

# The Professional **Mountaineer**

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The Association  
of Mountaineering  
Instructors

British Mountain  
Guides

British Association  
of International  
Mountain Leaders

Mountain Training  
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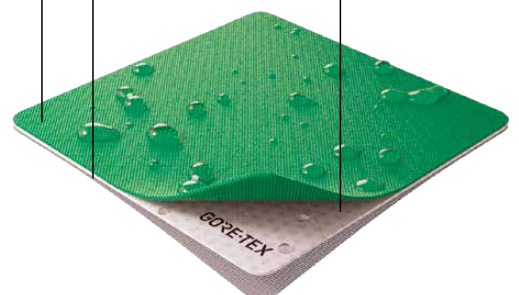
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# The Professional Mountaineer

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## NEXT ISSUE

**Winter 2021** CASM a human factor tool, capturing winter wildlife and Botony in Hohetauern NP.  
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**Our front cover**  
*Doubtless Wall* on a chilly April day.  
Cummington on the Moray Firth.  
© Dave Chapman

## Woodland Carbon scheme



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# EDITORIAL

This autumn we can look ahead to climbing as an established Olympic event. The inclusion of speed climbing in the combined event was a compromise that facilitated this new era, but coaches and athletes can now look forward to focusing on lead climbing and bouldering: climbing 'as we know it'. Speed climbing sits uneasily within a broad church that regularly quotes 'Do nothing in haste; look well to each step' (the safety aspect is largely delegated by the athlete to the organisers) – however, its inclusion in the Olympics reminds us that cultural attitudes extend even into mountaineering and climbing.

In the early days of my career, I struggled to understand why qualifications were necessary – in those days I argued that a logbook should be sufficient. As an employer I soon realised that self-assessment has serious limitations! Nowadays, as part of my role within the UIAA I am regularly asked to cut through language and culture to examine whether the structures of national qualifications are appropriate for the scope and remit of national awards; often providing a fascinating mirror for reflection on the qualifications that underlie membership of the associations responsible for this magazine.

I am invariably reassured by the layers of authority and peer review that support every one of our members: by way of contrast, I would like to share a few issues that I have encountered over the years. Until 2014 the Chilean federation had qualifications for a range of activities, with universally excellent standards. Shortly after the formation of an association of leaders and instructors, a new executive disbanded the national centre and



ABOVE Granddad editor teaching natural history.

ceased all the existing qualifications, leaving the association members stranded overnight! This situation took several years of bitter wrangling to resolve. The Mexican federation currently has huge potential for unforeseen but related problems, as it has started to issue qualifications before forming a training committee. Hopefully, this can be rectified before anybody questions an assessment verdict, or the syllabus needs updating or ... the list goes on. Here in the UK and Ireland every aspect of the qualifications system has been scrutinised for over half a century. The associations have collaborated to manage the post-assessment quality control: the UIAA accepts this as a form of the compulsory "revalidation" required for its accreditation of qualifications. Supporting the scope and remit of all our qualifications and associations, we have the strongest established and most experienced training committees in the world – our own Golds.

**Steve Long**  
Technical editor

## OUR COVER



### Dave Chapman

Dave is a Winter Mountaineering & Climbing Instructor and works for Scotch on the Rocks Guiding – a provider of Mountain Training courses, as well as providing coaching, instruction and guiding in climbing, mountaineering and walking in Scotland.

## OUR AUTUMN ISSUE CONTRIBUTORS INCLUDE



### Trevor and Desiree Massiah

Trevor and Desiree are the Directors of Rock & Sun, who offer climbing courses and holidays in the UK, Spain, France, Greece, Italy, Morocco and Thailand.



### Stuart Halford

Stuart is a Winter Mountaineering & Climbing Instructor based in Cumbria. He works on an associate basis as an instructor in the mountains and on corporate personal development programmes.



### George Raine

George is a freelance Mountain Leader. He currently reads an MSc in Global Sustainability Solutions at the University of Exeter and is a qualified Geography teacher.



### Simon Duczak

Simon works for the Ambulance Service and is a TRIM Assessor for his colleagues. He is a Mountain Leader and Rock Climbing Instructor, as well as a Mountain Rescue Volunteer.

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**Feeling inspired?** If you would like to contribute to the next issue, please contact **Belinda Buckingham** at [belinda@mountain-training.org](mailto:belinda@mountain-training.org)

**Fancy advertising?** If you would like to advertise in the next issue, please contact **Caroline Davenport** at [caroline@media-solution.co.uk](mailto:caroline@media-solution.co.uk)

# NEWS



## THE ASSOCIATION OF MOUNTAINEERING INSTRUCTORS (AMI)

The summer season is reportedly as busy as ever for AMI members working across the UK, helped by some great weather, and as we move into autumn and winter we can only hope for normality to continue. A range of work continues to support members and promote their work in the new membership year.

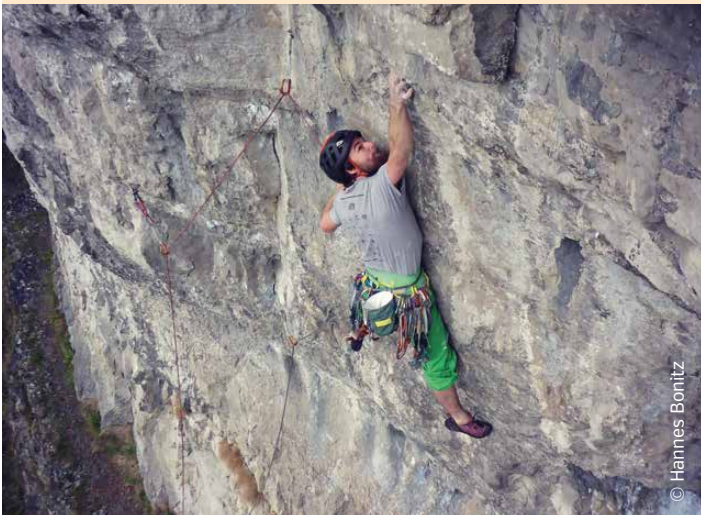
The AGM date is now set for 23rd–24th April 2022 at which we will be recruiting two committee posts, namely the Charity and CPD representatives. Both current post holders, Kris and Jay, have done an amazing job and will be fully supporting the new postholders during the transition. A recruitment pack will be available shortly.

Plas y Brenin and AMI have liaised to develop links further between the two organisations. PyB have offered to provide a CPD weekend for members in November preceded by an AMI trainer and mentor update. In addition AMI are providing a series of extra regional CPD events in the run up to the implementation of mandatory CPD as a membership renewal requirement from June 2022.

Working overseas guidance is now available on the website and this will be followed up by new documentation about working as a technical advisor. My thanks to both working groups involved in developing these.

As we head into grit season and look forward to winter, enjoy some safe and fun climbing!

**Phil Baker** (Chairman)



AMI is the representative body for professionally qualified Mountaineering and Climbing Instructors in the UK and Ireland and is committed to promoting good practice in all mountaineering instruction. Full members hold the Mountaineering and climbing instructors qualification or higher qualification the Winter Mountaineering and Climbing Instructor.

