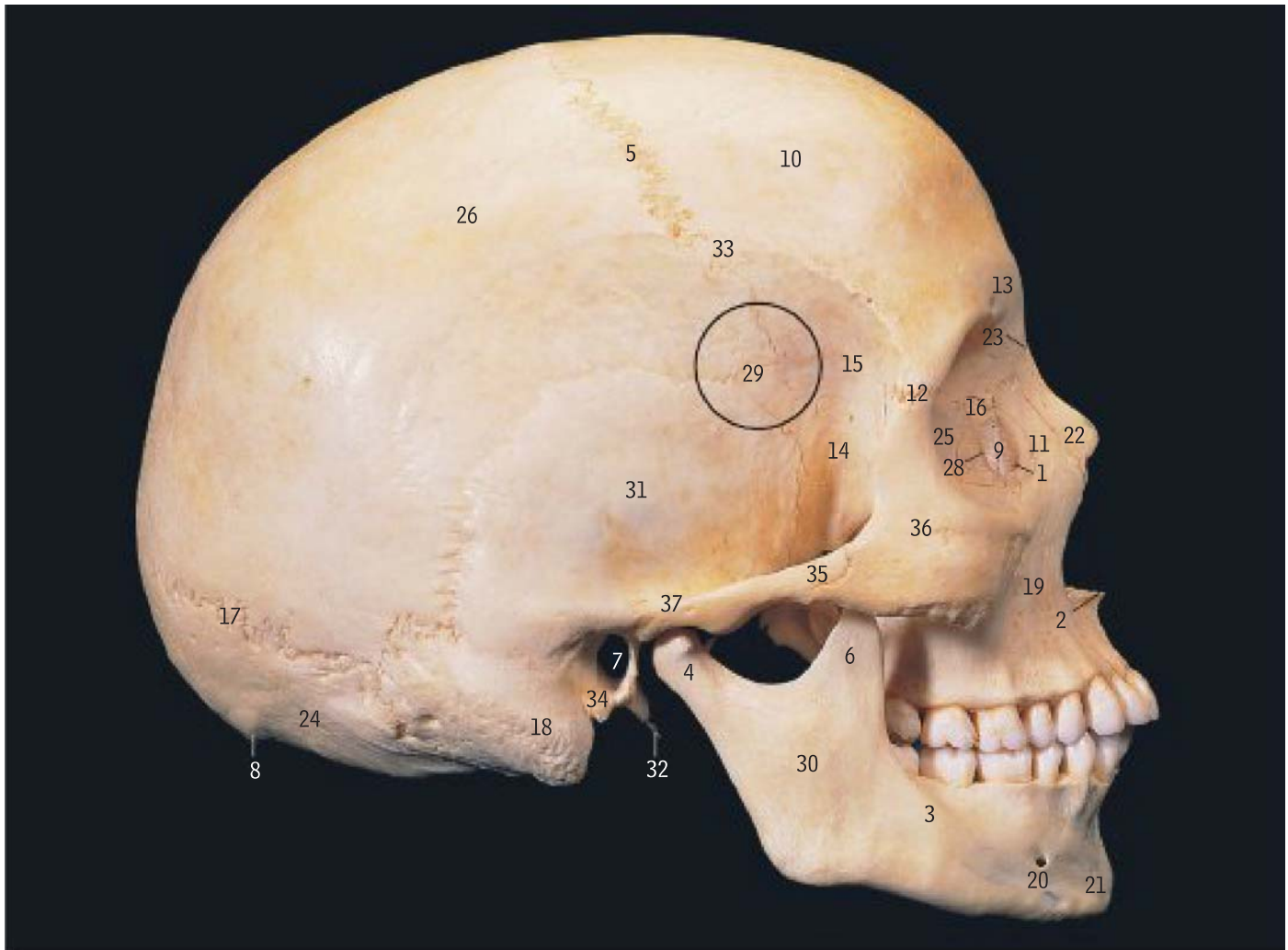
- 1 Buccinator
- 2 Corrugator supercilii
- 3 Depressor anguli oris
- 4 Depressor labii inferioris
- 5 Levator anguli oris
- 6 Levator labii superioris
- 7 Levator labii superioris alaeque nasi
- 8 Masseter
- 9 Mentalis
- 10 Nasalis
- 11 Orbicularis oculi
- 12 Platysma
- 13 Procerus
- 14 Temporalis
- 15 Zygomaticus major
- 16 Zygomaticus minor

