The Institute of Anatomical Sciences

Spring Scientific Meeting

10-11 April 2017

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IAS Spring Meeting - Day One
Dissection in History and Education

Monday 10 April 2017

11.00 Refreshments and Registration
The Denis Murphy Gallery

11.25 Please make your way to the Cripps Auditorium

Session 1

Chair: **Professor Ceri Davies**

11.30 Welcome by IAS Council members
Welcome to Cambridge and Magdalene College

11.40 History of anatomical dissection in Cambridge
Professor David Riches

12.10 Augmented anatomy:
Benefits of a dissection-based anatomy teaching course
Dr Cecilia Brassett

12.40 The anticipation and the reality:
Medical students' experience of the Dissection Room
Dr Stephen Barclay & Mr Chris Kassam

13.10 **Talks by Sponsors**

13.30 **Lunch**
The Denis Murphy Gallery

Session 2

Chair: **Dr Wendy Birch**

14.30 Report on the visit to the SOMSO Museum, Sonneberg
Mr Steve Gaze

15.00 The rise of anatomical imagery in popular culture
Ms Emily Evans

15.30 **IAS Annual General Meeting**

16.30- **Pepys Library Tours**
17.30 In 3 groups starting at 16.30, 17.00 and 17.30
Conducted by Dr Jane Hughes
President of Magdalene College
Pepys Librarian and Director of Studies in English

16.30 **Tea**
The Denis Murphy Gallery

18.00 **Pre-dinner Drinks**
Hosted by Heffers Bookshop
20 Trinity Street
CB2 1TY

19.30 **Gala Dinner**
The Hall, Magdalene College

IAS Spring Meeting - Day Two
Anatomical Research

Tuesday 11 April 2017

09.25 Please make your way to the Cripps Auditorium

Session 3

Chair: **Professor David Wilson**

09.30 Connecting the dots:
Reconstructing the marvellous middle ears of mammals
Dr Matthew Mason

10.00 From tissue to technique:
Validating image analysis with human tissue
Dr Tom Turmezei & Dr Jamie MacKay

10.30 **Refreshments and Sponsor Stands**

11.00 Anatomical illustration
Dr Robert Whitaker & Mr Ali Alam

11.30 Micro-CT scanning and reconstruction of the human inner ear in search of clinically useful measurements
Mr Prabhvir Marway

11.45 A reliable landmark for identifying the mandibular foramen in intraoral vertical ramus osteotomy
Mr Milan Kapur & Mr Rahul Shah

12.00 Neurovascular anatomy of the anterolateral thigh flap used in reconstructive surgery
Mr Max Stewart

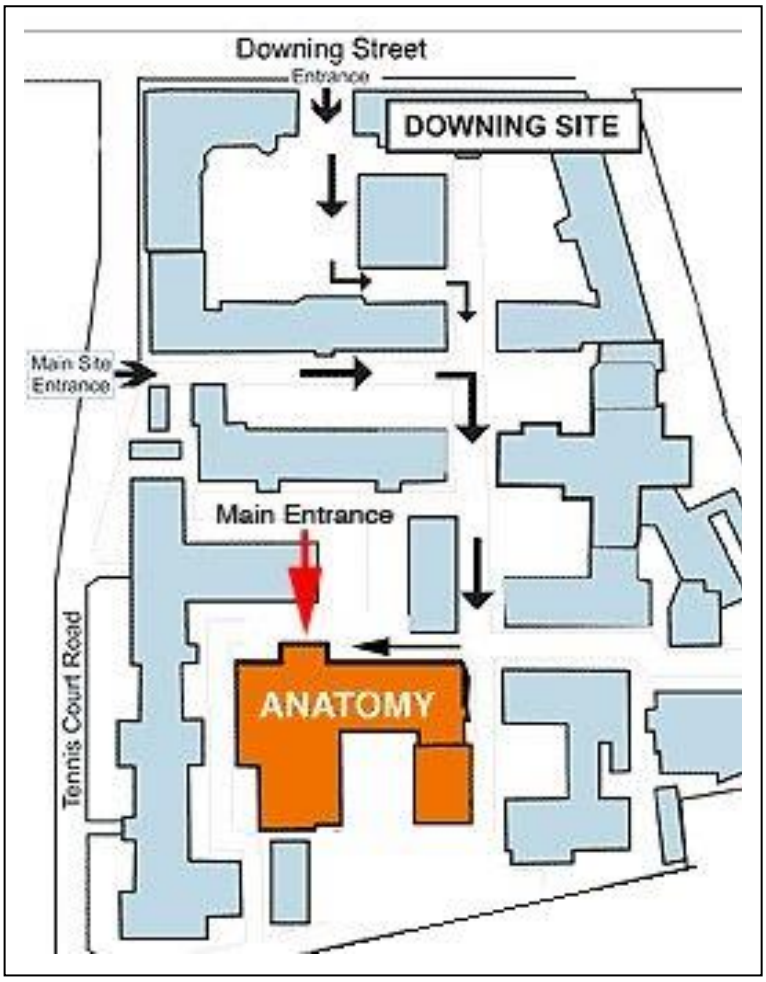
12.15 Analysis of colonic configurations and their relevance to colonoscopy
Mr Jacob Lam & Mr James Wilkinson