T 01690 720123  
[www.ami.org.uk](http://www.ami.org.uk)



## BRITISH MOUNTAIN GUIDES (BMG)

The ongoing challenge remains identifying and engaging with regulations we will need to follow to continue our professional work in EU countries. We have joined with kindred bodies to strengthen our opportunities to lobby the UK Government, as well as engaging with government ourselves.

Like 2020 we have enjoyed some remarkably hot and dry periods of weather that seem to have encouraged enquiries and bookings from clients, so members are returning to work and making the most of conditions. For Guides based in the Alps there is a steady flow of work primarily with Europe based clients. For UK based Guides there has been a return to haunts of old and a summer here enticing clients onto our wonderful mountain crags and sea cliffs. It's been a different sort of summer for many Guides but certainly refreshing and enjoyable, and for some a pointer to the future. Members have also been applying skills in other commercial ventures supplying safety and supervision cover in a variety of projects – the news photo is of Steve Long filming at Tremadog for BBC Blue Peter.

Our training scheme is operating well as trainers and trainees work flexibly together for the courses to run. Our UK summer training courses have been completed and the assessments will run as normal. Similarly, our alpine aspirants have completed their training courses and are progressing well.

**Martin Doyle** (President)



The BMG is a member of the International Federation of Mountain Guides (IFMGA), currently comprising 24 nations worldwide, with growing membership, it is the professional organisation that trains and assesses Mountain Guides in all disciplines. A British Mountain Guide operates to the highest recognised level throughout the world, in all terrain and in diverse roles.

T 01690 720386  
[www.bmg.org.uk](http://www.bmg.org.uk)



## THE BRITISH ASSOCIATION OF INTERNATIONAL MOUNTAIN LEADERS (BAIML)

Whilst current travel restrictions continue to affect many members, the UK summer season is now in full flight with many reporting to be exceptionally busy. Regionally, BAIML CPD sessions are now taking place all over the UK.

A process is now detailed online enabling members to apply for a work permit in Switzerland. Many have applied successfully so far, and hopefully this is the start of things to come as BAIML has continued to be busy working hard to represent the interests of members (and other stakeholders) to try and push the UK Government to move forward with negotiating working rights and qualification recognition agreements with EU countries in the wake of Brexit.

The member gear deals (available on the Members side of the [baiml.org website](http://baiml.org)) have now been updated with some new suppliers added.

By the time you're reading this, bookings will be open for the BAIML Annual Conference (26-28th November at the Royal Victoria Hotel in Llanberis) with a full program of CPD available – and, finally, a chance for us to be together again.

We hope to see many of you there.

**Kelvyn James** [President]



BAIML is the professional association for International Mountain Leaders (IMLs) in the UK. It represents the UK at UIMLA, the Union of International Mountain Leader Associations, which is the international governing body for IMLs. Full members hold the IML award and are committed to a dedicated CPD programme.

T 01690 720272  
[www.baiml.org](http://www.baiml.org)



## THE MOUNTAIN TRAINING ASSOCIATION (MTA)

We are pleased to announce that our 2021 mentoring programme is underway to help trainee members on their Mountain Training journey. We've trained a further 30 mentors to join our previously trained volunteers offering support to those working towards their assessments.

A big thank you to members who are getting stuck into doing a series of habitat and vegetation surveys, investigating the impact of climate change and environmental factors on UK semi-natural habitats as part of the National Plant Monitoring Scheme.

This year the Camping and Caravanning Club have seen an increase in newcomers wanting to get out walking, and this autumn we will be collaborating with them to provide opportunities for members to lead walks at some of their sites.

Keep an eye on the workshop programme this autumn as we work with our regional volunteers to pull together a programme of peer-led events along with an assortment of CPD workshops.

Whilst we have had to take our final three mountain weather workshops online for the remainder of this year, we are excited to be continuing our collaboration with the Met Office next year, with a return to in-person sessions.

Our winter CPD event is also beginning to take shape and is scheduled for 22nd-23rd January at Glenmore Lodge, so if you have winter aspirations this season, save the date.

**Belinda Buckingham** [Development Officer]



The MTA is a membership organisation providing support and development opportunities for all candidates of Mountain Training. Promoting good practice and providing continued personal development opportunities as part of a UK-wide community of outdoor leaders. Full members hold one or more of the Mountain Training Awards.

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# TREKKING *in* TRIGLAV



1

This mini-adventure series continues with a multi-day trek through the incredibly beautiful Julian Alps in Slovenia's Triglav National Park.

WORDS AND PHOTOS BY JIM LANGLEY



2



3



4



MAIN PHOTO Alpine meadow by the Triglav lakes hut. 1. Dolomite Saxifrage. 2. Triglav from Vodnikov hut. 3. Julian columbine. 4. Julian poppy. 5. Sternberg's pink. 6. Edelweiss. 7. Lake jezero v Ledvicah in the Sevel lakes valley. 8. Clusius' cinquefoil. 9. Clusius' gentian. 10. Triglav rose.



With its unique blend of climate and geology and positioned at the extreme eastern limit of the European alpine chain this region throws up its own distinctive floral character.

The mountains of the Julian Alps illustrate the immense accumulation of marine sediments and subsequent mountain-building forces which have thrust them upwards. These limestone mountains form the eastern most limit of an Alpine arc spanning over 1,200 kilometres through the heart of the European continent. They lie in the geological Southern Alps which include the Dolomites and Friulanischen Dolomites to the west.

The limestone rock forms from calcium-rich sediments laid down in shallow tropical waters on the southern edge of what is known to geologists as the Tethys Ocean. This process took place in the Mesozoic

Era between 225 and 200 million years ago. Alpine mountain-building forces subsequently thrust these sedimentary rocks upwards at one of the latter stages in the formation of the Alps (around 35 million years ago) making them among the most recent Alpine thrusts. The thrusting was also less intense than in the Eastern or Helvetic Alps, for example, where dramatic folds in the rocks are displayed. As a result few folds in the rock layers exist and many parts have retained their near horizontal bedding.

We travelled to Slovenia in early August which was still in the main flowering season of this region. With a dog in tow we could journey at a steady pace enabling us to explore the beautiful landscapes of this classic limestone region. Trekking with Alfie meant we weren't able to scramble along any of the magnificent alpine ridges where via ferrata equipment is advised, but it did

mean we could stay in the winter rooms of the huts and could enjoy having the room to ourselves due to Covid-19 restrictions!

Triglav was designated a National Park in 1981 and is the only National Park in Slovenia. It lies within the Julian Alps which stretch from Northeast Italy to Slovenia and whose alpine mountains and karst landscape are incorporated into a UNESCO biosphere reserve in Slovenia. Triglav is the highest mountain in the Julian Alps at 2,864 metres and was first ascended in 1778 by 'Four brave men' from the local Bohinj valley. It is a powerful symbol of the Slovene nation, even featuring on the national flag.

Climbing Triglav itself is a rite of passage for any Slovenian national who must submit to drinking a shot of vodka and being bull whipped on its summit at least once in their life – a tradition that would seem outrageous on the top of Snowdon!

