

The Fountain

Issue 28 • Autumn 2019



50 years ago we set foot on the Moon. Writer **Keith Mansfield (1984)** explores where our next giant leap will take us.



**TRINITY
COLLEGE**
CAMBRIDGE



Welcome from a Fellow



It is my pleasure to welcome you to the Autumn 2019 edition of *The Fountain*.

While Cambridge may quieten a little during the summer months, Trinity is always a hive of activity in Admissions and Outreach. The A Level results arrive in August, when our teaching staff are on hand to see if the students they interviewed last December have reached the high standards we expect of them. In the large majority of cases they do indeed meet the requirements, and I'm delighted to report that those who have matriculated in 2019 show very great promise.

Trinity also remains full of students over the summer. These are prospective university students, mostly from non-academic backgrounds, who participate in our taught residential programmes, developing a taste and a sense of curiosity for what the College has to offer them. Each of the residentials is steered by a College Fellow, who is supported by a wide range of other members of the College including current students and alumni. We are tremendously grateful for everyone's support of our work to ensure that Trinity is as diverse and welcoming as possible. The response to the residential programmes is fantastic, and a good proportion of participants go on to be our future students.

This October, we not only turn the page on a new academic year but we also begin a new Trinity chapter under the leadership of **Professor Dame Sally Davies** as Master, so it is fitting that this edition focuses on new chapters. In the year we are celebrating the 50th anniversary of the Apollo 11 mission, writer **Keith Mansfield (1984)** steers us from the Moon to the stars. **Dr Alyce Mahon (e2000)**, curator of the first major exhibition of Surrealist Dorothea Tanning, reveals how the artist took art into challenging new domains, and we showcase the new Trinity building on Round Church Street that will provide a home for graduate students from 2021. We experience a 'Day in the Life' of **Dr Catherine Aiken (1999)**, Fellow in Medical Sciences and Senior Treasurer of the First and Third Trinity Boat Club, and we put our cryptic crossword setter **Tim King (1980)** under the spotlight.

I hope you enjoy the edition, and do share your news and views with us.

Dr Glen Rangwala (1993)
Director of Admissions

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Dr Ian Hall (1983) has been appointed Chief Examiner, Royal College of Psychiatrists.



© DOMINIC DÖRING

Dr Bee Wilson (1992) received the Guild of Food Writers 2019 Investigative Food Work Award for her *Guardian* long read 'Yes, bacon really is killing us'.



Mark Lane (1968) was installed as the 31st Master of the Worshipful Company of Water Conservators on 8 July 2019.



Trinity in New York alumni group will be launching in the near future. If you are interested in joining please contact the Alumni Office – we'd love to hear from you: alumni@trin.cam.ac.uk.



Residing in Brazil since 1971, network scientist at the Brazilian Research and Education Network [RNP], **Dr Michael Stanton (1964)** was inducted into the Internet Society's Internet Hall of Fame at a ceremony in Costa Rica in September, in recognition of his work promoting the development of the Internet in Latin America.



Congratulations to architect **Luka Pajović (2014)**, who held his first solo exhibition 'In The Image of La Serenissima: Reflections on the architectural history of Perast (1687–1797)' in Bujović Palace, Montenegro throughout June and July.

Global Alumni News



Dr Lisa Jardine-Wright (1994)

received the Lawrence Bragg Medal and Prize 2019, Institute of Physics, with Professor Mark Warner (Cambridge), in recognition of establishing and directing the Isaac Physics programme, which has revolutionised physics education for teachers and students in UK schools.



Professor Sadaf Farooqi (1995)

received the American Diabetes Association 2019 Outstanding Scientific Achievement Award for her contributions to understanding the genetic and physiological mechanisms that underlie severe obesity.



Dr Dan Jane (2000)

triumphed in the DLR Environment, Energy and Health Challenge 2019 for the Copernicus Masters, with a novel use of the Sentinel constellation of satellites to bolster a culture of compliance within the shipping industry.



Congratulations to **Chandras Choudhury (2000)** on the publication of his book *Days of My China Dragon*, a collection of stories from a restaurant in Mumbai's Prabhadevi neighbourhood.

Australia (Sydney)

Alumni and partners based in the Sydney area enjoyed drinks at the Four Seasons Hotel on 24 May thanks to **Catriona Ling (1983)**. We hope it will be the first of many get-togethers.



Congratulations to **Professor Xiang Yu (1992)**, recipient of the 2019 Hsiang-tung Chang Young Neuroscientist Award.

College News

Installation of 39th Master of Trinity

On the afternoon of Tuesday 8 October Professor Dame Sally Davies DBE FRS FMedSci was installed as 39th Master of the College. Fellows, staff and students attended the traditional ceremony.

Proceedings opened with a brass quintet and welcome party greeting Dame Sally on the cobbles outside Great Gate. As the College clock struck 2.30pm, she knocked on the wicket gate to announce her arrival and to hand the Letters Patent from the Queen to Head Porter, Peter Windmill. It was carried to Chapel for inspection by Vice-Master Professor Grae Worster, who announced to Fellows that the document granting the vacant Mastership to Dame Sally was in order.

The Fellows processed from Chapel and assembled on Great Court's lawns to join students and staff, before Great Gate was opened to admit Dame Sally. The Vice-Master presented her to the Fellows, who doffed their caps and bowed, with Dame Sally doffing her cap in reply. The procession then headed to Chapel for the installation service, which included a beautiful, specially commissioned Te Deum by composer, conductor and former organ scholar Owain Park (2013).

Looking to the future, Dame Sally said: 'We are seen as a citadel of excellence. We need to continue that but be seen to be part of a broader community and



© LAURA RUPOLO

The Master and Vice-Master Professor Grae Worster lead the installation procession to Chapel.

show our relevance and our impact, scientific and cultural, on society at large. The research at Trinity does lead – often it takes many years – but it leads to changes and advances for society; and

the education we give people makes them into potential future leaders across all areas of life.'

 @MasterSallyTrin

Nobel Prize in Physics 2019 for Professor Didier Queloz



On 8 October Professor Didier Queloz (e2013) was jointly awarded the 2019 Nobel Prize in Physics,

along with Professor James Peebles and Professor Michel Mayor for their pioneering advances in physical cosmology, and the discovery of an exoplanet orbiting a solar-type star.

The Nobel Assembly said: 'The discovery by 2019 Nobel Prize laureates Michel Mayor and Didier Queloz started a revolution in astronomy and over 4,000 exoplanets have since been found in the Milky Way. Strange new worlds are still being discovered, with an incredible wealth of sizes, forms and orbits.