Skull radiograph, occipitofrontal 15° projection



- 1** Basi-occiput
- 2** Body of sphenoid
- 3** Crista galli
- 4** Ethmoidal air cells
- 5** Floor of maxillary sinus (antrum)
- 6** Foramen rotundum
- 7** Frontal sinus
- 8** Greater wing of sphenoid
- 9** Internal acoustic meatus
- 10** Lambdoid suture
- 11** Lateral mass of atlas (first cervical vertebra)
- 12** Lesser wing of sphenoid
- 13** Mastoid process
- 14** Nasal septum

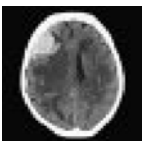
Skull from the right



- | | | | |
|---|-------------------------------------|---|---------------------------------------|
| 1 Anterior lacrimal crest | 9 Fossa for lacrimal sac | 19 Maxilla | 30 Ramus of mandible |
| 2 Anterior nasal spine with tympanic ring | 10 Frontal bone | 20 Mental foramen | 31 Squamous part of temporal bone |
| 3 Body of mandible | 11 Frontal process of maxilla | 21 Mental protuberance | 32 Styloid process of temporal bone |
| 4 Condylar process of the mandible | 12 Frontozygomatic suture | 22 Nasal bone | 33 Superior temporal line |
| 5 Coronal suture | 13 Glabella | 23 Nasion | 34 Tympanic part of temporal bone |
| 6 Coronoid process of mandible | 14 Greater wing of sphenoid bone | 24 Occipital bone | 35 Zygomatic arch |
| 7 External acoustic meatus of temporal bone | 15 Inferior temporal line | 25 Orbital plate of ethmoid bone | 36 Zygomatic bone |
| 8 External occipital protuberance (inion) | 16 Lacrimal bone | 26 Parietal bone | 37 Zygomatic process of temporal bone |
| | 17 Lambdoid suture | 27 Pituitary fossa (sella turcica) (see Figure A on page 5) | |
| | 18 Mastoid process of temporal bone | 28 Posterior lacrimal crest | |
| | | 29 Pterion (encircled) | |

Pterion (29) is not a single point but an area where the frontal (10), parietal (26), squamous part of the temporal (31) and greater wing of the sphenoid bone (14) adjoin one another.

It is an important landmark for the anterior branch of the middle meningeal artery, which underlies this area on the inside of the skull (page 17).