12.30 **Vote of Thanks and Prize-Giving**
Mr Stephen Franey

12.45 **Lunch**
The Denis Murphy Gallery

14.00 **Tours of the Human Dissection Room**
Demonstration of 3D imaging in Neuroanatomy
Dr Sue Jones, Mrs Maria Wright
Dr Isla Fay & Dr Cecilia Brassett

Anatomy Building
Downing Site
CB2 3DY



15.30 **Close**

ABSTRACTS

Session 1

History of Anatomical Dissection in Cambridge

David Riches
Emeritus Professor of Anatomy, University of London
Fellow & Director of Studies in Preclinical Medicine, Gonville & Caius College, University of Cambridge

Cambridge University was founded in 1209 and early anatomical teaching would have taken place by reading classical texts based largely on those of Galen. In 1549 anatomy became a statutory requirement for medicine and from 1562 until 1707 the Regius Professors of Physic were required to do one "anatomie" a year. These were mainly done in the Schools, but some were done in the Colleges. When John Caius 'refounded' his old college 1557, which was renamed Gonville & Caius College, there was a provision in the new statutes a sum of £1 6s 8d for anatomical dissections. He also stipulated that the bodies should be treated with utmost respect and subsequently buried in St Michael's graveyard with the whole College attending. Caius had studied medicine in Padua alongside Vesalius and on returning to England he became the first Reader in Anatomy at the Barber Surgeons. Dissections probably did not commence until August 1565 when Caius obtained a yearly grant from Queen Elizabeth I of two bodies of criminals or unknown strangers for dissection. Until the establishment of the Anatomical School in 1716, dissections were probably carried out in some of the other colleges as well.

The first Chair of Anatomy was founded in 1707 when Professor George Rolfe was appointed. However the provision for the teaching of Anatomy was not made until 1716 when a lecture room and room for the Professor of Anatomy were assigned in part of the University Printing House close to the entrance of Queens' College. In 1833 Anatomy was moved to a new building in Downing Street on the site of the original University Botanic Gardens and this consisted of a museum, a small dissecting room and lecture theatre. By 1885, the medical student numbers had increased so that a temporary dissecting room was erected prior to new building being occupied in 1891. The present dissecting room is in a building opened in 1938.

Augmented Anatomy:
Benefits of a dissection-based anatomy teaching course

Cecilia Brassett
University Clinical Anatomist, University of Cambridge
Fellow & Director of Studies in Preclinical Medicine, Magdalene College

Human anatomy has been taught using cadaveric dissection for over 450 years in Cambridge, and we continue to offer this irreplaceable experience to all our medical students today. The phrase *Augmented Anatomy* refers to the additional array of skills that students can acquire through this way of learning. The opportunity to learn anatomy through hands-on dissection enables medical students, as *Tomorrow's Doctors*, to develop in multiple domains: knowledge and intellectual ability, personal transferable skills, clinical understanding and professionalism, as well as an inquiring scientific mind.

A dissection-based anatomy course is well-suited to a spiral curriculum, defined as a course of study in which students are exposed to the same topics throughout their academic career, with each encounter increasing in complexity and reinforcing previous learning. During practical dissection sessions, students not only acquire basic anatomical knowledge, but also discover clinicopathological conditions and interventional procedures in their donors, which they will encounter in subsequent years. Participation in data collection for clinically relevant research projects during their first year as medical students enables them to develop critical thinking skills and a questioning mind. Other important skills such as teamwork and manual dexterity are also significant benefits that will be invaluable in clinical practice.