This year's Laureates have transformed our ideas about the cosmos. While James Peebles' theoretical discoveries

contributed to our understanding of how the universe evolved after the Big Bang, Michel Mayor and Didier Queloz explored our cosmic neighbourhoods on the hunt for unknown planets. Their discoveries have forever changed our conceptions of the world.'

Professor Queloz is the 34th Trinity Nobel Laureate and the 13th winner in the field of Physics.

An illuminating weekend Trinity Writers and TrinTalk

Thank you to all alumni who joined us at the end of September for the Trinity Writers event and the annual TrinTalk – a stimulating and enlightening weekend.

On Saturday 28 September four of Trinity's top writing talents returned for Trinity Writers, on the theme of the creative process in popular literary genres. Thank you to novelist and television screenwriter Daisy Goodwin (1980), *New York Times* number one best-selling crime writer Alex Michaelides (1996), travel and nature writer Hugh Thomson (1979), and award-winning food writer Bee Wilson (1992) for sharing their inspiring stories.



The Trinity Writers panel. From left: Alex Michaelides, Professor Adrian Poole, Bee Wilson and Hugh Thomson.

The theme of this year's TrinTalk on Sunday 29 September was 'Global Responsibilities?' Our expert panel Andy Rubin (1984), Dr Amy Ludlow (2005), Professor Sadaf Farooqi (1995)

and Dr Hugh Hunt (e1990) considered how global we should be thinking when it comes to our actions, and what we can do, both individually and collectively, to be more globally responsible.

© MERIN SOEFERS



GOLDEN YEAR

2019 has proven to be another astonishing year for medical student Imogen Grant (2014), who claimed gold for Great Britain in the lightweight women's single sculls at World Cup III in Rotterdam in July, with a winning time of eight minutes 43.59 seconds.

Imogen was also one of the 64 athletes selected to compete for Great Britain at the 2019 World Rowing Championships in Linz, Austria from 25 August to 1 September. Imogen partnered Emily Craig of University of London in the women's lightweight double, and they brought home a bronze.

Good news for EU students

Students from the European Union who begin their degrees in England in 2020 will pay the same fees as British students throughout their studies here, regardless of Brexit.

Director of Admissions Dr Glen Rangwala (1993) welcomed the government's announcement of June 2019, 'Trinity has always been open to bright and motivated students from around the world, including from EU countries. Each year, around 40

students from EU countries join Trinity as undergraduates, making up about 20% of our undergraduate intake. The government announcement gives all EU students the confidence that they can come to Cambridge University from 2020 with financial support for the duration of their courses.'

The scheme applies to both graduate and undergraduate students, who will continue to be eligible for loans to cover their fees.



© IAN OLSSON

A day in the life of Dr Catherine Aiken (1999), Fellow in Medical Sciences

I set out from home early so that I can arrive in good time for the opening of my clinic at the Rosie Hospital, based on the Addenbrooke's site. I have to be ready to hit the ground running before 8am, and in an average morning I can see a huge range of women who are dealing with difficult pregnancies.

I spend my morning running genetic and invasive tests, scanning patients, and counselling them on likely outcomes and what can be done. A really busy clinic like today takes my whole brain, and there is no time to think about anything else.

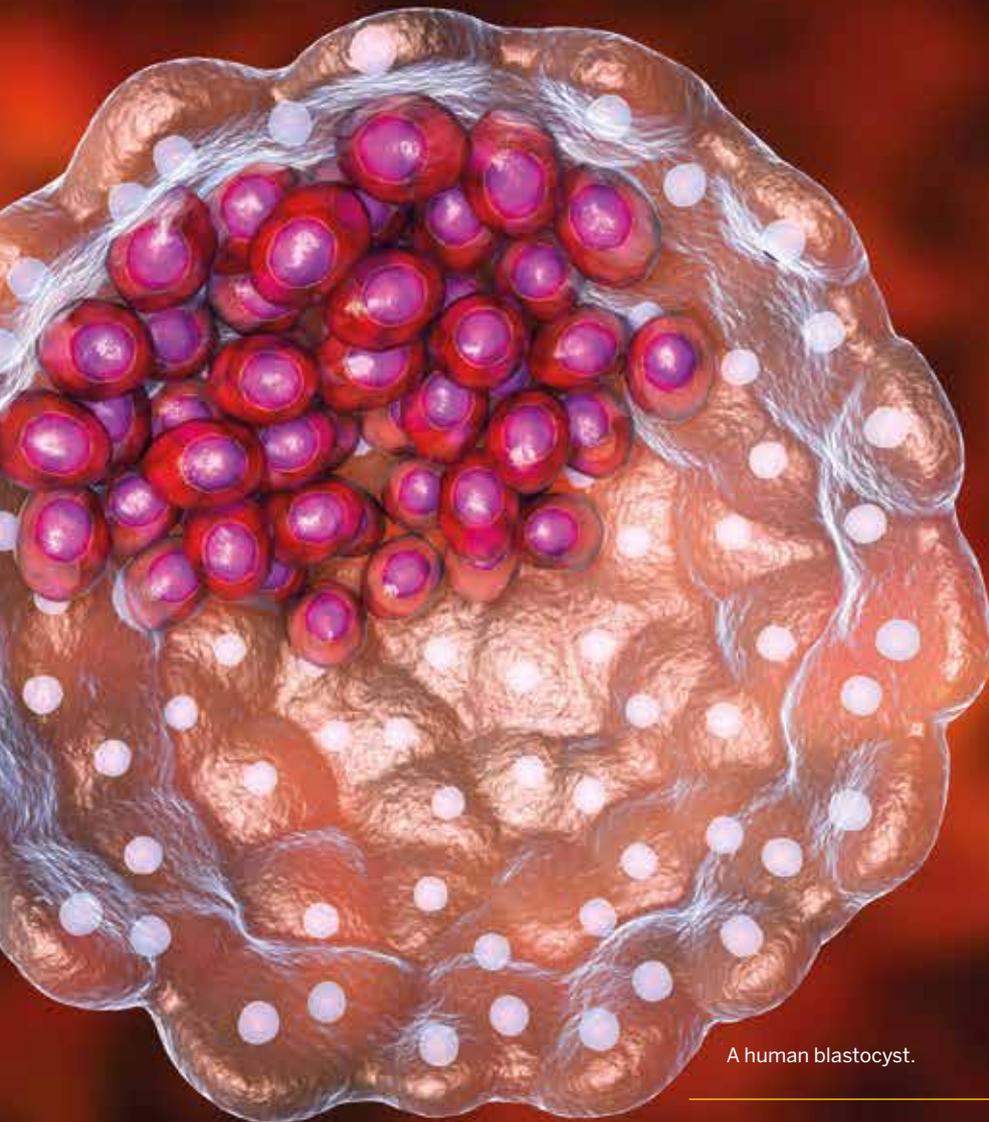
One particular scientific idea ignited my interest in studying medicine – the idea that there's a single cell and suddenly, without anybody

doing anything, there's a whole new person. The timing, programming and everything you need to be a person is already in that cell. As a student at Trinity, I was influenced by Martin Johnson who at the time was one of the first PhD students working with IVF pioneer Professor Bob Edwards, who went on to win a Nobel Prize. I remember hearing an amazingly inspiring anecdote about the night just the two of them were in the laboratory

and they had managed to culture the first ever human blastocyst. They were just staring down the microscope in wonder, the first time in history that anyone had seen a human at that stage of development. That was totally what I wanted to do, and luckily being an obstetrician turned out to be a really fun job.