## DESTINATIONS

11. Crimped bellflower.
12. Panorama of Triglav National Park from Kanin above Bovec.



**Jim Langley** is an International Mountain Leader and co-author of *The Alps – a natural companion*. He runs CPD workshops for leaders and instructors in the UK (mainly Snowdonia) but also in the Alps. To book a workshop or to learn more about his educational business, Nature's Work, check out his website [www.natureswork.co.uk](http://www.natureswork.co.uk)

I knew we were in for a botanical treat as we set off from the remote car park at Planina blato situated to the north of lake Bohinj at the end of a toll road starting at Stara Fužina. The first vivid sky-blue, pinched flowers of a species I've never seen before appeared on a rocky cliff as we trekked through alpine meadows, now above the cooling shade of the coniferous forests of Norway spruce, Larch and Silver fir below.

This flower is known as the *Crimped Bellflower* and is endemic to the Eastern Alps of Austria and northern Italy (Dolomites) with its stronghold being in Slovenia. In older alpine flower books it is known as *Zios' Bellflower* named after Karl von Zios, its discoverer, back in the late 18th century. In Slovenia it is held in high regard as a symbol of the Slovene Alps. Its narrow mouth makes it hard for insects to enter, with some resourceful insects resorting to cutting a hole at the base of the petals to gain access to its sweet nectar.

The trek continued over the Stapse Pass descending a rock band onto an enormous scree slope. Even in this inhospitably dry and barren terrain another locally restricted (endemic) plant, the *Julian Columbine*, was growing in its element amongst the mobile screes far away from competition and eking out its existence on meagre nutrients and resources. The screes gave way to luxuriant vegetation as we approached the valley floor. Limestone rock is renowned for being porous to water so entering the alpine valley known as the Triglav lakes, or Seven lakes, valley we knew we were somewhere special.

Our first night was in the Triglav Lakes hut, situated between two crystal clear lakes. We were now at 1,450 metres above sea level, so the mountain air cooled quickly as the sun sank behind the mountains. The morning dew lingered on the tall vegetation as we continued along the Julius Kugy alpine trail. This is a major trekking route leading to various trails, huts and ultimately the summit of Triglav. The trail ascended steadily along the deeply glaciated valley until we were crossing a dry and rocky, desert-like mountain plateaux. Plants such as *Alpine adenostyles*, *Chives*, *Giant knapweed* and *Monkshood* gave way to a whole new range of alpine flowers. Amongst these were *Clusius' gentian*, *Sternberg's pink*, *King of the*

*Alps* and *Pyrenean whitlowgrass* all of which favour the poorer, skeletal soils and more exposed, harsher environment.

The lunar-like, limestone landscape of the alpine plateaux, with its deeply fissured surface, is known as karst. A karst landscape is formed by the dissolution of soluble rocks such as limestone, dolomite and gypsum. As rainwater seeps into the rock it slowly erodes it creating a fissured appearance along with lots of crevices. It also creates underground drainage and caves by dissolving weak points within the rock. A system of underground rivers carry water to lower valleys, such as the renowned Soča valley, where they emerge bitterly cold and flow with crystal clarity in colours of azure blue and emerald green.

The barren karst plateaux would appear at first glance to be way too hostile for any flowering plant to survive, but incredibly some truly alpine specialists have adapted to endure the long cold winters and are able to grow and reproduce in the brief summers. Amongst these incredible species are the *Julian poppy*, *Clusius' cinquefoil* and the charismatic *Triglav rose*. The Triglav rose, also known as *Pink cinquefoil*, forms wonderful silvery-grey, compact leafy cushions from which bright pink-red blossoms develop in mid-summer. It is a symbol of the National Park and is also connected to the legend of the gold-horned goat, *Zlatorog*. It is said that a hunter shot the goat but forgot about its magical powers. From the blood of the wounded animal these flowers grew. Zlatorog was restored to health by nibbling the leaves of this magical flower and took revenge on the hunter who subsequently fell to his death.

We descended off the plateaux via the pass at Sedlo Dolic and continued steeply down the head of the Velska Dolina valley through alpine meadows towards the Vodnikov hut. We were rewarded with a wonderful display of alpine flowers and vast numbers of *Planika – Edelweiss* in Slovenian. If you have never seen an Edelweiss flower then this valley is one to head for. These tiny, woolly-grey flowers carpet the high alpine meadows in great abundance. At the centre of each flower are five or six small, yellow clustered florets, easily overlooked by the prominent fuzzy outer petals (bracts). ■



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**Libby Peter**  
Mountain Guide  
and mother of two





# What to do when YOUR ROPE ISN'T LONG ENOUGH

This is a follow up article to ‘Watch your rope – why are people being lowered off the end of their rope?’ There we described several things you should be doing to avoid not noticing that your rope is too short, long before the knot in the end comes into play. This you can find in issue 29 of *The Professional Mountaineer* (Spring 2020).

This article will look at what our options might be when you choose to climb a route that you know your rope is not quite long enough for, as well as what to do if you realise, too late, that your rope is not long enough.

*On more than one occasion I've had to leave a cold beer over sunset on Tonsai beach and head up to Cat Wall (a steep wall above a narrow ledge 40 to 50 metres above the beach). A few of the harder pitches are long and if the last party on the crag had a rope only just long enough to reach the ground, but not the 10 or 12 metres extra necessary to throw and pull the climber back in, they would resort to whistling or shouting for help. A very easy situation to resolve if someone is willing to head up the trail to the ledge with a spare rope to throw and pull the climber back in. It's an easy mistake but one that wouldn't happen with a little forward planning for the length and steepness of route versus length of rope.*

- *A knot in the rope removes the possibility of lowering the climber off the end of the rope but does not solve the problem of not having enough rope to reach the stranded climber. Alternatively, the belayer can be tied into the end of the rope: this also comes in handy for a couple of solutions that we will describe later.*

What are your options if you would rather not buy beers all night for being rescued? A simple solution would be back clipping while being lowered to stay close to the rock, and the last climber leaving a karabiner or a maillon on a bolt far enough down the route to deposit you on the ledge. This would take some thinking ahead, because once the climber is too far away to reach the wall, this is not an option.

The most obvious thing to do to prevent situations like these is to choose routes that are short enough for the rope you have. But, if you're set on climbing even though your rope is too short (your rope may also have been damaged limiting your options), bear these things in mind:

- When threading anchors, tie back into the end of your rope to maximise length. Threading with a bight of rope can easily use 2 metres of rope. If you prefer the extra security of threading a bight of rope through the anchors and being attached to the rope before untying, then do so. But when you would normally be done, tie back into the end and then remove the bight.
- When climbing steeply overhanging routes from a ledge as opposed to from the ground it is fairly standard to back clip (unclip the belayer's side of the rope and clip your rope in) to ensure you lower back to the ledge rather than hanging out in space. Another solution would be for the belayer to toss the end of the rope to the lowering climber and pull them back into the belay ledge.

When your rope is too short for these suggestions to work, there are at least five solutions.

WORDS BY TREVOR & DESIREE MASSIAH  
PHOTOS BY ROCK & SUN

ABOVE When lowering off a steep route, when you lose contact with the rock, your options are limited. Climber Tim Emmett. Photographer: Alun Richardson. © Rock and Sun.