In this talk, specific examples will be provided of the ways in which the outcomes outlined by the General Medical Council can be achieved through a dissection-based anatomy course: the doctor as a *scholar and scientist*; the doctor as a *practitioner*, and the doctor as a *professional*.

The Anticipation and the Reality:
Medical students' experience of the Dissection Room

Stephen Barclay
University Senior Lecturer in General Practice & Palliative Care
Fellow & Director of Studies in Clinical Medicine, Emmanuel College, University of Cambridge

Chris Kassam
Graduate Course Medical Student, Hughes Hall, University of Cambridge

The experience of the Dissection Room (DR) is challenging for medical students: full body dissection starts in the first week of the preclinical course for Cambridge students. A study of first-year undergraduates aims to investigate their experience of the DR. Students were asked to complete a questionnaire concerning their thoughts and feelings about dissection before they entered the DR, with a further questionnaire being completed after four months of twice-weekly practical dissection sessions.

Data collected from these questionnaires will be presented, contrasting the initial "anticipation" and the later "reality" of full body dissection, and discussing the important educational and pastoral issues that have risen from the students' experiences.

This will be followed by Chris Kassam's presentation of a study of the tributes written by Cambridge DR table groups at the end of their first year. These tributes were designed to be sent to the families of the donors they have been working with all year. Their analysis has revealed a variety of thoughts and feelings expressed by the students which have significant implications for their developing medical professionalism.

We are grateful to the first-year medical students from the University of Cambridge who completed the two questionnaires, and also to the table groups who provided consent for us to analyse their tributes.

Session 2

The Rise of Anatomical Imagery in Popular Culture

Emily Evans
Senior Anatomy Demonstrator, University of Cambridge
Medical illustrator, author and publisher

The last 15 years have seen an unprecedented rise in the use of anatomical imagery and content both in the works of contemporary artists and within visual culture. In this talk, Emily will look at what potentially triggered this movement along with why it appears to capture the interest of so many. She poses the question: 'Just what is it about anatomical imagery that fascinates people and what does this mean for the future?'.

Images of anatomy have come a long way from the ancient anatomists and in the Renaissance where anatomists worked with fine artists to reflect the awe and wonder of anatomy. In today's culture, there are many ways in which anatomy is depicted: by medical illustrators, fine artists and the wide range of visual culture and media that has picked up on this trend.

Emily is an anatomist and artist. She worked as a medical illustrator for 12 years alongside teaching anatomy, and over the last few years has begun to specialise in researching anatomy in popular culture. The trend in the increased use of anatomical images has informed her own work and brand *Anatomy Boutique* which she will touch upon in this talk. Emily will also discuss her future artistic practice and how she sees this evolve and contribute to increasing the awareness of anatomy in society.

Session 3

Connecting the Dots:
Reconstructing the marvellous middle ears of mammals

Matthew Mason
University Physiologist, University of Cambridge
Fellow & Director of Studies in Physiology, St Catharine's College

The middle ear is a tiny region of the body which is of disproportionate importance to evolutionary biologists. The possession of three middle ear bones is a unique feature of mammals, and their function is in many respects enigmatic. Anatomical differences in the ear structures of mammals have classically been investigated by dissection, but it can be difficult to picture the three-dimensional relationships between the various structures once the middle ear cavity has been broken into. Many researchers have therefore turned to micro-computed tomography (micro-CT), but for greater resolution of soft-tissue structures, 3D images can also be produced from histological sections.

3D reconstructions are relatively simple and inexpensive to produce, and can be used in student research projects or to inform teaching. In this lecture I will show how I have used such techniques in projects ranging from following ear development in human embryos to reconstructing the ears of 40 million year old fossil rodents.