I spend half my time delivering babies and looking after women with high risk pregnancies, and the other half on my research. My teaching and other College commitments fit around this. My medical students are good fun, the questions they ask are fascinating, and they're a really joyful part of what I do. I came from a state school in Northern Ireland and studying at Trinity was like stepping into a completely different scale of possibility – by far the greatest thing I gained here was a really wide perspective on life and the realisation that anything was possible, which I try to instil in my students. There's no denying medicine is demanding – students have an awful lot of material to engage with, studies are long, and more and more they are emerging with a large pile of debt to work in an NHS which is not necessarily going to be kind to them.

To equip students for a medical career as well as we possibly can, we have started running professionalism courses from the very start of their first year. We try to give them the sense that whatever the challenge there's a community behind them, a profession behind them, and they won't be on their own. Fortunately, obstetrics doesn't have as large a problem with gender parity as some other areas. I think that's because there's always



A human blastocyst.

‘Being an obstetrician is an amazing privilege. You get to be in the most important points of people’s lives. You get to play this little cameo right at the moment when their whole life changes in front of you.’



been an instinct for women to look after women, and it’s a less daunting environment than some others in science. However, women in STEM initiatives such as the Trinity summer residential for year 12 students are vital to encourage young women to study and work in those arenas.

After a morning of back to back appointments, there is just time for me to grab a quick lunch before I cycle madly down to Trinity. The ride from the hospital is a welcome break in the middle of the day, and the physical change of scene helps me to change gear into the world of academia. I’ve had this dual role now for about eight or nine years and the two sides do complement each other, but switching brain from one to the other can be difficult. The clinical side is frantic – it really hits you in the face because there’s an insatiable demand in the NHS. On some days I’m on the delivery unit, responding minute by minute to whatever’s going on, and it might take me an hour or more just to recover from the adrenaline rush but I have got better at transitioning between the two worlds over the years.

I arrive in my lovely, quiet study in Blue Boar Court. I need to spend the afternoon writing a grant proposal, which means entering a completely different world. It is an amazing change of pace to sit down in the silence, with just a blank piece of paper in front of me, and start to construct the proposal. My research focuses on the long-term outcomes of difficult pregnancies, and we have a big study launching soon on mothers with gestational diabetes and what the

best treatment is, looking at their offspring’s health both in the short-term and further into childhood and adulthood. I also work on how you can preserve the health of children who face low oxygen environments inside the womb, because if we understand the health risks there’s a lot we can do to mitigate them.

Another project we’re running focuses on how babies grow inside the womb and what relationship that has to developing special educational needs later on in mid-childhood. If you can spot that early on you can put early learning interventions in place, and children can do really well, but if you don’t know who those children are you are just waiting for problems to happen. My work is all about protecting health lifelong, protecting their fertility, brain development and trying to have as good as possible an outcome, even though we know the pregnancy is difficult.

Mid-afternoon I need to catch up on planning for the First and Third Club. I am Senior Treasurer and it feels good to be able to give back to the College. I was a keen rower as an undergraduate, as a PhD student and again as a clinical medical student, and I was in the first women’s eight to go Head of the Lents for Trinity. I’ve swapped my days on the river for managing the Club’s finances and long-term strategy. We’re very lucky because our new Head Coach and Boatman Steve Harris has really moved the Club forward in the past year, and we have fabulous alumni volunteers who help with coaching the students. Their support is completely invaluable in keeping the First and Third afloat. I am really looking forward

to our next bi-annual dinner in 2020 and celebrating Trinity rowing together.

With my Club plans formulated, it’s time to head back to the hospital to make sure all my patients have plans for overnight. I wouldn’t have it any other way. Being an obstetrician is an amazing privilege. You get to be in the most important points of people’s lives. You get to play this little cameo right at the moment when their whole life changes in front of you. I particularly love it when parents bring their toddlers in to visit us. Seeing a child you thought may never walk now toddling around, or a child who really struggled inside the womb happily colouring in whilst their mother is being scanned, is so special.



Get in touch ...

If you are interested in volunteering to help with the First and Third Club, Steve Harris would be delighted to hear from you:

coach@firstandthird.org
www.firstandthird.org

 @firstandthirdtrinityboatclub

 @FirstandThird

 www.instagram.com/1stand3rd



By Edward Knapp (e2018),
Junior Bursar

A new Trinity chapter: Building at Round Church Street

It is my great pleasure to share with you the latest news on the College's new building, which is being constructed at Round Church Street and is designed by BB&C Architects, Cambridge.

As you may know, we are currently in the process of building state-of-the-art accommodation for 39 postgraduate students, together with 6 residential sets, in a self-contained, purpose-built new building, just a three-minute walk from the College and right at the heart of Cambridge. In addition, the whole ground floor will be a dedicated restaurant space, to be leased out for the long term. This will provide a helpful income stream for the College, together with improved facilities in the city centre.

Work progresses apace. Since I arrived at Trinity in January 2019, I have been pleased to collaborate closely with the Working Group of Professor Colin Hughes (e1997), Professor David Spring (e2007), Professor Harvey Reall (e2007), Dr Malte Grosche (1988), and the Vice-Master, Professor Grae Worster (1976), and to help to bring together our construction partners Bidwells with staff and students to focus on this important College project. We are completing our project alongside our friends and colleagues from the Cambridge Union, who are renovating and restoring much of their building. I was pleased to sign

the final contract papers for the scheme at the end of July 2019.

The whole programme of work will cost approximately £13m, and will be completed by January 2021. I look forward to sharing further news between now and then, and helping the College make good use of the new facilities for many generations to come.