**Trevor Massiah** (MCI) and **Desiree Massiah** (RCI) are the Directors of Rock & Sun, who offer climbing courses and holidays in the UK, Spain, France, Greece, Italy, Morocco and Thailand, and bouldering trips to Fontainebleau and Albarracin. Rock & Sun provide high quality coaching courses for all levels.



1. Belayer is tied into the end of the rope and can start climbing in order to lower the climber. 2. Leaving a maillon and snaggate on two consecutive bolts is an option. 3. When lowering off a steep route, if you lose contact with the rock, your options are limited. Climber Trevor Massiah.



**Solution 1 Thread another anchor**

- Check for mid-point double bolt lower offs. These are often in place for routes of 40 metres or longer (sometimes 35m+ routes). While being lowered off the top anchor, stop at the mid-point anchor, clip in direct, and re-thread the rope through this lower anchor to make it to the ground.
- Essentially the same: Check for shorter routes nearby that you can swing across to and use as an intermediate anchor.

**Solution 2 Maillon(s) or leaver biner(s)**

When there is no lower anchor to use, consider using a ‘leaver biner’ or maillon on a bolt lower down. Do consider the quality of the rock and condition of the bolt. Leaving gear on two consecutive bolts is an option if concerned. Please do not overtighten maillons, so they can be removed by a subsequent party – in some circumstances they can create leverage on the karabiner when clipping in front rather than behind the maillon. I’ve seen at least one karabiner failure due to this.

**Solution 3 Prusik up the rope**

When you can’t make it to the ground and have lost contact with the wall, prusiking up the rope to a point where you can contact the rock is of course an option – although not many sport climbers carry prusik loops with them on single pitch routes.

*I once witnessed Crispin Waddy (one of the UK’s most accomplished adventure trad climbers) abseiling, until reached the end of his rope 20 metres from the ground. A very angry and concerned Heinz Zac (the famous Austrian climbing photographer) raced up a route to throw a rope to a very bemused Crispin who was already happily prusiking up his abseil rope using his shoe laces! Luckily, he wasn’t wearing Velcros. Of course, Crispin accepted the rope. I’m certain neither knew who the other was which amused me no end.*

**Solution 4 Belayer climbs up to lower climber**

When you know beforehand or realise while lowering that your rope is not quite long enough, this solution can work on routes that are not overhanging, if the belayer intends to follow the pitch after lowering the leader. The belayer ties into the end of the rope – preferably beforehand, but it can also be achieved after locking off the belay device. Once the climber and belayer are counterbalanced, the belayer starts climbing – thereby lowering the other climber to the ground. If necessary, the belay device can be removed once there is enough slack in the system; the climber may need to clip in direct to a bolt to do this. It is not necessary to do this if you have more

than one belay device. The previous climber can simply put the new climber on belay when there is enough slack. Up to this point the climber is protected by the person on the ground staying tied in. I’ve used this solution on many occasions, and it is often possible to judge that once the draws are cleaned from the pitch and the rope is running in a straight line, the climber will make it back to the ground on rope stretch – therefore this technique is less effective if the rope is more than a few metres under-length.

**Solution 5 A spare rope (or slings)**

What should you do when none of the above solutions work, i.e. the climber is hanging in space so can not get to an intermediate anchor, nor re-thread a bolt by leaving a maillon, nor can he/she prusik up the rope?

I’ve used this on a couple of occasions when strangers at the crag have found themselves up to 5 metres plus off the ground and with a belayer who is unable to climb the route. The belayer steps backwards to retain the last metre or so and locks the belay device; the spare rope is attached to the end of the belay rope, and a belay device (or Italian Hitch) is fixed. Then, place a releasable prusik on the rope above the belay device and weight it to remove the belay device and transfer the tension to the added rope. The prusik can now be released and the climber lowered further – however, only until the knot hits the first runner – the limiting factor for this method. Alternatively, on occasion I’ve attached four 120cm slings and one 240cm linked together to the end of the rope, effectively lengthening the rope. The belayer clips into the end sling and the one closest to the rope. Once the prusik is removed the climber can be lowered using the belayer’s body as a counterweight, and unclipping from the first to the second to the third sling, until reaching the final sling and walking forwards until the climber is back on the ground. This is one to practice somewhere safe before trying in anger!

**Summary: Preparation – Awareness – Carry**

- **Preparation** How long is rope, how long is route, how steep is it? Knot both ends of the rope as standard practice.
- **Awareness** Keep an eye on the end of the rope. Look out for mid anchors, or lower stations on adjacent routes. When lowering off steep routes, stay in touch with the wall.
- **Carry** Maillons or ‘leaver biners’, slings and prusiks and know how to use them.
- **Last resort** Call for help and buy the first round. ■

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# Sustainable **BOLTING** PART TWO

Welcome back to the worthy cause of sustainable bolting.

WORDS AND PHOTOS BY STUART HALFORD



**Stuart Halford** is a Winter Mountaineering and Climbing Instructor based in Cumbria. He works on an associate basis as an instructor in the mountains and on corporate personal development programmes. A lover of cold environments, Stuart is Operations Manager for GELCO (Greenland Exploration & Logistics Consultancy) and spends time in the Arctic each year as basecamp manager, ski expedition leader and snowmobile guide.

In part one of this series my aim was to advance and explain the case for the use of resin anchors (as opposed to expansion bolts) on sport climbs and at lower-offs and abseil stations that use bolts. Here in part two I offer some general bolting guidance and an overview of the resin anchor fixing process. As with any practical skill, real-world training is fundamental, and relevant CPD is available through some of the Associations.

## Placing bolts – Some general principles

Three broad principles are common regardless of the kind of bolts you're using.

Firstly, you need to be safe while preparing and equipping a climb. If bolting on abseil, almost certainly the case with resin anchors, the enlightened way is to operate with two ropes – a working line and a safety line. As with industrial rope access work, there can be a lot going on, and redundancy with the ability to go up and down at will is important. This is a whole skill set in itself and warrants practice.

Secondly and hopefully obviously, the quality of a bolt placement is in part dependant on the quality of the rock. You might need to clean off loose rock first – known as scaling. If you're removing a lot of loose rock, ask yourself if you're ever going to get back to a solid surface? For bolts, you're looking for rock that looks, feels and sounds – at the tap of a light hammer – solid. Areas close to cracks should be avoided. Various rules of thumb equate to 20cm or less being too close. The same goes for avoiding edges such as the lip of an overlap or edge of a chimney.

Thirdly, there should be enough bolts, safely spaced – but not *too* many. Clipping any of the bolts should not constitute the crux of the climb, and you're looking to avoid any protruding rock which might compromise the position and correct loading of your karabiners. Importantly, the overall line of bolts should, as far as possible match the true line of the climb, with as few outliers as possible. All of this requires that some time will be spent trying or climbing the moves, perhaps on top rope or by abseil and also figuring out the shape and quality of the rock at various positions. Working out the distribution of the right number of bolts, clippable from reasonable positions can be quite a puzzle. Then there's the top of the route. It may top out, but more likely you'll be installing a lower-off in an area of good quality rock – perhaps sharing the lower-off with another line.