From Tissue to Technique:
Validating image analysis with human tissue

Tom Turmezei
Radiology Fellow, Royal National Orthopaedic Hospital, Stanmore
Formerly Wellcome Trust Clinical PhD Fellow, Department of Engineering, Cambridge & Honorary Consultant Radiologist, Addenbrooke's Hospital

Jamie MacKay
Department of Radiology, University of Cambridge School of Clinical Medicine

Improved methods of assessing human joints using clinical imaging are desirable to enhance understanding of the onset and progression of conditions such as osteoarthritis and to assess response to treatment. Traditional image analysis for this purpose has involved manual segmentation of the various joint structures such as articular cartilage and subchondral bone in order to deliver parameters such as cortical bone thickness, joint space width and articular cartilage thickness. While such techniques are generally reported as accurate and reliable, they are time consuming and require intensive training to reproduce faithfully. The averaging of such measures over large regions of the joint may also mask clinically important focal changes.

In recent years, the Engineering Department at the University of Cambridge has been developing novel techniques for semi-automated surface-based measurement of these parameters at joints, with validation results demonstrating considerable levels of accuracy and reliability. One key methodological factor has been the ability to demonstrate validity using high resolution imaging of cadaveric tissue as the gold standard, a step which most researchers do not consider. These novel image analysis techniques visualize the spatial distribution of a parameter across the entire joint space or cartilage surface with the ability to perform statistically powerful comparisons between individuals or within individuals over time.

In this talk we will describe how the use of intact and disarticulated cadaveric hip and knee joints has enabled us to validate these techniques by comparing measurements made using clinical computed tomography and magnetic resonance imaging to 'gold-standard' measurements from high-resolution computed tomography. This has allowed us to overcome many of the traditional obstacles to technical validation when using living subjects, but not without certain challenges that we also discuss.

We are grateful to the donors whose generosity made this study possible.

Anatomical Illustration

Robert Whitaker
Senior Anatomy Demonstrator, University of Cambridge
Anatomy Supervisor, Selwyn College
Formerly Consultant Paediatric Urologist, Addenbrooke's Hospital

Ali Alam
Third-year medical student, Jesus College, University of Cambridge

The first speaker will begin this presentation by discussing the use of illustrated operation notes after surgical procedures. This will be followed by a description of an approach to anatomical undergraduate and postgraduate teaching using simple coloured images. The images are computer generated using *Adobe Illustrator*. Much stress is placed on simplifying complex images by building up a series of simpler images that culminate in the final image. Similar serial images can also be usefully used for demonstrating anatomical features such as eye movement, reaction of the pupil to light and the formation of the brachial plexus. Many such images are the basis of an anatomy text book: *Instant Anatomy*, and subsequently a free teaching website www.instantanatomy.net and a more specific and fuller one for subscribing Universities and Medical Schools www.instantanatomy.co.uk.

The second speaker will describe the advantages and disadvantages of the progression from hand drawn images to the more popular and modern computer generated ones. Examples of the use of *Adobe Illustrator* will be shown to demonstrate the formation of blood vessels using the Circle of Willis as an example.

Mr Robert Whitaker is a retired urological surgeon who was so inspired by his senior surgical partner's illustrated operation notes that he attempted, with only moderate success, to emulate him. Following his surgical career, he became a full-time anatomy teacher and turned his artistic interest to the use of anatomical images in teaching, which will be described in this talk.

Micro-CT scanning and reconstruction of the human inner ear in search of clinically useful measurements

Prabhvir Marway
Third-year medical student, Trinity College, University of Cambridge

In this study, micro-CT scanning was performed on eight human petrous temporal bones. This imaging technique has enabled us to gather very high-resolution (~0.02mm) 2D images of the human inner ear. Using various software and conversion methods, we were able to create 3D reconstructions and models to allow us to make highly accurate measurements of the dimensions of the inner ear, with a particular focus on the cochlea and semi-circular canals.

One of the aims of this project is to discover a proxy measurement for the cochlear spiral length, a clinically relevant measurement which is useful for surgeons performing cochlear implants. By making highly accurate and repeatable measurements, we hope to find a useful set of measurements that a surgeon could make in clinic in order to reliably and accurately estimate a patient's cochlear spiral length prior to implantation. According to the current literature and the preliminary results I have gathered, there is an intraspecific difference in the measurements of the human inner ear. In light of this, I shall also examine what functional implications these differences in the inner ear could have in humans.

We acknowledge the generosity of the donors who had consented to the use of their bodies for anatomical research.