A home for all

Trinity's graduate community of approximately 300 students continues to grow, and the College needs to provide them with the best possible accommodation. We have acquired a 300-year lease on land situated on the corner of Round Church Street and Park Street, and the new building that will soon take shape there will ensure that we have enough high-quality housing to meet demand.

When planning the building, our key concern was to provide a welcoming home for all, as close as possible to Trinity, and where members of College can work and relax in comfort. We are fortunate to have a cosmopolitan

College community, and we have involved the students in the process from the beginning to help us to meet everyone's needs. Thanks to the invaluable support of the BA Society, we undertook a student consultation survey to ensure we understood what was wanted and needed from each of the spaces, from layout to fixtures, furniture and décor, and the helpful feedback has been used to inform our decisions.

Celebrating the past, building for the future

You will know that we are building on a truly historic Cambridge site. The Church of the Holy Sepulchre (the 'Round Church') was built in the 12th century, predating the University by some 75 years. The University Archaeological Unit conducted investigations on-site through July and August 2019, and we hope to be able to share full details about their findings in the near future. One particularly fascinating item the team unearthed was a rare Tudor-era pocket sundial (pictured on page 11), which is in good condition although its precise age is yet to be confirmed.



Round Church Street elevation, with our building on the left and the Cambridge Union to the right.



The ground-floor restaurant in our building will increase footfall for the shops and businesses in the area, and provide a smart new central venue. An additional benefit for Cambridge is that the new building will enable the College to release for sale on to the open market a number of individual houses across the city that are currently being used for student homes.

Sharing progress

I hope you have enjoyed reading about this exciting and important College project. We will provide progress updates but if you would like to know more about the project please get in touch with me any time.

I look forward to hearing from you soon.

All the best,

Edward Knapp
Junior Bursar

For information on making a gift towards the new building, including naming opportunities, please contact us at alumni@trin.cam.ac.uk.

- 300 year lease
- 39 ensuite student rooms and 6 one bedroom upper floor flats
- Improved energy efficiency and sustainability footprint
- New city restaurant space
- Enhancing the environment of a key city area
- Completion date January 2021

Although our building will sit on historic ground it will offer the best in contemporary architecture, and will be harmonious with the Cambridge Union's Grade II listed building of 1886. As you will see from the architect's visuals, our building is respectful of the proportions, materials and spirit of the Union's building, to provide a sense of architectural unity along the length of Park Street.

Community

Our project will run in tandem with the Cambridge Union's renovation of their building and will also coincide with an extension of retail space along Round Church Street. The redevelopment therefore offers us not only an opportunity to collaborate with our Union colleagues to deliver improved facilities for our respective members, but also to revitalise the quarter for all city residents and visitors to enjoy.

Above left: Tudor pocket sun dial.
Above right: The site during the archaeological dig.
Main image: The future view of our new building from the corner of Round Church and Park Streets.



Dorothea Tanning: Pushing the boundaries of Surrealism

The art world, alongside many other spheres, is finally enjoying a *feminaissance*. As Trinity celebrates 40 years since its first female undergraduates arrived, as we welcome our new female Master, Professor Dame Sally Davies, and as we work towards the greater visibility and celebration of women in all aspects of our college life, so museums across the globe are beginning to ensure that their exhibition programmes, permanent collections, and educational and public events better reflect and promote a more equal and diverse culture.

In curating the first major exhibition of Surrealist artist Dorothea Tanning for the Reina Sofia Museum, Madrid (3 Oct 2018 – 7 Jan 2019) and the Tate Modern, London (27 Feb – 9 Jun 2019), I had the great privilege of sharing with the public my research on an artist and writer who has all too often been neglected by scholars, museums, and the art market alike. Tanning (1910–2012), enjoyed a long career which spanned the twentieth century, producing paintings, drawings, ballet designs, sculptures, novels and poems. Her life story is that of the 'modern woman' who knew from the age of seven that she wanted to be an artist and whose passion for art brought her from small-town Galesburg, Illinois to

New York in the late 1930s, where she supported herself by producing fashion designs for Macy's department store, and where she soon established herself as a major Surrealist writer and painter, breaking into a largely male dominated art scene.

Tanning enjoyed a wide circle of avant-garde friends, including Marcel Duchamp, Man Ray, Lee Miller, Roland Penrose, Leonor Fini and John Cage, and in 1946 she married the more established Surrealist Max Ernst (1891–1976). Surrealism believed that art must coax the spectator into new domains, through enchantment, curiosity, desire and fear. In her art and writing Tanning challenged the institutions of the family, church and nation, and looked to Gothic literature and black humour for inspiration. Many of her paintings portray young girls in torn Victorian dresses being swallowed up by chairs or reaching for half closed doors, as in *Eine Kleine Nachtmusik* (1943), or subvert the family and its orderly life, symbolised by the pristine white table cloth, as in *Family Portrait* (1954, pictured above right). Her later soft sculptures were crafted in the south of France on her old Singer sewing machine, using tweed and soft pink cloth and sheep's wool from a local farm to fashion twisted, erotic bodies. Sculptures, such as *Emma* (1970, pictured right) with its pink belly and lace skirt, draw on her long-standing obsession with nineteenth-century literature – it pays homage to the female protagonist in Gustave Flaubert's notorious *Madame Bovary* (1856), who escapes the boredom of married life through literature and clandestine affairs.

In true Surrealist spirit, Tanning not only challenged bourgeois expectations in her imagery and ideas but emphatically refused gender stereotypes, deeming the term 'woman artist' redundant. She stated in 1990,

By Dr Alyce Mahon (e2000)



Family Portrait (1954).



Emma (1970).

'You may be a woman and you may be an artist; but the one is a given and the other is you.' These words still resonate powerfully today as we face the challenges of ensuring women artists are not just brought into the frame but recognised as a powerful means to question and expand the frames with which we discuss and appreciate art.

Taking Trinity Women's Network members and other alumni to tour the exhibition in May reminded me yet again of the ways in which Tanning's art speaks to so many different perspectives and generations, and encourages us all to question what we think we know and to give the imagination free rein.



Dr Alyce Mahon (e2000) is Fellow in History of Art and a Reader in Modern and Contemporary Art History.

Trinity’s Alumni Associations and *Trinity in...*

With a growing list of Alumni Associations and *Trinity in...* groups, the opportunity to engage with alumni across different industries and geographical regions is better than ever.

Alumni Associations	
• Trinity in the Arts and Media Association (TAMA)	
• Trinity Business & City Association (TBCA)	
• Trinity College Choir Association (TCCA)	
• Trinity Engineers' Association (TEA)	
• Trinity First & Third Boat Club Association (TFTBCA)	
• Trinity Law Association (TLA)	
• Trinity Medics' Association (TMA)	
• Trinity Women's Network (TWN)	
Trinity in... groups	
• China	• Hong Kong
• Japan	• New York
* We also have a Trinity Golf group, who meet annually for Trinity Golf Day.	

