

"Time flies, but memories and the Schwitzer Times remain" – old proverb



An index of past Christmas Newsletters is at www.schw.it

SCHWITZER TIMES

news that matters ♦ stories you missed ♦ opinion that shatters ♦ puzzles that resist

Monday, 25th December 2023

New Year Gift. On 31-12-2022, Audrey was born in Edinburgh to John and Hendrickje, the sixth great grandchild of Joan & Mat.

Engaged. We are delighted to announce that Edward proposed to Laura in February this year, with the wedding to be celebrated at the end of August next year in the Surrey Hills. This will be the fourth marriage of Joan & Mat's seven grandchildren.



#IAmEuropean. "I wish it need not have happened in my time," said Frodo. "So do I," said Gandalf, "and so do all who live to see such times".

Tip of the Iceberg. Play the square QR codes in this newsletter on your smartphone for more content! *With most newer phones your camera highlights the code when it recognises it – just tap to play content immediately! With some older phones you may need to download an app. It may help to close browser windows with longer videos when they have finished.*

This will probably be the last **Schwitzer Times**. I hope you've enjoyed the read as much as I've enjoyed the write.

"But at the laste, as every thing hath ende, he took his leve" – Geoffrey Chaucer

Our bible reading this Christmas is from the Book of Matthew

“The people living in darkness have seen a great light, and on those now living in the land of the shadow of economic despair a new light has dawned. For, after much gnashing of teeth, the nation has finally understood what it is: a small country that needs big & competent government, regulators with sharp teeth, immigrants aplenty for satisfactory services, high yet progressive taxes to pay for it all, and European allies for influence on global issues. And lo, there appeared in the sky, a new star, which went before them, till it came and stood over the place they once were. And when they saw the star, they rejoiced with exceeding great joy.”



Puzzles you can take anywhere. The results of a worldwide study were:

1. Germany
2. New Zealand
3. Italy
4. Australia
5. Israel, Saudi Arabia, Turkey
6. Netherlands, Austria
7. Sweden, Switzerland, Sri Lanka
8. Ireland, Indonesia
9. Portugal, Slovakia, Iran, Uruguay, Russia
10. Egypt, South Korea

How did the U.K. do? Answers to William, a magnum of Prosecco awaits the first correct answer received (for collection / next time we meet)

In July, we saw a fine performance of **Rigoletto** in Orta San Giulio. Acts 1 & 2 were in the gardens of the Comune (where we were married). The audience was then taken by launches to the island for Act 3 on the steps of the Basilica.



Where was I? In the new Canary Wharf Underground Station.



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=ROUNDUP (2023)

January. Croatia adopts the euro and joins Schengen, the 20th member of the Eurozone and 27th member of Schengen, the first enlargement of the Eurozone since Lithuania in 2015, and the first enlargement of Schengen since Liechtenstein in 2011.

Dawn silence. Since March, we have almost no garden birds in Highgate. As something you take for granted, now they're gone it's actually quite upsetting. Avian flu may be a cause, and there are other stresses on bird populations, like competition for nesting spaces. Shared feeding locations in urban settings may aid the spread of disease. In local green spaces like Hampstead Heath we now tend to see only larger birds like crows, jays, magpies (these last two also being from the crow family, renowned for their intelligence), also pigeons and of course parakeets, that all seem to have adapted well to the city life. This autumn a solitary robin still occasionally watches me turn the soil, but sparrows, blackbirds and blue tits seem to have just disappeared from our corner of London.

April. An independent and long-established UK health charity reports that life expectancy at retirement has fallen by 2 years in the decade 2012–2022. Whilst largely down to premature pandemic deaths, the figures show some worrying and not fully explained trends in comparison with other countries. For more on this search “King’s Fund Life Expectancy”.

July. Temperatures in Spain surpass record 60C in deadly heatwave. July confirmed as the hottest month worldwide on record ever. António Guterres, UN Secretary General, warned “the era of global boiling has arrived” and “immediate climate action” is required. August and September also set many new records.

Smash & grab. In September, a 250g sample from the 500 metre wide asteroid Bennu was delivered to earth, after the 7 year NASA Osiris–Rex mission, the largest sample ever returned from an asteroid. Bennu does not have enough gravity to land on, so the sample was collected while in motion.