A reliable landmark for identifying the mandibular foramen in intraoral vertical ramus osteotomy

Milan Kapur
Third-year medical student, King's College, University of Cambridge

Rahul Shah
Third-year medical student, Girton College, University of Cambridge

The mandibular foramen marks the entry of the inferior alveolar nerve into the mandibular canal, on the medial ramus of the mandible. During the intraoral vertical ramus osteotomy (IVRO) procedure, the ramus of the mandible is approached and cut from its lateral aspect. Hence, a landmark on the lateral ramus is required to estimate the position of the mandibular foramen, enabling the surgeon to make the cut posterior to this point, avoiding potential damage to the inferior alveolar nerve.

The antilingula has been described as a palpable prominence on the lateral ramus, which may be used as a landmark to identify the mandibular foramen. We tested this hypothesis by measuring the 3-dimensional coordinates of the lingula, antilingula and mandibular foramen on 267 dry mandibles (478 sides) by using the MicroScribeG2X (Immersion Corporation, San Jose, CA, USA). In addition, we measured the coordinates of several defined points on the mandible, including the mandibular notch, and the anterior and posterior concavities of the ramus. By comparing the distance of these points from the antilingula and mandibular foramen, we were able to determine the relationship between these two points, thus enabling us to assess the use of the antilingula during the IVRO procedure. Additionally, we were able to compare this relationship between the sexes, and across eight different ethnicities.

All the mandibles in this study are housed in the Duckworth Laboratory at the Leverhulme Centre for Human Evolutionary Studies, and were used by the kind permission of its Director, Dr Marta Mirazon Lahr.

Neurovascular anatomy of the anterolateral thigh flap used in reconstructive surgery

Max Stewart
Third-year medical student, Sidney Sussex College, University of Cambridge

Born in ancient India and revolutionised following the World Wars, reconstructive surgery has become one of the most innovative and exciting disciplines in medicine. Reconstructive surgeons repair congenital defects and injuries in an effort to restore form and function to the body. A major part of their work concerns the repair of severe wounds, which are too large or deep to heal unaided. Such injuries are repaired by transfers of healthy tissue, or 'flaps', from other parts of the body.

The anterolateral thigh (ALT) flap is one of the most popular tissue transfers in use today, and is used to repair defects resulting from trauma such as road traffic accidents, burns and tumour resections. The ALT flap consists of a block of skin and muscle harvested from the thigh, along with a cutaneous artery known as a 'perforator' that supplies blood to these tissues. The flap is transferred to the injury site and the perforator is then re-attached to a local blood vessel, thus re-establishing circulation through the flap.

As surgeons may often have several perforators to choose from when raising an ALT flap, this study aims to provide surgeons with better anatomical evidence on which to base this decision. Comprehensive characterisation was made of the neurovascular anatomy of perforators along the proximal-distal length of 20 such thighs flaps. Of particular interest is the point where the perforator arises from its source vessel. This area, known as the box junction, is a key point of navigation during surgery. In this study, a number of variables were carefully examined and measured, including artery diameter, length of intramuscular dissection, location of nearby accessory branches, and the relation of motor nerves to the vessel.

This study would not be possible without the generosity of the donors who had consented to the use of their bodies for anatomical research.

Analysis of colonic configurations and their relevance to colonoscopy

Jacob Lam
Fifth-year medical student, University of Cambridge School of Clinical Medicine & Jesus College

James Wilkinson
Fifth-year medical student, University of Cambridge School of Clinical Medicine & St Catharine's College

Colonoscopy is a common endoscopic imaging technique that plays an important role in the screening, diagnosis and treatment of colorectal pathology. Complete visualisation of the colon occurs only if the scope tip has intubated the caecum. In some patients, increased mobility of segments of the colon leads to the formation of tortuous loops, which require complex reduction manoeuvres in order to permit further retrograde passage of the scope. These challenging colonic loops limit the clinical effectiveness of colonoscopy as they are an important cause of its incompletion. Our studies examined the relevance of colonic configurations to colonoscopy.

The first strand of our work used magnetic ScopeGuide™ imaging to visualise real-time scope configurations during 103 colonoscopies carried out by a single expert operator. Analysis of the images led to novel definitions for morphologically distinct looping patterns in both sigmoid and transverse colonic segments. Sigmoid n-shaped loops and deep transverse loops were more common in females; furthermore, patients with deep transverse loops were more likely to have a sigmoid n- or alpha-loop. This preponderance of difficult looping patterns in females might explain why colonoscopy is more difficult in this group. Nevertheless, no particular combination of sigmoid and transverse configurations predicted time taken to complete colonoscopy, which possibly reflects the experience of the operator in resolving loops.