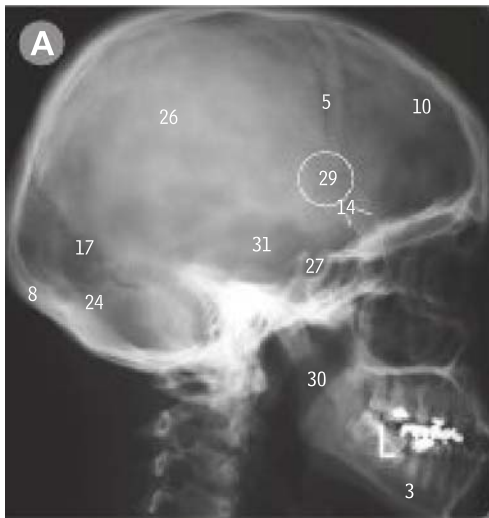


Extradural haemorrhage

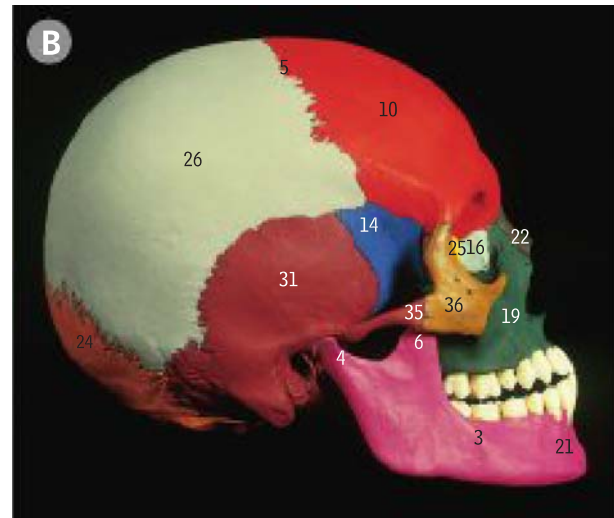


Skull

radiograph, lateral projection



coloured bones

See label list on [page 4](#) for A and B labels

scalp dissection



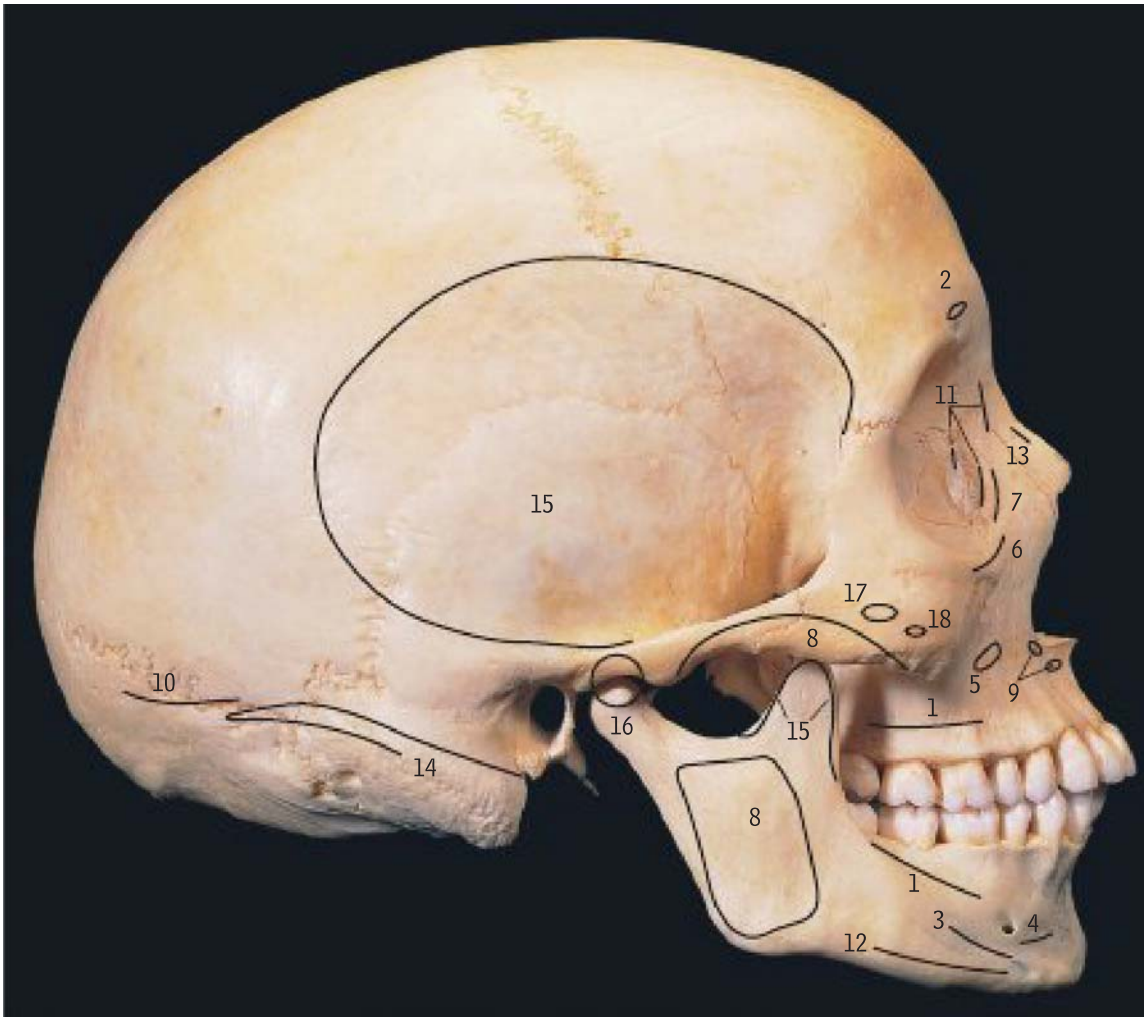
Scalp layers

S, skin; C, connective tissue; A, aponeurosis of occipitofrontalis; L, loose areolar tissue; P, periosteum.

- 1 Aponeurosis of occipitofrontalis
- 2 Dura mater
- 3 Frontalis muscle (covered by loose areolar tissue)
- 4 Loose areolar tissue
- 5 Middle meningeal artery impression on dura mater
- 6 Parietal branch of the superficial temporal artery
- 7 Periosteum
- 8 Skin
- 9 Subcutaneous tissue
- 10 Temporal bone
- 11 Temporal fascia
- 12 Temporalis muscle



Skull muscle attachments, from the right



- 1 Buccinator
- 2 Corrugator supercilii
- 3 Depressor anguli oris
- 4 Depressor labii inferioris
- 5 Levator anguli oris
- 6 Levator labii superioris
- 7 Levator labii superioris alaeque nasi