October. Terrorists kill 1400 Israelis and 8000+ Gazans. The failure of so many world leaders, past and present, to bring the sides together and resolve the longstanding differences in this part of the Middle East and to prevent these new atrocities is deeply depressing and truly shocking.

“For to be free is not merely to cast off one’s chains, but to live in a way that respects and enhances the freedom of others.” - Nelson Mandela



Where am I? In the fourth dimension? Having a bit of a visual aura? Dreaming of the M25 in the next century? Looking up Mondrian’s chimney stack? Beyond the Infinite on the set of a Kubrick film? No, it’s actually somewhere much more down to earth! *Answer inside back cover (no prizes for this one I’m afraid).*



We had two great days at Henley Regatta this year – more inside!

Therapist - “And these Brexit Benefits you see, are they in the room with us now?”



confirms why it is not possible to extend complex numbers to just three dimensions.

**meaningful arithmetic: with operations that revert to what we are used to for lower dimensions; with a concept of size; and with multiplication distributive over addition $a \times (b + c) = ab + ac$.*

Yes, that list did include 8-dimensional numbers, known as octonians. And interestingly, octonian arithmetic has to abandon a *further* arithmetic law, associativity $a \times (b \times c) = (a \times b) \times c$, which makes it fiendishly awkward. So it seems that with every higher number of dimensions, a further basic law has to be abandoned (which explains why higher dimensional arithmetic only works in a small number of cases, there being very few axioms for basic arithmetic to start with).

“The time you waste on social media could be space-time doing general relativity” - Albert Einstein

Finally, when you combine the four possible arithmetics of 1, 2, 4 and 8 dimensions into a colossal 64 dimensions, I’m told it provides enlightenment for physicists trying to understand the properties of elementary particles, with some curious number coincidences. But it’s so horrendously complicated that nobody has managed to work it all out yet, though ideas have been surfacing now and then that the four fundamental forces of nature (strong, weak, electromagnetic and gravity) might spring logically from the mathematical properties of this super-combination of the four arithmetics...

So here then is a table of all possible arithmetics (from real numbers onwards) and their properties.

Number Type	Dimensions	Ordered?	Commutative?	Associative?
Real Numbers R	1	✓	✓	✓
Complex Numbers C	2	✗	✓	✓
Quaternions H	4	✗	✗	✓
Octonions O	8	✗	✗	✗

Table 2. The multi-dimensional numbers

This table, showing the relationship of number types with the underlying axioms, should help you see why no other number systems are possible; why they are not arbitrary constructs; and why mathematicians refer to their discovery, not their invention.

Q.E.D.

necessary is far from obvious, and it wasn't until 1843 that the Irish mathematician William Hamilton (1805-1865) realised it was necessary to jump to four dimensions to make any extension of complex numbers work. Whereas complex numbers have real and imaginary dimensions, quaternions have one real and three imaginary dimensions, and with this construct everything fell into place. Hamilton's eureka moment was immortalised when he carved the defining equations of his three imaginary dimensions into a Dublin bridge (still there today):

$$i^2 = j^2 = k^2 = ijk = -1$$

Abandoning the commutative law was a major stumbling point, but mechanical engineers were already used to the concept: rotations have a handedness that represents (in a not entirely intuitive way) the nature of three dimensional space (also why bicycles stay up). Quaternions can be thought of as scalar plus vector (yes, that is adding apples to oranges). Quaternions act on (i.e. rotate) pure position vectors of physical objects, which results in both a dot product and cross product, which you may recall is perpendicular to both vectors. *(This is where the engineers revert to the index finger, middle finger and thumb of their right hand to work out the direction of the result.)*

"Every moment you waste on social media, you could be finding continued fractions" - Srinivasa Ramanujan

Today quaternions are used in computer gaming and robotics for fast calculation of spatial movement, avoiding the problem of poles becoming aligned (so called 'gimbal lock' or 'wrist flip') that is inherent in "conventional" 3D matrix calculations (yes, robots have recurring complaints too!). This resulted in the Apollo 11 lunar lander's control system somewhat annoyingly setting off alarms when the spacecraft pitch reached 70°, and even more annoyingly freezing up completely at 85°.

Quaternions provide a simple proof of the four square theorem, known to Diophantus of Alexandria in the third century, but only proved in 1770 by Joseph-Louis Lagrange (1736-1813), that every natural number is the sum of at most four squares. This theorem is one of the easier results for representing numbers as sums of powers, reflecting that quaternions 'exist' and provide a 4D diagonal (their size) that is the square root of the sum of the squares of their four dimensions.