What are Alumni Associations and *Trinity in...*?

- We have eight Alumni Associations covering a range of key industry sectors (e.g. Business, Engineering, Law, Medicine) and Trinity activities (e.g. Boat Club, Choir), which provide a welcoming forum for alumni to make the most of the connections in their sector.
- Our *Trinity in...* groups are geographically-based and designed to bring the Trinity experience to you, via regular social events and visits from Fellows.

Why join an Alumni Association or *Trinity in...*?

- **Networking** – support our students and your fellow alumni by playing an active role in the Trinity alumni network, whether you would appreciate some advice from more experienced alumni in your field, or can offer a current student words of wisdom to help them on their way.



Trinity in Hong Kong Dinner 2019.

- **Events** – with more than 30 different Association and *Trinity in...* events in 2019, there are always plenty of opportunities to find something that piques your interest. This year even saw the first event jointly organised by three Associations – the TBCA/TMA/TWN Distinguished Speaker Series event with Professor Dame Sally Davies in June!
- **Community** – maybe you simply want to socialise and enjoy the company of other Trinity alumni. With over 4000 alumni already belonging to at least one of our Associations, *why wouldn't you want to become a member?*

How can you get involved?

Join an Association, attend an event, offer up your expertise to support students through mentoring, or step up to the organising committee and help shape the future direction of your association – the choice is yours!

If you would like to volunteer to serve on a committee, wish to offer to speak at a future event, have ideas on activities, or simply want to join an Association's mailing list, you can do so easily by visiting the Associations' webpage, where you will also find their social media links:

www.trin.cam.ac.uk/alumni/associations/



© TRUDA SPRUYT (1989)



Above: On 26 June the TBCA, TMA and TWN collaborated on a special event with Professor Dame Sally Davies as part of the Distinguished Speaker Series.

Left: Alumni enjoying Dr Alyce Mahon's guided tour of the Dorothea Tanning exhibition.

If there is an Association or *Trinity in...* group that you think we are missing and you would like to become involved with, or if you have any comments about our existing Associations and groups, please contact Phil Pass, Alumni Relations Manager by email on alumni@trin.cam.ac.uk or by phone **+44 (0)1223 361 527**.

APOLLO 11: From the Moon to the Stars

By Keith Mansfield (1984)

The summer men first walked on the Moon was a mere sixty-six years after Orville and Wilbur Wright flew all of 36.5m across sand dunes near Kitty Hawk, North Carolina. Three years old, I'm told on the night of 20 July 1969 I was plucked from my bed and carried downstairs to join the family around our black and white television and witness Neil Armstrong's first small step on another world.

I'm not sure I remember it, though I vividly recall my father, the local Baptist minister, leading his congregation in prayer for the safe return of the Apollo 13 astronauts just one year later – my first realisation that 'space is hard'.

During the Apollo missions there seemed no limit to what we could achieve with powered flight. By 2019 we'd have settled the inner solar system, humans also travelling to its outer reaches. We could even be building the first worldships, several generations of humans proposed to live and die during epic voyages to nearby star systems such as Alpha Centauri, fully four light years away.

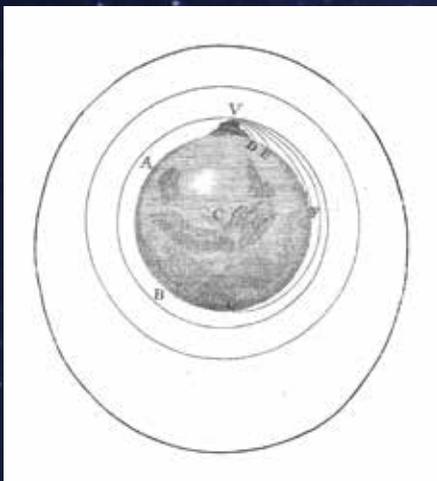
Newton (1661) started it. In *Principia Mathematica* he visualised a cannon

placed atop a high mountain, hypothesising the path of any cannonball fired would depend solely on its speed. Too slow and the projectile falls back to Earth. Fast enough and it escapes Earth's gravity. At the right speed it reaches orbit and continues to circle, a path first witnessed with Sputnik in 1957 and just four years later with Yuri Gagarin in Vostok 1.

During those heady times, John F. Kennedy chose to go to the Moon and the newly formed NASA coopted Wernher von Braun to take them there using his chemical rockets. Trinity's Freeman Dyson (1941) was already thinking of atomic-powered spaceships. His Project Orion proposed detonating hydrogen bombs to propel the giant vessel forward. Fears of atmospheric contamination

ended the programme – such colossal structures need to be built in space. American physicist Gerard O'Neill was also thinking big, presenting Congress with plans for what are nowadays called O'Neill colonies, 20km long pairs of rotating cylinders constructed in space and containing beautiful cities around parks and lakes.

That America reached the Moon within a single decade remains extraordinary, but the main goal was to demonstrate Western superiority over the Soviet Union. With political and public interest waning, missions 18 to 20 were cancelled. Just three years after Apollo 11, Gene Cernan closed the hatch on the Apollo 17 lunar module and the last of twelve humans to set foot on another world departed for Earth. Since 1972 we've restricted ourselves to space stations in low



Above: Newton's cannonball from the *Principia*.

Right: Selfie at the KSAT satellite tracking station in Tromsø, Norway earlier this year, while investigating aurora at the invitation of the European Space Agency.



Earth orbit, a thousand times closer than the Moon. We regressed, losing our ambition, people even debating the merits of having a crewed spaceflight programme at all.

Then, in 2008, a commercial company launched a rocket to reach orbit – only nations had achieved that previously. The feat saw NASA award a contract to these upstart rocketeers who went by the name of Space Exploration Technologies, otherwise known as SpaceX.

Founder Elon Musk always harboured a vision for reusability. Until recently spaceflight was akin to flying Concorde from Heathrow towards JFK, have passengers parachute out over Manhattan and deliberately ditching the plane in the Atlantic. We reached the Moon starting out with a 110m long Saturn V rocket but only the 3.6m command module splashed down in the Pacific. If this were how we did air travel the costs would be astronomical. The space shuttle appeared reusable, but work between launches made the per-flight cost around \$1.6 billion. It was unsustainable, not to mention unsafe, evidenced by the Challenger and Columbia disasters. Step forward former Trinity engineer Lars Blackmore (1999), SpaceX's Head of Rocket Landing. 2015 saw his first successful return of a Falcon 9 rocket after delivering its payload to orbit. Four years on such miracles appear routine.