- 8 Masseter
- 9 Nasalis
- 10 Occipital part of occipitofrontalis
- 11 Orbicularis oculi
- 12 Platysma
- 13 Procerus
- 14 Sternocleidomastoid
- 15 Temporalis
- 16 Temporomandibular joint
- 17 Zygomaticus major
- 18 Zygomaticus minor

The bony attachments of the buccinator muscle (1) are to the upper and lower jaws (maxilla and mandible) opposite the three molar teeth. (The teeth are identified on [page 13](#).)

The upper attachment of temporalis (upper 15) occupies the temporal fossa (the narrow space above the zygomatic arch at the side of the skull). The lower attachment of temporalis (lower 15) extends from the lowest part of the mandibular notch of the mandible, over the coronoid process and down the front of the ramus almost as far as the last molar tooth.

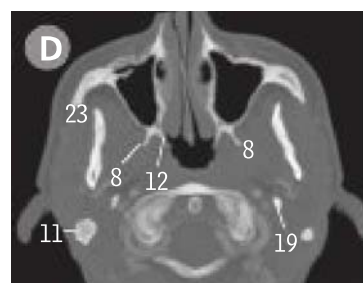
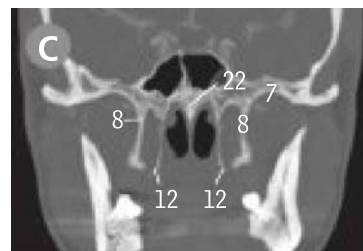
Masseter (8) extends from the zygomatic arch to the lateral side of the ramus of the mandible.