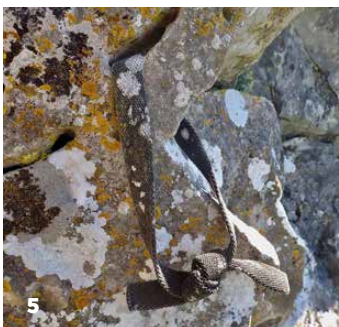
## Resin anchors specifically

This is where the extra skill and effort referred to in Part One come in. It's more involved than simply drilling a hole, whacking in an expansion bolt and spannering a hanger on. Below is an overview which will hopefully whet your appetite for some practical training.

Once the line is prepared and the placements planned as above, the best way you can help yourself is to divide the workload into a drilling plus cleaning routine followed by a gluing plus making-good routine. As a minimum you'll abseil twice – once to drill and clean, once to glue and make-good. A longer route may require more than one abseil for each routine even if only because you



1. Hole-drilling and cleaning equipment carried on abseil. 2. Glueing equipment carried on abseil. 3. It's a dirty job but someone has to do it if we're going to sport climb. 4. A good hanger with a non-compatible bolt resulting in mixed metal corrosion. Who knows what's underneath. 5. 1980's tat with lichen camouflage. 6. Checking the hang of a quick draw before beginning the glueing process.



need a rest. For each routine prepare yourself and your kit – much like climbing it pays to know where things are on your harness. Check that you have what you need before abseiling and carry spares of consumables including battery power. The drilling plus cleaning routine involves creating the holes to the correct depth, diameter and shape, removing dust from the hole and surrounding area with brushes, blown air and water followed by drying the hole and loosely marrying a specific bolt with it.

The gluing and making-good routine is likely to be time-bound. The chances are you'll be using a glue and hardener applicator system which, when underway is difficult to pause due to the mixing system and the speed at which the mix hardens, especially in warm weather. Cleaning up excess glue can be an absolute nightmare or quick and easy with some simple preparation. There are all sorts of tricks to make the process slick and clean and to minimise waste, and the final product safe, neat and unobtrusive. Again, as with learning to climb, these require practical training.

There still remains some finishing off to do. I like to label newly glued up bolts with plastic tags advising 'do not use' until I'm able to return and test the bolts another day and remove the tags. Correctly mixed resin cures remarkably quickly especially during warm weather but there is no harm in giving it longer. Careful though, you don't want someone beating you to the first ascent of your new route (if that's what it is) – I find the warning tags usually put people off. Finally, it's good practice to label spent resin cartridges and nozzles with date, route and specific bolt information. That way, if a fixing problem is found with a particular bolt, all other bolts installed with that particular cartridge (or batch of resin) can be identified and checked – useful in case it turns out there was a mixing or manufacturing problem.

Finally (really this time) like any skilled tradesperson, clean up your workspace and your tools, step back and admire your work.

A more pictorial 'Part 3' article will dive deeper into types of bolts and the installation process. ■



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# Atmospheric Optical PHENOMENA

ABOVE A Brocken spectra. The elongated shadow of the observer is seen with a glory surrounding the observers shadow. © Paul Gannon.

**Often in the mountains we are blessed with some amazing views, but perhaps none more rewarding than observing one of those rare atmospheric optical phenomena such as a Brocken spectra. This article will attempt to explain a little of the physics behind the appearance of rainbows, haloes and Brocken spectra (glories).**

WORDS AND ILLUSTRATIONS BY DR RON HOLT

Most of us have seen a rainbow, despite the fact that conditions have to be just right for it to be observed. However, there are other atmospheric optical phenomena such as haloes and Brocken spectra that have even more stringent conditions attached to them before they become visible. As such they are rare events. Whilst a mountain environment is not always necessary to observe these phenomena they are nonetheless best observed at altitude.

## Rainbows

The formation of a rainbow requires only direct sunlight and water droplets in the form of rain. The optical illusion only appears when an observer is in a direct line between the Sun's strong light rays and the rain cloud with the centre of the rainbow located at what is termed the antisolar point. The more dramatic rainbows are therefore best observed when the Sun's rays are strong and low in the sky (early morning or late afternoon) striking a huge number of raindrops that lead to its large colourful arcs. Rainbows are only visible when the angle between the observer, the centre of the rainbow and the top arc is close to  $42^\circ$  (*Figure 1*).

This primary bow is caused by sunlight (white light) entering spherical raindrops (almost all raindrops are spherical) where they undergo refraction at its boundary between air and water. The light is then dispersed within the water droplet into its ordered band of colours (red, orange, yellow, blue, indigo and violet) before being reflected from its inner surface. Each coloured band is refracted on leaving a raindrop (water to air) at a precise angle that depends on its wavelength, with red light being refracted less and blue light more. The resulting primary bow is then visible at an angle close to  $42^\circ$ . Given strong sunlight and dense rain (darker clouds) it may be

possible to discern a second, larger rainbow above the primary one where the viewing angle is now around  $52^\circ$ . This secondary rainbow has its arc colours in reverse to the primary one and is also much fainter. This secondary bow arises from two reflections within the raindrop itself which reverses the colour sequence (*Figure 2*).

The space between the primary and secondary bows is noticeably darker and is known as Alexander's dark band. Although a rainbow's upper arcs are only generally seen from the ground, a full circular rainbow may be seen if the raindrops are below the observers' horizon as in the case of ascending to a higher viewpoint, such as on a ridge or summit, with rainclouds in the valley below.

## Brocken spectra (Glories)

Another optical phenomenon that requires the same direct line order of Sun-observer-cloud (as in a rainbow) is called a Glory. Glories are most readily seen on the shadow side of an aircraft flying above the cloud base. However, their first recorded sighting was back in the 18th Century in the Harz Mountains of Northern Germany. Frequent misty conditions, particularly around the peak of Brocken, eventually gave rise to its more infamous title of Brocken spectra.

In mountainous regions Brocken spectra can best be seen from a ridge or summit, where a magnified elongated shadow of the observer is cast upon the mist, fog or rain cloud opposite the Sun's direction. The observer's shadowy head is surrounded by circular, fuzzy coloured bands, similar to a rainbow, but perhaps only  $5^\circ - 20^\circ$  across. This is the glory of spectra. The colours go from a bluish centre towards a red outer ring that becomes weaker and dimmer the further we move away from the central shadow (not the same coloured sequence as in a rainbow).