Musk's mission is to colonise Mars, and SpaceX sees its role as the equivalent of building the space railroad. To realise the ambition others must join to create space-based infrastructure and a space-based economy. First will come tourism – journeys to low Earth orbit will soon be available from Richard Branson's Virgin Galactic and Amazon Founder Jeff Bezos's Blue Origin. Flying wealthy civilians you need to reduce the risk and both companies are being cautious, but will likely take their first passengers in 2020.

Branson and Bezos will charge \$200k to experience a few minutes of weightlessness in low Earth orbit.

SpaceX twin booster landing from the Falcon Heavy test mission.



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That's too much for most, yet fifty years after Apollo 11, I was able to walk on the Moon four times, courtesy of Antony Gormley (1968) and astrophysicist Priyamvada Natarajan (1993) and their virtual reality installation Lunatick. The Trinity duo recreated an area of the lunar surface using NASA data and even dialled down the gravity to one-sixth Earth normal so you could bound across magnificent desolation like the astronauts in those long ago broadcasts. Seeing a blue marble Earth hanging in the black sky above a crater rim – wow!

Filmmaker James Cameron also hopes to boldly go, investing heavily in an asteroid mining company. This will be where the space-based economy takes off. Rocket fuel can be made by combining liquid hydrogen and oxygen, and water appears plentiful throughout the solar system, estimates suggesting near Earth asteroids contain as much as in America's Great Lakes. Space travel will only become sustainable using resources available beyond Earth. First will come spaceship and satellite refuelling stations (plus astronaut drinking water and air) extracted from asteroids and on the Moon (which has water too). Further into the future we'll mine vast quantities of precious metals and other minerals to enable space construction and technologies.

We can't run before we can walk. When the Space Shuttle was decommissioned in 2011 America lost the ability to launch astronauts, relying on Russian Soyuz rockets to transport crews to the International Space Station. NASA's Commercial Crew Program hopes private companies will do the job and by the end of 2019 or early 2020 it's likely Boeing's Starliner or SpaceX's Crew Dragon will be the first vessel from American soil to return crews to the orbiting laboratory.

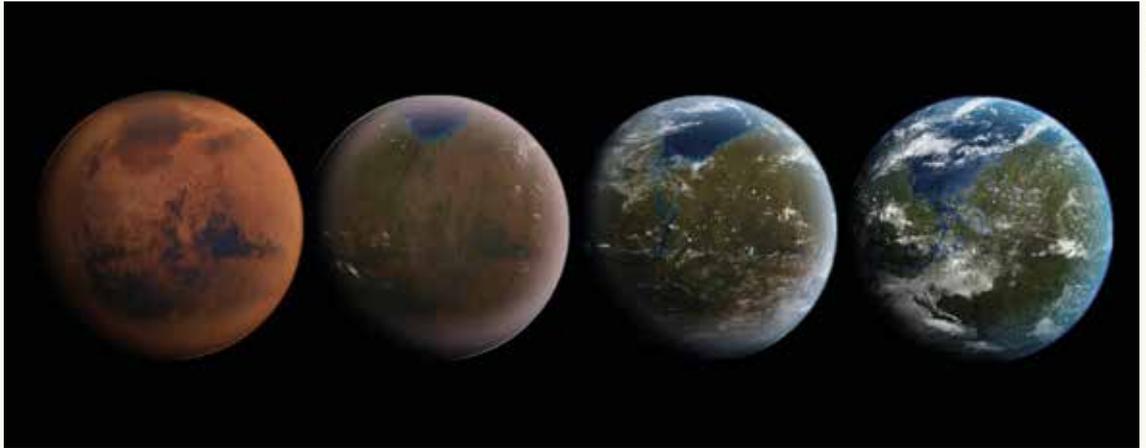
President Trump has charged NASA with landing the first American woman together with American men on the Moon by 2024. This time we'll stay for good, a permanent presence mandated by 2028. Despite half a dozen successful landings from 1969–72, it's far from certain the new target will be achieved. Jeff Bezos has unveiled his Blue Moon lunar lander to aid the task. While Musk harbours a vision of a million humans on Mars by the end of the century, Bezos believes spacefaring communities should live closer to home in O'Neill colonies.

In 2008 I applied to the European Space Agency to be their first UK astronaut, but a physics degree from Trinity proved no competition for many helicopter flying hours and Major Tim Peake was selected. Until now only the

Right:

Terraforming Mars.

Below: Early Starship rendering showing stage separation before the Superheavy booster returns to Earth.



© SPACEX

chosen few could venture off world, but Musk is planning to democratise space travel, cutting the costs by orders of magnitude.

With SpaceX, \$200k will buy you a return ticket to Mars – it’s about scale. At sites in Texas and Florida SpaceX is building a true 21st century rocket called the Starship, designed to transport a hundred humans at a time to anywhere in the solar system. Their schedules are notoriously ambitious, the company targeting 2021 for the maiden flight. Blue Origin plans that same year for the first launch of its New Glenn reusable orbital rocket and NASA hopes to finally reveal its long-delayed SLS (non reusable Space Launch System) at the same time.

Resembling Tintin’s three-legged retro rocket, the first gleaming stainless steel Starship could land humans on Mars before 2030. Historically human settlers

often took one-way journeys, but future travellers can return because SpaceX needs its rockets back to transport more colonists every 26 months, assembling an ever larger fleet each launch window. I wonder if I should join them, though I would miss the warmth of the sun, and even the snow, wind and rain. Will spacefaring humans be content to remain enclosed within artificial environments or spacesuits?

Entering SpaceX’s California factory you see four images of a world transitioning from red to green then blue (pictured above). The aim is one day to terraform Mars to make it like our own Earth, with oceans and a breathable atmosphere. The red planet was warm and wet in the past, so why not engineer it into that earlier state? Such an epic challenge may take centuries or millennia but it’s likely the early settlers will want to begin the process so their descendants can benefit.

It may be Starship is first onto the lunar surface. There is, though, a limit to how far chemical rockets can take us and the future will likely see space elevators ringing planets and moons (as the most efficient way to lift cargo and people to and from within a gravity well), and novel rocket drives using ionised gas for small but continuous acceleration, before fusion power finally arrives. An alternative propulsion system that requires no fuel is the lightsail. Radiation pressure exerted by sunlight affects all spacecraft, if only slightly, and the idea of harnessing this by unfurling ultrathin mirrors to manoeuvre in space has been successfully tested. Now there’s an even more ambitious plan. The Breakthrough Starshot Project proposes high-powered Earth-based lasers to accelerate lightsails to a significant fraction of the speed of light (in everyday terms a hundred million miles per hour).