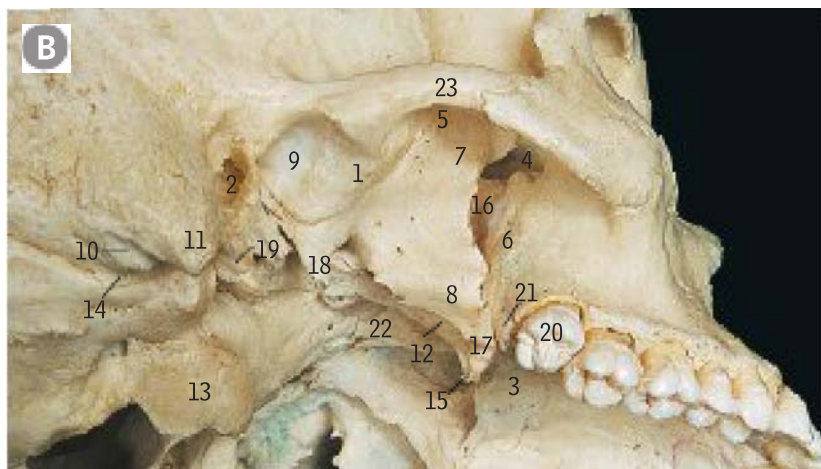
Temporomandibular joint (TMJ) dislocation

Skull from behind

- 1 External occipital protuberance (inion)
- 2 Highest nuchal line
- 3 Inferior nuchal line
- 4 Lambda
- 5 Lambdoid suture
- 6 Occipital bone
- 7 Parietal bone
- 8 Parietal foramina
- 9 Sagittal suture
- 10 Superior nuchal line



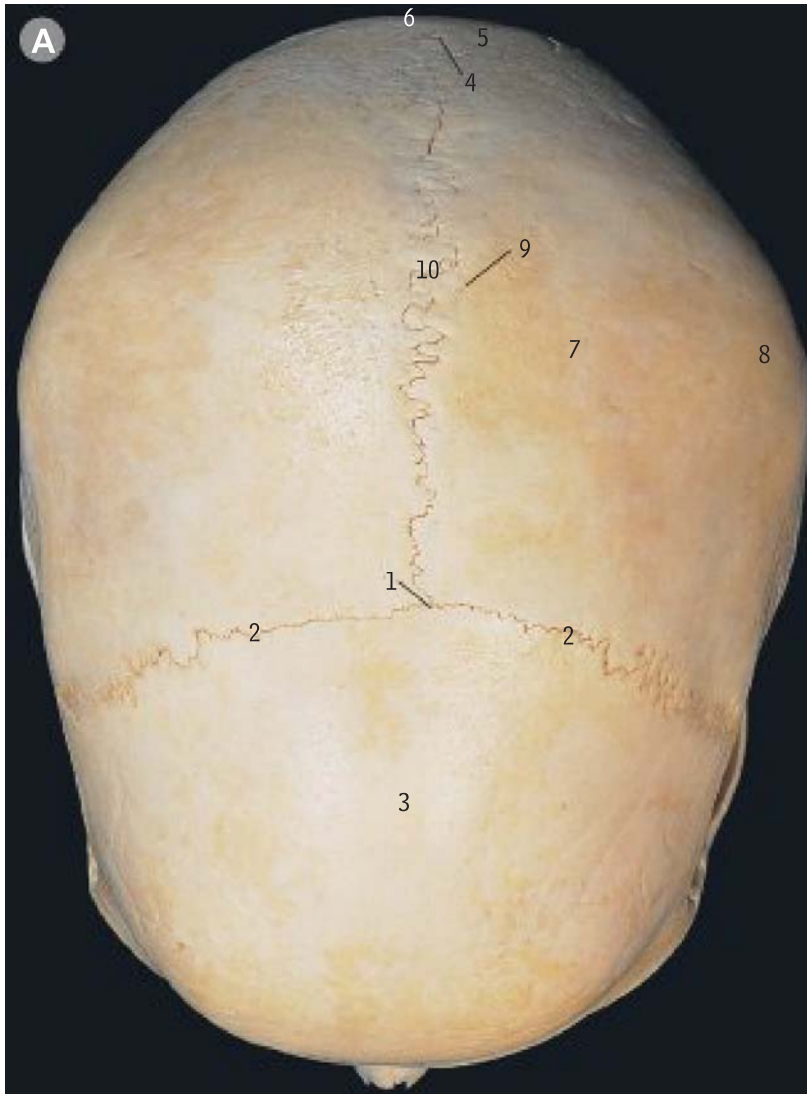
See label list below for C and D.