'Exist' in quotes, because it gets philosophical: in what sense do quaternions exist? Surely they're just some arbitrary over-egged construct, I hear you say?

Unfortunately not: among the seemingly infinite possibilities offered by higher dimensions, it's only possible to construct a meaningful* arithmetic in 1, 2, 4 and 8 dimensions. So, far from being arbitrary, it's more like quaternions were quietly waiting throughout pre-history and history to be discovered. This result also



Yasmin has had a busy year with weddings most weekends.



Ciccia has also had a busy year modelling!

Opposite: Charlie & Yasmin at the Cliffs of Moher, Co. Clare, for Yasmin's birthday



In July, William cycled from Orta to Pavia and back, some 220km in 4 days, following the ancient canals to the west of Milan. Above at Bereguardo, the end of the canal of the same name.

Infinite scrolling you might as well be watching Medusa herself.

Haiku for 2023. If you've found yourself using your favourite social media app more this year than last, this haiku is dedicated to you. Because, though you may not know it, you are addicted to infinite scrolling: you may experience long periods when eye movement is the only visible sign of life; you are susceptible to being turned to stone the moment you reach for your phone.

What is infinite scrolling? Maybe you've discovered Facebook reels and went back to using Facebook again or more than before. Maybe you tried the innocuous little "Swipe up for more" that now appears on Twitter (sorry, X) videos. Maybe you've discovered Instagram reels. In all cases, you're using infinite scrolling: the ability with a simple swipe to scroll down for more content. This didn't happen in the past: Facebook and Twitter (sorry, X) feeds both took time to load. (The main X feed on web still has "Show 35 posts" that only appears after a delay.) But in the last 18 months or so, all major social media apps, as part of a series of endless but seemingly small changes to their user interfaces, have adopted infinite scrolling in some part of their user interface. And for a simple reason: it works for them. Declining audiences have been held, in some cases infinite scrolling may have saved their bottom line from what was otherwise falling user engagement. And it works because it's seriously addictive.

Technical innovation. What they've done is make relatively modest changes to pre-load further content. Videos and other content are streamed to your phone **before** you scroll. New content is immediately available without any perceptible delay: a simple swipe brings it into view. The effect is that, however fast you scroll, and for however long, still more content is ready and waiting: it's literally infinite. And all tailored to what you like most (with a few novelties thrown in every now and again in case you get bored). The technical innovation may seem slight, but seeing just how more hooked users have become, is what's made social media platforms realise they've struck gold. At the moment, there are no triggers from any of the apps to jolt you out of your stupor: scroll for hours and still they offer more (I believe). And paid-for content (advertisements) seems to be served more frequently once the app realises you're hooked. Money, money, money.

If you find these extensions confusing it may reassure you to know that they were not without controversy at the time: there were still maths text books being published in the second half of the 18th century that refused to use negative numbers, despite René Descartes (1596-1650) having used them unrestrictedly more than a century before.

"Each minute you waste on social media, you could be solving differential equations" - Isaac Newton

All the numbers considered so far possess *order*. This really is a consequence of Peano's second axiom, and the fact that all the operations employed preserve order. It turns out that having order restricts these numbers to those on a line (you may find that obvious!). So numbers with order are one-dimensional - but that is a limitation for some problems!!

To work in two dimensions, we must abandon order. This leads to complex numbers $z = x + iy$, where x and y are real numbers, and $i^2 = -1$. Although z has two components, we think of it and use it as a single number. The complex numbers, perhaps the worst named, have intimidated many a student, especially as the y component is known as 'imaginary'. (It was also a rather short sighted name, given later discoveries - see below - of *really* complicated numbers!) Note that while order does not exist for complex numbers (they cannot be placed on a line), the weaker concept of "size" (the correct term is 'modulus' or 'norm') *does* exist.

Lots of wonderful mathematics follows, which it turns out is crucial for a great deal of physics. i represents a quarter turn (because its square is -1 which represents a half turn). While exponentials of real numbers represent growth and decay, exponentials of imaginary numbers represent rotation. The equation $e^{i\pi} = -1$ ties together three letters from seemingly unrelated areas of mathematics, polynomials of order n always have n roots, sine and cosine curves are just components of exponentials, and everything falls into place!! Augustin-Louis Cauchy (1789-1857) showed that an integral along a closed loop in the complex plane is always zero, except if there are some "nasty" points within the loop (singularities where the function is infinite), in which case the integral is the total of the easily calculated "residues" of the enclosed singularities. This means the values of complex functions at any point are determined by the values "nearby" (Cauchy's Integral Formula). As these magical results do not hold for functions of real numbers, sometimes the easiest way to deal with complicated integrals is to first extend to complex numbers.