Called the StarChip, the probe carried by such sails must have very little mass – probably less than one gram despite being packed with sensors. A succession of them would speed towards a nearby star. Even the fastest chemical rocket would take thousands of years to make such a journey, but a laser-powered lightsail could reach Alpha Centauri within a couple of decades.

Will humans follow these miniature probes? By the time we might be ready it’s likely we’ll have reached the next, posthuman phase of our evolution, probably merging with the technology and artificial intelligences we will create – or vacating the stage for them to take our place. Trinity’s Astronomer Royal



© SPACEX

Martin Rees (1960) has speculated that if we are ever to encounter intelligent extraterrestrials they would not be organic but machines, unconstrained by the physical difficulties of existing in space or on other worlds.

In 1995 the first planet outside our solar system, 51 Pegasus b, was discovered by Trinity Fellow Didier Queloz (e2013), for which he won this year's Nobel Prize for Physics. We now know there are many billions of Earth-sized exoplanets in our Milky Way galaxy. Given there are also hundreds of billions of galaxies in the Universe, the question known as the Fermi paradox – 'Where is everybody?' – becomes ever more vexing. If there were other intelligent technological civilisations many argue we could observe their activity (and they ours). Yet we see nothing.

This leads on to the question should we boldly go anywhere at all? Especially when there are pressing needs such

as extreme poverty or climate change to be addressed on Earth. A future for humanity among the stars is by no means certain, but some moral philosophers argue that if we can achieve it, there will be trillions of worthwhile human lives which can be lived. The good that can be done in all those lives will be because we prioritise space travel in the decades to come.

Every other species that once dominated our planet is long since gone. The dinosaurs became extinct because they didn't have a space programme and, if we keep all our eggs in one basket, the demise of humanity is equally certain. Long before our Sun runs out of fuel and expands into a red giant its increased radiation output will have evaporated our oceans. Before then, whether from an asteroid strike, gamma ray burst, nuclear conflict, synthetic or natural pandemic, or some currently unforeseen mechanism, humans will cease to be.

Space is hard and we may be the only example of technological intelligence in the Universe. To reach this point in our evolution has been impressive, but also fortuitous. Were we to become extinct now, we wouldn't know for certain that others would follow. We took a giant leap for humanity in 1969. Unless we take many more the Universe may never teem with intelligent life, and intelligent beings may never witness the myriad wonders it holds.

Keith Mansfield (1984)
 is a writer of nonfiction and science fiction, a scientific publisher and a futurist. His most recent book *The Future in Minutes*, laying out events from today through to the end of the Universe, was published by Quercus Books in May.

 @KeithMansfield



SPOTLIGHT

on Encota, our Crossword Setter



Tim King (1980) is the man behind the fiendishly difficult Trinity Cryptic Crossword puzzle. Tim is a professional crossword setter, who sets as *Encota*, and he has been published in a wealth of magazines and newspapers including *The Times*, the *Sunday Telegraph* and the *i*. He also hosts Crossword Solving Beginners and Improvers Workshops, and talks on 'How to Solve Cryptic Crosswords' and 'Problem Solving and Lateral Thinking.' We asked Tim about life after Trinity, making the move from enthusiast to puzzle professional, and whether he'd be willing to share his top tip for crossword cracking.

Q You read *Engineering at Cambridge* – where did that take you after Trinity?

I've always been keen on problem-solving, innovation and getting the most from teams. Since Trinity I have worked for several communications companies, including BT for 27 years and, as part of that, ten years as Chief Technology Officer supporting innovation in various parts of UK Government.

Q How/why did you make the move from crossword enthusiast to professional setter?

I knew I'd love to retire early and have a go at crossword-setting and luckily got the chance to do so in my early fifties. I'd met several of the top setters through taking part in *The Times* national cryptic solving championships since my early twenties and that really stimulated my interest. I had brilliant support from kind folks on *Big Dave's* website – the one that supports all *Telegraph* solvers – who gave me great feedback on my early puzzles. I also had amazing help from some of the experienced *Listener* crossword setters, without whom I'd probably still be floundering!

Q What's your favourite crossword puzzle and why?

My favourite are the thematic cryptic puzzles in *The Listener* series, termed by some as 'the hardest crossword in the world'. As many readers of *The Fountain* will know, *The Listener* used to be

a magazine published by the BBC. The magazine folded in 1991 but its puzzle was so good that *The Times* soon 'rescued' it and has been publishing it weekly ever since. Each one famously features a Preamble where, on first reading, people often say, 'I understand the words: it's the sentences I have trouble with'. But they are well worth persevering with and are the most satisfying types of puzzle to solve, especially when the hidden theme is finally revealed!

Q What's your top tip for solving puzzles?

Beyond the basics of knowing the main twelve types of cryptic clue – e.g. anagrams – and lots of abbreviations, it helps to think like the setter. If the setter is trying to misdirect you, how can you see through it? Seasoned crossword solvers will see 'Flower', for example, and immediately think of the meaning 'something that flows', i.e. a river, without even considering that the answer might be a type of plant. Most types of misdirection are just like this, though sometimes much more subtle!

Q Has creating puzzles for a living dimmed your enthusiasm for solving them?

Quite the reverse! I solve *The Listener* every week and six puzzles in the brilliant *Magpie* magazine every month, plus two or three cryptics most mornings, so around 1000 puzzles per year. I also test-solve for several other setters, often as part of an informal reciprocal arrangement.