Skull right infratemporal region, obliquely from below

- 1 Articular tubercle
- 2 External acoustic meatus
- 3 Horizontal plate of palatine bone
- 4 Inferior orbital fissure
- 5 Infratemporal crest
- 6 Infratemporal (posterior) surface of maxilla
- 7 Infratemporal surface of greater wing of sphenoid bone
- 8 Lateral pterygoid plate
- 9 Mandibular fossa
- 10 Mastoid notch
- 11 Mastoid process
- 12 Medial pterygoid plate
- 13 Occipital condyle
- 14 Occipital groove
- 15 Pterygoid hamulus
- 16 Pterygomaxillary fissure and pterygopalatine fossa
- 17 Pyramidal process of palatine bone
- 18 Spine of sphenoid bone
- 19 Styloid process
- 20 Third maxillary molar tooth
- 21 Tuberosity of maxilla
- 22 Vomer
- 23 Zygomatic arch



Skull from above



- 1 Bregma
- 2 Coronal suture
- 3 Frontal bone
- 4 Lambda
- 5 Lambdoid suture
- 6 Occipital bone
- 7 Parietal bone
- 8 Parietal eminence
- 9 Parietal foramen
- 10 Sagittal suture

In this skull, the parietal eminences are prominent (A8).

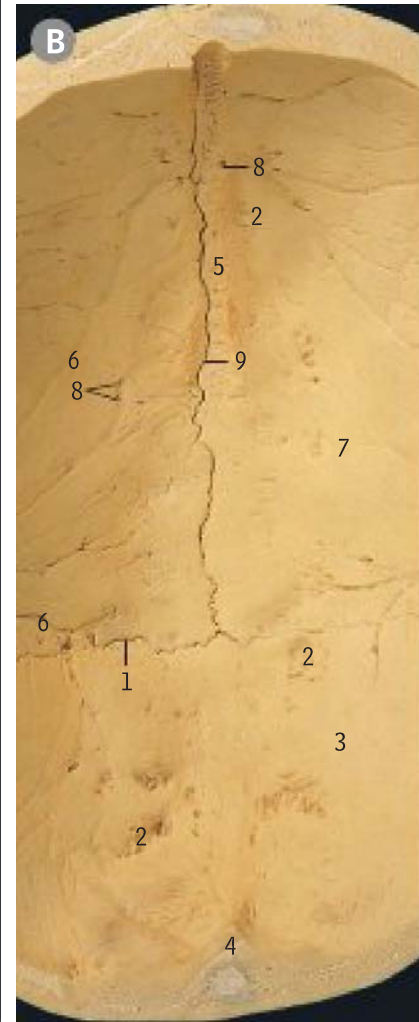
The point where the sagittal suture (A10) meets the coronal suture (A2) is the bregma (A1). At birth, the unossified parts of the frontal and parietal bones in this region form the membranous anterior fontanelle (page 14, D1).

The point where the sagittal suture (A10) meets the lambdoid suture (A5) is the lambda (A4). At birth, the unossified parts of the parietal and occipital bones in this region form the membranous posterior fontanelle (page 14, C13).

The label A3 in the centre of the frontal bone indicates the line of the frontal suture in the fetal skull (page 14, A5). The suture may persist in the adult skull and is sometimes known as the metopic suture.

The arachnoid granulations (page 62, B1), through which cerebrospinal fluid drains into the superior sagittal sinus, cause the irregular depressions (B2) on the parts of the frontal and parietal bones (B3 and 7) that overlie the sinus.

Skull internal surface of the cranial vault, central part



- 1 Coronal suture
- 2 Depressions for arachnoid granulations
- 3 Frontal bone
- 4 Frontal crest
- 5 Groove for superior sagittal sinus
- 6 Grooves for middle meningeal vessels
- 7 Parietal bone
- 8 Parietal foramina
- 9 Sagittal suture



Pepperpot skull