Complex numbers, then, arise when we abandon order. To extend further, we must abandon more rules (do I hear cheering?). Next to go is the commutative law ($a \times b = b \times a$), which has been true for all numbers up to this point. That this was

Mathematics for the Million

We instinctively use different types of numbers depending on the task in hand, but their characteristics and interrelationships are rarely well taught. To complicate matters, the names used for different sets of numbers – which reflect their history – are unfortunate (putting it politely) and lead to misunderstandings and even apprehension. So let me offer an “explainer” to enlighten you over Christmas!

The simplest numbers – those we learn first – are the natural numbers (as if the others weren’t!) that we use to count things. A better name would be ‘signless’. The logical basis for natural numbers (denoted by **N**) was set out by Giuseppe Peano (1858–1932) of the University of Turin: in its simplest form just two axioms are required: (i) there is a number (let’s call it ‘1’); and (ii) every number has a successor. These two axioms ‘generate’ the natural numbers and a lot of mathematics follows. For example, addition is simply repeatedly finding successors, and multiplication is repeated addition. In this way we can build up to lots of amazing stuff about divisors, prime numbers and much much more.

Roman numerals represent the natural numbers, but the Romans had no zero and no way of representing negative numbers. But there’s nothing ancient about the natural numbers: when we try and order three of our favourite buys on Amazon and there are only two in stock, the computer says no.

What’s going on here then? What’s happened is that once we define addition the inverse operation (in this case subtraction) is not always possible. And so the set of integers, usually denoted by **Z** (which includes zero and negative numbers) is needed when we need to allow subtraction to always have a result.

Allowing an inverse operation leads to an extension of a number set. So next, we find that division, the inverse of multiplication, is not always possible with integers. This leads to the set **Q** of rational numbers.

Even now, square roots cannot always be taken, as was known to the ancient Greeks with a simple proof that $\sqrt{2}$ cannot be written as a fraction, and this leads to the so-called real numbers **R**.

Number Type	Examples	Can always		
		Subtract?	Divide?	Take Roots?
Natural Numbers N	1, 2, 3, ...	✗	✗	✗
Integers Z	..., -2, -1, 0, 1, 2, ...	✓	✗	✗
Rational Numbers Q	fractions	✓	✓	✗
Real Numbers R	$\sqrt{2}$	✓	✓	✓

Table 1. The one-dimensional numbers

Addictive nature. Infinite scrolling is seriously addictive. It’s all about dopamine and learned behaviour. As with drinking alcohol and other addictive activities, after using infinite scrolling a few times, your brain actually receives the dopamine **whilst you are scrolling and in anticipation of the reward of fresh content**; you have learned to enjoy the action of scrolling itself; you are now hooked. If you think back, you might just recognise your addictive moment after using infinite scrolling a few times: the scrolling itself becomes compulsive. In addition, new content is available **as quickly as you can read (or skip) it**, so it becomes all-engrossing (so same as sudoku, tetris, solitaire and all the others), thereby offering a break from the tough day / jobsworth of a boss / depressing news / argument with partner: you now find infinite scrolling relaxing, and will readily return to it whenever you can.

What can you do about it? Awareness is everything – hopefully this mini-rant helps. At the moment, whilst the evils of social media in general are fairly well known, the power of this specific feature seems to still be little understood. Now you might argue that social media has brought down crime by keeping angry people off the streets, but clearly a big issue is the time wasting. And, depending on the content you’re hooked on, there are a multitude of serious mental and physical health issues that present with excessive social media usage. But here’s a thought: the next time you reach for your favourite social media app, why not write down the time you start and how long you want to spend on it? If you find you are spending more time than you want to, you have a problem.