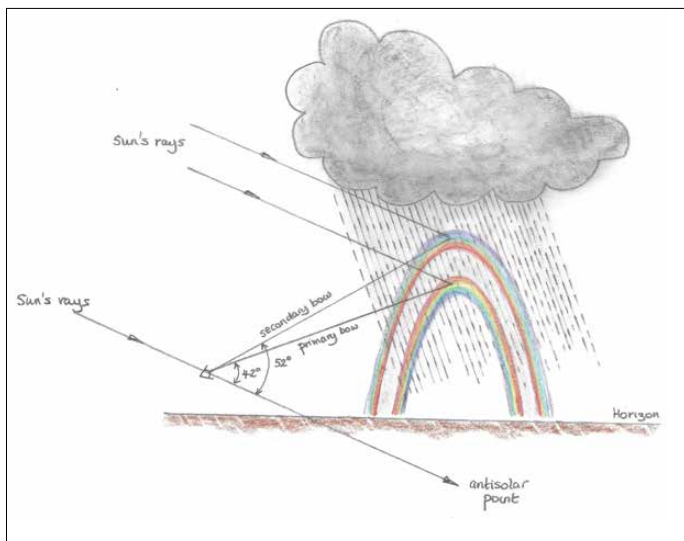
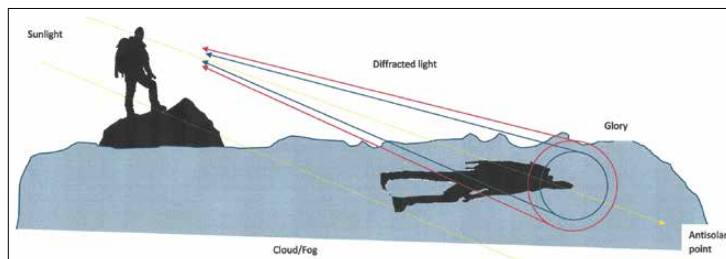
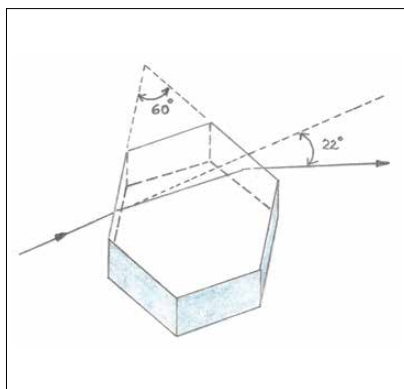


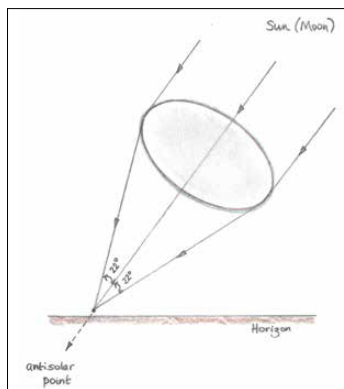
FIGURE 1 LEFT Primary bows are formed when the Sun's rays are reflected from the raindrops at a mean angle of  $42^\circ$  whilst secondary bows appear at a mean reflection angle of  $52^\circ$ . The space between the bows is known as Alexander's dark band. Note the colour reversal in the secondary bow.



An observer's shadow appears elongated on the cloud or mist with a glory centred on the observer's shadow's head [the antisolar point]. Diffracted sunlight from around the antisolar point back towards the observer is seen as concentric coloured rings.



Halo's are formed by light traversing through an hexagonal (6-sided) ice crystal.



The most dominant halo is formed at a precise angle of  $22^\circ$ .

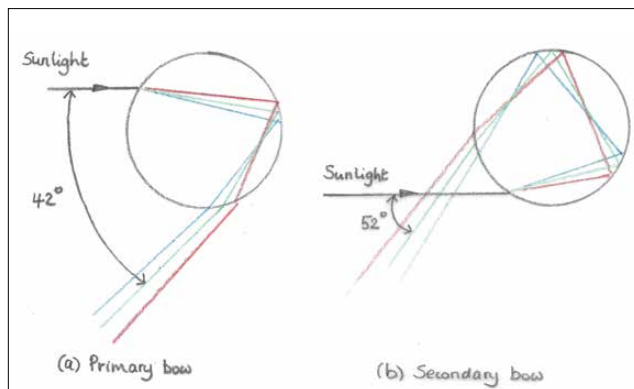


FIGURE 2 ABOVE Refraction, reflection and dispersion processes in spherical water droplets that lead to the formation of primary and secondary rainbows.

It may be possible to observe secondary coloured bands. These follow the same colour sequence as the primary bands and clearly indicates that the physical processes behind the formation of Brocken spectra are much more complicated than that of a rainbow. The pattern is characteristic of what is termed multiple slit diffraction of light about the antisolar point that is reflected back towards the observer. However, a full and more adequate explanation is still awaited.

**Halo's**

Another circular phenomenon that occurs in much colder conditions is called a halo. It is formed by the *refraction* and *dispersion* of sunlight (or moonlight) as it passes through ice crystals in high cirrus and cirrostratus clouds. Solidified raindrops at this altitude form ice crystals that are hexagonal (6-sided) in shape; light refracted on entering one of the side faces is refracted for a second time on leaving another side face. Knowing the refractive properties of the ice crystal it is possible to calculate the minimum amount of deviation the light takes on passing through the crystal and this turns out to be  $22^\circ$ .

Due to the very large number of ice-crystals that are randomly oriented the halo appears as a circle at  $22^\circ$  to the observer. As no light is refracted less than this angle the central region of the halo appears darker. The height of the Sun (or a near full Moon) above the horizon, the extent and thickness

of the ice crystals, and the precise movement of the clouds, can give rise to other effects associated with halo's; this includes Sundogs (Ice-crystal orientation effect), Sun pillars and several types of arcs.

Light entering the side of a vertical hexagonal ice-crystal but exiting at the lower (or upper) face gives a total deviation of  $46^\circ$  and this leads to a wider but also rarer halo that is significantly more difficult to observe.

The familiar separation of colours of white light in the ice crystal is a result of dispersion giving rainbow hues to the ring. The inner edge of a halo is sharp and appears reddened whilst the outer edge is more of a blurred blue (similar to a primary rainbow).

So next time you are in the hills, on a ridge or peak in misty conditions, you may be fortunate enough to observe one of these optical phenomenon and explain how it arises.

**Glossary**

- Diffraction** is the spreading of light waves beyond straight-line motion
- Dispersion** separates light waves into its component colours (red, orange, yellow, green, blue, indigo and violet)
- Reflection** involves a change in direction of light waves at the surface of a boundary
- Refraction** involves the bending of light waves when they pass from one transparent material into another.



A  $22^\circ$  halo surrounding the Sun formed by the refraction of sunlight in hexagonal ice-crystals high in the atmosphere. © Belinda Buckingham.



**Dr Ron Holt** is a member of BAIML and has led several high-altitude expeditions for Jagged Globe. He is a physicist, teacher and author and runs bespoke navigational courses in and around the Peak District National Park.  
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# SHEEP

WORDS BY MIKE RAINE

# in our UPLANDS



**The British took to sheep breeding well. So well in fact that we now have over 60 breeds being farmed here; more than any other country in the world.**

### Part 3: Sheep Breeds in the uplands

The Blue-faced Leicester, the Suffolk, the Charollais, the Texel and the Lleyn are generally our meat producing lowland sheep. Over the years, and individual farmers will have their own thoughts on this, these sheep have been toughened up by breeding with upland breeds. It seems to be a constant topic of discussion and development of which it's nice to be aware, but probably of too much specialist knowledge for us to overly worry about (rather like climbers talking about grades is to non-climbers!).

What we need to know is what sheep we'll see 'on the hill'. I've chosen five.