Visit Tim's website at www.specialisedcrosswords.co.uk

Trinity Cryptic Crossword No.5

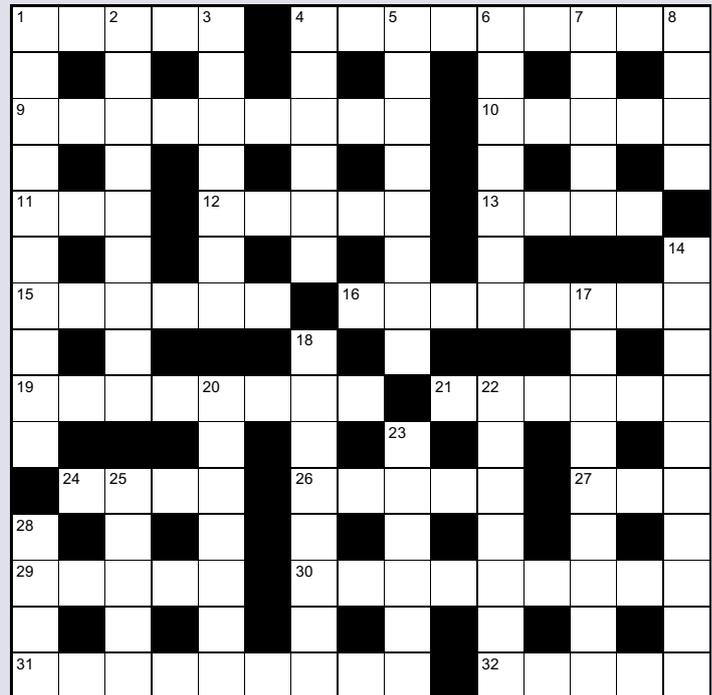
Trinity Autumn 2019 by *Encota*

ACROSS

- 1 New Master's witty remark (5)
 4 Physicist deconstructs his nobler elements (5,4)
 9 Now explaining how Bard could turn bad? (5,4)
 10 A sailor returns – perhaps with the aid of this (5)
 11 This period used alternatives to tear-gas (3)
 12 Take in butter for one small sum (5)
 13 Trinity's First and Third finally rowed on English river, in a poem? (4)
 15 Flipping animal's a layer! (6)
 16 College's beginning to replace coupling's front bearing (8)
 19 Discontinued Viz used to irritate (8)
 21 French mathematician showing hesitation in detailed last judgement (6)
 24 Famous boat repairing oar around Grantchester to begin with (4)
 26 Minor prophet pronounced material providing warmth (5)
 27 Support for balls using truss at first, by the sound of it (3)
 29 No safety device is effective (2,3)
 30 Perhaps Titania's manner evokes novel subject (according to Collins) (9)
 31 Directive gets one engaged in military supplies? (9)
 32 Observe boat changing direction (5)

DOWN

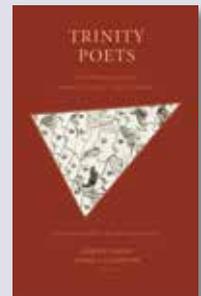
- 1 Tanning perhaps rustles air somehow (10)
 2 It may be on limb in Wayne's *Fringe* rehearsal initially? (3,6)
 3 Turkish sword raised to harass someone constantly and for ever (7)
 4 Latest fashion for Trinity mathematician? (6)
 5 Following exchange of letters get pay in from Cairo, perhaps (8)
 6 Break into star, the pieces everywhere (7)
 7 Well-lit party up round Notre Dame's location maybe (5)
 8 "Chance" seen in this game (4)
 14 Payment in North Yorks market town covering staff time (10)
 17 Supply supported by brave man who made one small step (9)
 18 Chap starts to love music so much – One Direction's managed by him? (8)
 20 Baffled lab with one and zero to represent such logic (7)
 22 American follows lost sheep in location of Diana's temple (7)
 23 *Encota's* drunk at start of play (3,3)
 25 Approximate description of church near Trinity (5)
 28 Quietly John's cycling in high-necked jersey (4)



Please send entries to: The Editor,
 Alumni Relations & Development Office,
 Trinity College, Cambridge CB2 1TQ
 Entries are due by 31 December 2019.

The first correct entry drawn will win a copy of *Trinity Poets*, and the winner will be included in the next issue of *The Fountain*.

For the solution to Cryptic Crossword No.4 email us at alumni-comms@trin.cam.ac.uk or visit *The Fountain* web page www.trin.cam.ac.uk/alumni/publications/the-fountain



WINNING ENTRIES:

Alumni competition

Congratulations to **Rob Cuthbert (1968)**, who successfully completed Trinity Cryptic Crossword No.4, winning a copy of *Trinity Poets*.

Student competition

Congratulations to **Ryan Kang (2018 Natural Sciences)**, winner of the first student crossword competition in memory of avid crossword fan John Grenfell-Shaw (2011). The prize of a generous Trinity catering credit is kindly supported by John's parents, Jenny and Mark.

Tim King (1980), is the Ipswich-based professional crossword compiler *Encota*. As well as setting puzzles for national newspapers and for magazines, Tim also sets personalised puzzles as unique and thoughtful gifts. If you'd like to know more, contact him at specialisedcrosswords@gmail.com and his website at www.specialisedcrosswords.co.uk

Go green

We are now wrapping *The Fountain* in more environmentally friendly potato starch-based packaging.



The wrapping is compostable, can be added to your green garden bin or can be used to line your food waste caddy. You can even pop it in your domestic waste bin – in six months' time 60 percent of it will have degraded, and in a year it will have turned into nothing more than carbon dioxide, water, energy and a neutral residue.

You may prefer to receive the online versions of *The Fountain* and *The Annual Record* instead of the printed copies. To switch to the online magazines please email us at alumni@trin.cam.ac.uk

Staying in touch

Please make sure that the Alumni Office has your up-to-date contact details and let us know your communication preferences. We take the protection of your data very seriously. We use it to keep in touch with you, and to keep you informed of College news and activities.



Full details of how your data is held and used are set out in our Data Protection Statement at www.trin.cam.ac.uk/alumni/information/dataprotectionstatement

You are welcome to request a hard copy from us. Some sensitive personal information may be held in the database. You have the right to contact us at any time to change how your data is used, or to tell us that you do not wish to receive a specific communication. Please contact us using the details below.

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If you would prefer to read *The Fountain* and/or the *Annual Record* online, please let us know by email: alumni@trin.cam.ac.uk

Don't miss out on our regular email communications – make sure we have your email address.

Alumni Relations & Development Office

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Forthcoming Events

November 2019

Thursday 7 November

Trinity Law Association Drinks and Talk: In Conversation with the Rt Hon Lord Justice Singh and Professor Catherine Barnard (London)

Sunday 10 November

Remembrance Sunday Service (Trinity)

Tuesday 19 November

TBCA Entrepreneurs' Evening (Trinity, Bradfield Centre)

Tuesday 26 November

Sir Antony Gormley at the Royal Academy (London)

Thursday 28 November

Trinity in Japan: The view from the Bench with His Honour Judge Witold Pawlak (Tokyo)

December 2019

Monday 2 December

Alumni Carol Service (London)

Thursday 12 December

Rugby Union Varsity Match 2019 (Twickenham)

March 2020

Saturday 28 March

Trinity Medics' Association Dinner (Trinity)

July 2020

Sunday 5 July

Family Day (Trinity)

For a full events listing and to book, please visit: www.trin.cam.ac.uk/events

Save the date – Annual Gatherings 2020

Saturday 11 July:

1996, 1997, 1998

Wednesday 15 July:

1968, 1969, 1970, 1971

Saturday 12 September:

2008, 2009, 2010