What should others do about it? From Prohibition and restrictions on gambling to Victorian pub and off-licensing hours (as recently as my mid-twenties I couldn’t buy alcohol between 2pm and 7pm on a Sunday!!), there are many examples from the past of attempts to limit addictive activities by law. But it’s clearly highly unrealistic to expect the current style of liberal and populist politics to get anywhere near putting serious brakes on social media usage. A few baby steps have been taken by EU regulators, so perhaps with greater awareness of this specific feature it might be possible to impose some sort of code of conduct on social media platforms, to limit content that can be served, introduce increasing delays, or triggers to prompt the user they’ve had enough (as with gambling apps). But, given notoriously poor understanding of the issues raised by social media usage on the part of many politicians – and an even worse record of dealing with them – I can’t see much happening any time soon. So for the time being, awareness (particularly by parents) and self-control will be key. Best of luck!

“Give me one moment in time / when you’re not on your phone / then we will be free”
- Whitney Houston

FAMILY FAMILY



Mike, Pardis & Laura above Tullochgorm in March



John with Audrey & Clara in July



Sofia, Roman, Neve & Anna in July



Veronika & Terry in front of Martello Tower No. 64 at Eastbourne in October. One of 103, these towers dating from around 1810 had cannons and were England's defence against Napoleon



With cousins Ilona, Csipi and Gabor in a traditional Hungarian restaurant (Kéhli Vendéglő) on my last Sunday in Budapest, a real treat.



Up close & personal with the newly reopened and beautifully restored Chain Bridge, now restricted to pedestrians, public transport, taxis & bicycles. After a lengthy closure it felt like a real treat to walk over this one, which I duly did several times! Super paintwork, new LED lights (opposite, at night) which blend in fine. Adam Clark would be proud! Royal Palace and National Gallery on the hill in background.



At the end of September, William returned to **Budapest** to catch up with friends and family and explore more of the city (having visited in May last year with Pardis). He enjoyed a stunning Renoir exhibition in the Museum of Fine Arts, and explored Aquincum, the Roman frontier town and capital of Pannonia province when the Danube was the *limes* (border) of the Roman Empire. He visited the new (2022) Museum of Ethnography, with its weird building with two upturned ends (the climb along the edge of the turfed roof is actually the best part of the museum!!), and the brilliant interactive Hungarian House of Music (which also only opened last year). He went to a concert in the stunning new Müpa (Palace of Arts, opened 2005) with an all-Hungarian programme, including a super performance of *The Miraculous Mandarin*, Bartók's one act piece with modern dance on a small raised stage set in the middle of the orchestra. Written a century ago in the turbulent period after WW1 (so perhaps very relevant again today), the story of sex and violence really comes to life with Bartók's powerful music with its strong contrasts and heavy dissonances. One way of describing it is as the *Clockwork Orange* of its day - in fact the three thugs in the opening sequence immediately reminded me of Alex and his Droogs - and both *The Miraculous Mandarin* and *A Clockwork Orange* were banned soon after their premieres.

Renoir
& his models



Rush hour in
Széll Kálmán Square



Exploring
Budapest



Miraculous
Mandarin



FAMILY FAMILY



Gemma, Veronika and Emma at Henley Regatta in July

◆ ◆ ◆ Helicopters wanted ◆ ◆ ◆

I'm sure we've all found things "not working" this year, whether trying to get a coffee or make a doctors appointment. So many machines, services and organisations seem to be broken. Pure frustration. A couple of times I've challenged people - what have they done about it? - of course I'm not blaming them personally!! - have they reported it? - (no, I don't want to report it!) - what was the response?! - what is their organisation doing about it right now? And I've come to the conclusion that there's a deeper problem with people "getting" their role within their organisation - perhaps even within society.

Processes, processes, processes. For a long time there's been an unhealthy reliance on "having the right processes in place". This, to my mind, constrains individual initiative, and is guaranteed to fail when new situations arise, particularly when a fast response is required. Every task becomes a potential single point of failure: unless you build in monitoring it risks nobody realising a process has failed. Reliance on processes suggests an organisation would work perfectly if everyone simply followed a series of set processes. Which is of course garbage.

Empowerment. In the 1990s we talked about "empowering employees" - but that has basically happened: today individuals are **able** to act. For example, today (usually) anyone can message anyone else in an organisation. But no one does!!

Why they don't is then the question! And the answer is... some combination of: (i) they're unsure they should, (ii) no one asked them to, and (iii) fear of subsequent blame. Does that thinking look familiar?! But companies and indeed the world we live in were shaped by individuals: to expect an organisation or society to be able to deal with new issues without thought from the individuals involved is surely silly, and in reality, individuals can usually make a lot of difference themselves. So this is partly about taking personal responsibility. But management style is important too - managers need to be in permanent listening mode - rather than act as if there's a one way flow of ideas from apex to base.