#### Welsh mountain sheep

In Snowdonia you'll most likely see the Welsh mountain sheep. There are a few varieties of Welsh mountain sheep, including an all-black version, but typically they are a white sheep. They are small and have some tan on their legs and a few black speckles on their faces. When clean they are a pretty sheep. They are probably the hardest of sheep, they survive on Yr Wyddfa, the Carneddau and the Glyderau, including Tryfan. The challenge for the farmer is 'fattening' them ready for market and this has to be done on lower land, traditionally on Anglesey or in the Conwy Valley, but today it could actually be quite far away. The smaller, tastier cuts of meat they produce tend to be exported to France, Spain and Italy. The fleeces are used to improve the durability of carpets and carpets with



**Mike Raine** is the author of *Nature of Snowdonia* (2020). He runs CPD workshops for Mountain Leaders and Mountaineering and Climbing Instructors. You can find out more at [www.mikeraine.co.uk](http://www.mikeraine.co.uk)

Welsh mountain wool in will be sought after by hotels and airlines. This is not, sadly reflected in a premium price for the fleeces. These sheep have been around since the 13th Century and have many dedicated followers represented by the Welsh Mountain Sheep Society.

#### Herdwick

In the Lake District, its scruffy looking grey sheep have been moulded into something of an icon. Originally a Scandinavian sheep, Herdwick meaning sheep pasture in Norse, they're well adapted for the wet and wild fells of Lakeland. Interestingly the lambs are black, and they fade to the distinctive blue grey as they mature. Like the Welsh mountain sheep Herdwicks are territorial and they will look after their young on their 'heft'. They produce a tough wool and sweet mountain lamb which is considered to be good eating. Whilst still a small sheep they can be seen fattening up on the rich pastures along the Lakeland valleys and surrounding gentler land.

#### Swaledale

In the Yorkshire Dales and across most of the Pennines the breed you'll most likely see is the Swaledale. A grand old Yorkshire breed dating back to the 12th Century. The Swaledale usually has low, quite wide, horns, they have a black face with a white nose and white around the eyes. The fleeces are a light grey. This is a hardy breed that can get by on some pretty coarse grasses, it will,



MAIN PHOTO Welsh Mountain Sheep. © Mike Raine. 1. Scottish Blackface. © Ger Nee. 2. Swaledale. © Alison Cowin. 3. Cheviot. © Julian Cartwright.



of course, produce tough wool, useful in the making of carpets, but also used in sweaters, cardigans and hats. The meat is very good eating.

**Scottish blackface**

Strictly speaking the Scottish Blackface is one of a few different blackface breeds and is itself spilt into sub-breeds. It is a very common sheep though. Across Scotland this will most likely be the breed you'll see. It is an old breed dating from the 12th Century and once again is a hardy sheep bred to live on the uplands. The Blackface Sheep Breeders Association claims this is our most numerous sheep comprising about 35% of the national flock. It is another breed that will 'heft' and take care of its lamb on rough, exposed upland terrain. The Scottish Blackface produce a good lean meat and wool that is durable and resilient – think Harris Tweed.

**Cheviot**

Whilst being another 'upland' sheep the Cheviot is not quite as hardy as those already mentioned. It does however produce a fine quality wool and is good to eat. This was the sheep that really boosted the Highland clearances. Whilst the Scottish Blackface could live on the hill, above settlements, the Cheviot needed some better-quality lower ground, and upon that ground were the crofters. Removal of the crofter allowed for more productive sheep rearing and better profits for the Highland estates. Sadly, the Cheviot is less common in the Highlands now and many of those former habitations are ghost settlements. The Cheviot has a white face and will still be seen in the Cheviot Hills of Northumberland and in Scottish Border country. ■



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# CLIMATE CHANGE

**How we can use our qualifications for the benefit of future generations**

## The issue of climate change and why mountain professionals should act.

WORDS AND PHOTOS BY GEORGE RAINE  
UNLESS REFERENCED.

### Introduction

'I've seen the Ghiacciaio della Fradusta get smaller since working here. The storms have got worse. This shouldn't happen within my lifetime.' said Mountain Guide Mariano Lott, guardian of the Rifugio Rosetta, who I met while working in the Dolomites.

As mountain professionals our hard skills are sought after to safely facilitate experiences in beautiful places, and our communication skills and environmental knowledge complement this. Yet, following a recent Mountain Training course, I have been left deflated by scepticism from other Mountain Leaders towards the greatest environmental challenge we face: climate change. As a passionate Masters student reading this subject, I have written this series of articles to shift this inhibiting suspicion to unite outdoor professionals to become an effective and valuable group who have the agency to mitigate climate degradation. This article will focus on the issue of climate change and why we must act.

### What is climate change?

Climate change refers to the planet's long-term shift in weather patterns and average temperatures. The scientifically proven, irrefutable reason for this change is because of the release of carbon dioxide (CO<sup>2</sup>) and other greenhouse gases into the atmosphere. Once in the atmosphere, these gases trap heat from the sun and cause the planet to warm up, known as the greenhouse effect. An increase in atmospheric CO<sup>2</sup>, among other issues, also acidifies and warms the oceans, which reduces the oceans' ability to sequester carbon and to support marine life, further impacting humans.

The Industrial Revolution in the mid-1800's began the start of rising temperatures following a relatively stable temperature period of 11,000 years after the last Ice Age. During the Industrial Revolution, the energy we used to create goods and resources was sourced from the burning of fossil fuels: coal, oil and gas. Since the mid-1800's, we have increased the amount of atmospheric CO<sup>2</sup> by around 40%, now exceeding 417ppm (parts per million). This is the highest level of carbon dioxide in the atmosphere for 800,000 years. Ice core measurements recorded pre-industrial atmospheric CO<sup>2</sup> levels in 1750 at around 278ppm. This number is the baseline used by governments to quantify future CO<sup>2</sup> contributions.

The Intergovernmental Panel on Climate Change (a collection of UN atmospheric scientists) state that human activity is the overarching cause of climate change, and have released this evidence in all five of their assessment reports (which are available for us online). Many scientists have proven that natural events such as volcanic activity, solar activity and natural releases of CO<sup>2</sup> are not the primary causes of climate change, although they do contribute at a small scale. I often hear the valid argument that 'the climate has always changed and always will'. This is true, but the exponential rate of temperature change within the last 150 years, which correlates closely to atmospheric CO<sup>2</sup> release, is an anomaly of temperatures from the past.