The second strand of our work used novel definitions to describe the mobility of sigmoid and transverse loops in the undisturbed abdomens of 122 cadaveric subjects. There was a strong correlation between sigmoid and transverse colonic mobility and females had a more mobile transverse segment; these results are consistent with the findings of the colonoscopic data. Further investigation is required to identify how difficult loops occur during colonoscopy and the anatomical factors that underpin them. We acknowledge the generosity of the donors without whom this study would be impossible.

www.anatomical-sciences.org.uk

The Institute of Anatomical Sciences was founded in 1984; we are a growing international group of anatomy and anatomically-related professionals dedicated to sharing knowledge, techniques and best practices to ensure informed intellectual, legislative and technical expertise in the field of anatomical science.

The Institute has an extensive educational programme including anatomical techniques workshops, skeletal preparations, embalming, dissection/prosection and several other techniques/skills unique to our profession. A formal educational qualification, the IAS Diploma provides and ensures a gold standard of expertise expected by Higher Educational Institutions and is accompanied by a Certificate in Anatomical Technology and Science.

In addition to holding two Scientific Meetings a year in the UK and Ireland to update and educate our general membership, IAS publishes a journal and a newsletter, which serves to keep the members informed. The benefits of membership include:

- Networking with colleagues from other Institutions in both Medical & Veterinary Schools; gaining insight into new developments in teaching methods and specimen preparations; sharing ideas and information for courses (programmes run/cost comparisons).
- Staff development: Training programme for staff through the IAS Diploma and Foundation Certificate, supported by IAS workshops. Opportunity to give presentations at scientific meetings developing communication skills.
- Opportunity to enhance the reputation of your Institution through presentations, the winning of awards (dissection/museum competition and open awards), and hosting IAS Scientific meetings.
- Links with other professional bodies, The Anatomical Society of Great Britain and Ireland, The British Association of Clinical Anatomists and the Human Tissue Authority through the 'Anatomy Associations Advisory Committee'.

Membership grades are awarded, based on our Accreditation Scheme which was introduced in 1990. Points are gained for experience, qualifications and actively supporting the IAS by giving talks, writing articles for the newsletter or journal, presenting a poster, attending meetings and entering competitions.

For more information contact the IAS Membership Secretary:
membership@anatomical-sciences.org.uk

The Pepys Library

The Pepys Library, comprising 3,000 volumes, is a splendid enrichment of the College by one of its most notable sons. Samuel Pepys (1651) became Secretary to the Admiralty for many years, and President of the Royal Society. His famous Library came to Magdalene only after the death of his nephew, John Jackson, who made a significant contribution to its final order. These are arranged by size, from No. 1 (the smallest) to No. 3,000 (the largest), and housed in twelve stately late seventeenth-century oak bookcases. Their fine bindings, mostly done for Pepys, are of much interest. The library desk, perhaps Pepys's own, is also an integral part of the arrangement. There is a studio-copy of the Kneller portrait of Pepys here.

The Library continues to fascinate tourists, and to attract scholars from all over the world, as it has done ever since Macaulay discovered its importance. Among the Library's treasures are some sixty medieval manuscripts, some important early printed books (including seven *incunabula* by Caxton, eight by Wynkyn de Worde, and seven by Pynson), and a naval collection (notably the 'Anthony Roll', illustrating the ships of the Royal Navy *c.*1546, such as *The Mary Rose*, and Drake's autographed nautical pocket almanack). In addition, there are special collections of prints, ballads, music, maps, and calligraphy, all of them now the subject of comprehensive published catalogues.

Pepys's own diary covering the years 1660 to 1669 is preserved in six volumes, written in Shelton's shorthand. This too has recently been definitively edited by Robert Latham, CBE, FBA, Fellow and Pepys Librarian (1972-82). Dr Jane Hughes, current President of Magdalene College and Pepys Librarian, published *The Pepys Library and the Historic Collections of Magdalene College Cambridge* in 2015, a lavishly illustrated volume that recounts the history and development of the collections and celebrates some of the highlights in extended descriptions and with specially commissioned photography.

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