Big Picture View. But perhaps most importantly this is about individuals seeing the bigger picture - able to take a "helicopter view". Understanding how their organisation works, how it makes money, and what needs to happen for it to function well. Key to that is having a good understanding of what the people they interact with need from them. That means both the people around them, including their bosses and subordinates, and externals. Having that "big picture" helps see when and how they need to act. And conversely, helps people twig that if **they** don't pursue an issue, it will never be fixed.

"The problem with following the herd is that you might end up at the abattoir"

"When I was a child I stayed with my grandparents in a little village called Thundersley. It was a very rural area. They had a long garden and at the bottom of it there was a row of very tall elm trees. I happened to be up early one morning, and I saw the sunlight shining right through the foliage of the trees. I remember the rays



of light were spraying out, creating a sense of depth in the trees and the surrounding area, and glinting on the bark, giving them an almost jewel-like quality. I'll always remember the effect it had on me... it was

a very uplifting feeling, and it remained with me throughout my life. It drove me to become a painter, because I wanted to capture that atmosphere, that vision of light.

I paint to create the world of this vision; the play of light on objects has fascinated

me ever since. When I look at trees and at light, I look at where the light comes through the foliage, the planes of light passing through the trees; even in the darkest shadow you can still see the light passing through. Whenever I visit places, I



gravitate towards those aspects that bring that memory back, a memory which has remained with me." – Harold Hitchcock (1914-2009)

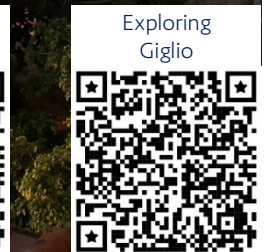
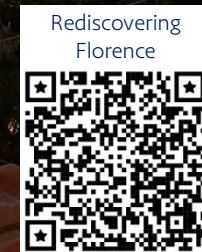


City Lights. What can you spot? The river and London's many parks show dark on this picture, the Thames grows wider as it flows from left to right – spot the dots of Thames Barrier at right, and square Battersea Park hanging from the river at left! Anvil-shaped Hyde Park is above (West Carriage Drive snakes across!), dead straight Edgware Road (Roman Watling Street) leads up diagonally from its top-right corner (Marble Arch) to the left, whilst Bayswater Road / Oxford Street (Roman Via Trinobantina, medieval Tyburn Road) runs along its north edge into central London. Lower right corner of Hyde Park points at Green Park, Buckingham Palace and (beyond bright Victoria Memorial!) St James Park. The most easterly bridge, Tower Bridge, shines brightest, HMS Belfast is just to its left. Harringay Ladder (19 parallel roads) is visible at the top, below it Finsbury Park points down at The Emirates Stadium (shining bright!). At left, the rounded Regents Park (Inner Circle just visible), leading off it Parkway and straight Camden Road, which crosses Holloway Road becoming Seven Sisters Road, up to Finsbury Park. Large dark area in top left is Hampstead Heath (smaller dark areas to its right are Waterlow Park and Highgate Cemetery). Wooded Hampstead and Highgate are noticeably dark! Boot-shaped Victoria Park is on the right, to its right West Ham stadium in the Olympic Park shines bright! Coming up from Victoria Park the large dark areas are Hackney Marshes leading to (at the top) Walthamstow Wetlands.



In August, cousins Monika & Marek & family came to stay with us at Lake Orta.





In early September, William & Pardis visited the magical Island of **Giglio**, part of the Tuscan Archipelago, for a relaxing few days walking. We stayed in Giglio Porto (dawn above), its bars and restaurants just a few yards from our hotel, and used public transport to get there - including a Frecciarossa (right) doing 298km/h - and buses and a “water taxi” to get about the island. We had an overnight stop in Florence on the way there.

On the first day we walked to Arenella beach with its crystal clear waters; the next day we took buses across to Giglio Campese and up to Giglio Castello. The highpoint was the walk down from Giglio Castello on an ancient footpath - probably Roman - at first mainly on the level through pine woods - and then, passing large carved prehistoric stones with fantastic views out to sea, descending to Cannelle Beach and along to Caldane Beach, returning by water taxi. All captured in the video clip you can play above!