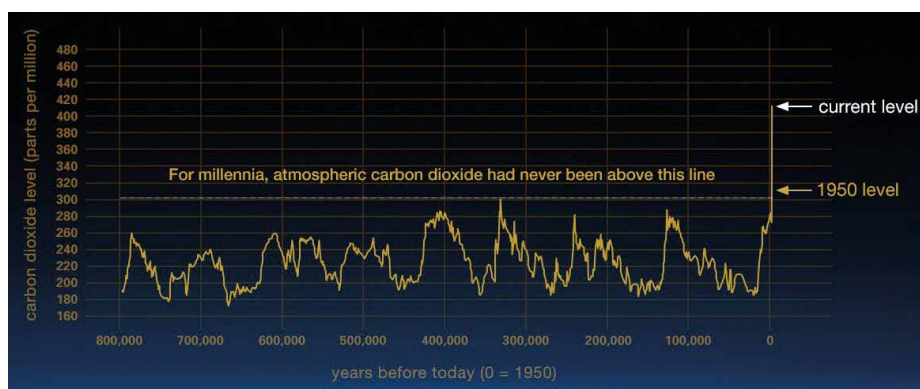
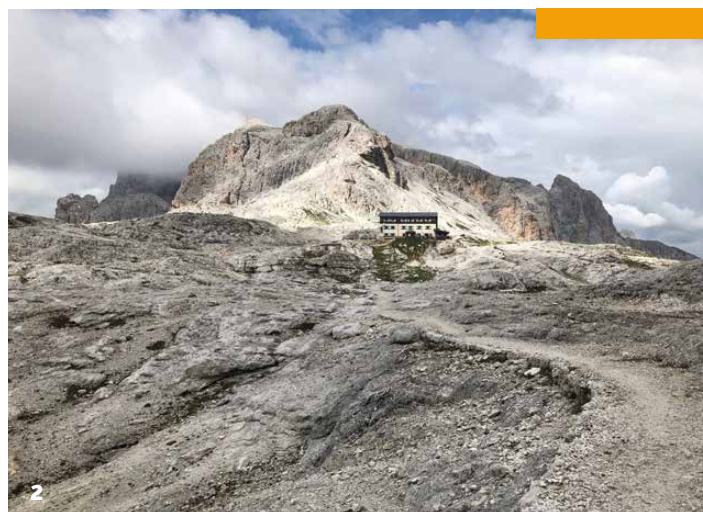
### Tipping points

We do not have much time left to curb our emissions, especially if we continue our harmful 'business as usual' actions before tipping



MAIN PHOTO The Dolomites experience shifting climatic conditions each year. 1. The remains of the previously expansive Ghiacciaio della Fradusta, Dolomites.

2. The Dolomites' Rifugio Rosetta where guardian Lott has seen changing climatic conditions since working here.



CO<sub>2</sub> rise over 800,000 years. Available from: [www.nasa.climate.gov/evidence](http://www.nasa.climate.gov/evidence). [Luthi, D., et al., 2008].

points occur. Tipping points involve degrading a natural system into an irreversible, self-damaging loop. An example of this is the albedo effect. Ice sheets reflect huge amounts of solar radiation off their bright, white surfaces away from the earth, which helps to stabilise temperatures. As temperatures increase, ice-covered areas begin to melt away to reveal darker ground underneath. The darker ground absorbs more solar radiation, reflects less, and in doing so heats the ground.

### ‘Can you keep it down please?’

A frequent rebuttal of the explanations above is ‘I don’t like climate change shoved down my throat.’ Nowadays I lack sympathy for those who say this. The perfect storm of climate change is that those who contribute to it the least directly experience the worst of its effects, and those who contribute the most, experience climate change the least. The least wealthy half of the world contribute a mere 7% of carbon emissions. As I type this, the number of crops able to grow in the Sahel region of Africa is reducing because of rising temperatures, causing further fatal food insecurity. I can’t turn to these innocent people and say ‘Sorry, can you keep it down? X from the UK doesn’t like to hear that’. People generally resent being forced or manipulated into lifestyle choices when the link between cause and effect is separated by time or distance – as we have seen during the pandemic. But now high-emitting countries are also becoming visibly impacted from their actions. Canada is in the midst of heatwaves beyond anything seen before, and Turkey is experiencing wildfires; a phenomenon that is increasing in frequency and severity. People don’t want significant change to their lives when they won’t experience the outcomes of their actions. Yet, I feel we can meet in the middle. Groups requesting this aren’t asking for themselves, they represent future generations who lack a voice. These groups want our grandchildren to experience the same Earth we adore; an equal and just Earth, safe within the planetary boundaries.

### Conclusion

We should be able to use these examples to fuel our efforts to improve the climate. We have urgency to act now, but we also have agency (this excellent quote was taken from Michael Mann’s *A New Climate War*, a book I would recommend). This agency comes from our qualifications. As I mentioned at the start of this piece, the public come to us for our expertise. They trust our professional judgement in the outdoors. If we set a high standard to become guardians of the outdoors and explain climate issues with our clients, we will provide a valuable service for the environment we adore so much that we have built a career around it. We can take responsibility and set an example for others to follow – whether they could be a powerful CEO with money to invest or a DofE group presenting to their school about a topic they care about. The sharing of knowledge is key for the safety of our future environment. To aid this, in the next issue I will explain what solutions are in place and how we, as mountain professionals can act effectively. ■

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WORDS AND PHOTOS BY RICH GENTRY

# HUMAN HISTORY of SNOWDONIA

ABOVE Bryn Cadar Faner.

**In the previous article we left North Wales still in the Stone Age. Here I'll cover the period from the Bronze Age until the Romans arrived.**

In the previous article we left North Wales still in the Stone Age. Here I'll cover the period from the Bronze Age until the Romans arrived.

Around 4,500BC in Mesopotamia (now Southern Iraq) people had discovered that smelted tin could be added to molten copper to make Bronze, which opened up a whole new world of tools, weapons and jewellery. This technology slowly travelled with the migration of people and through the spread of ideas from one community to the next. It arrived in North Wales around 2,500BC and the Bronze Age began and lasted for around 2,000 years. Tin wasn't found locally but copper was, and so on Parys Mountain, Anglesey and the Great Orme, Conwy, humans had another quarry to exploit. At the latter site over a thousand years of mining left more than 3 miles of tunnels to a depth of 70 metres, as well as workings on the surface. The copper mine on the Orme is one of the largest Bronze age mines in Europe and it's thought that for a period (1,600 – 1,400BC) it was the main source of copper for most of Britain. This was a complex organisation that needed people of skill, organisation, tools, trade and transport links. The Bronze age was far from primitive.

In the mountains, Bronze Age people started to leave their mark with ritual sites dotting the landscape. The main concentrations are on the northern Carneddau and the Rhinogs, with other important sites including the hills above Barmouth. These sites tend to be on the areas close to the coast, as people lived on the mountain flanks close to the sea, with access to trade and fishing. Anglesey and the Llŷn Peninsula were also well populated.

The chambered tombs of the Neolithic were replaced by simpler burial cairns that were largely single use and they started to dot the landscape, often on high points such as mountain tops or ring contours. This change of tomb signals a change in culture from a

community-orientated society with shared tombs, to a society that lived under the rule of a chief or a king who was buried alone in sacred spots. These cairns usually take the form of a circular pile of rocks, although other examples exist. Ring cairns are sometimes found where a circle was made using a ring made from rocks. In the Rhinogs you find Bryn Cadar Faner, a spectacular ring cairn. When I first saw it, I thought it was pristine and therefore recent, but it turns out it was probably even more spectacular in the past. Being damaged by Victorian treasure hunters and used as target practice by the British Army before WW2 will not have helped it survive the passage of time. In the middle of the cairn was the burial site. At the start of the Bronze Age people were buried in cists (stone walled coffins), by the middle of the Bronze Age people were cremated with their ashes in urns.

The Bronze Age is most famous for the stone circle, and one of the most important in Wales is found a short distance above the axe factory at Penmaenmawr. The Druids' Circle consisted of 13 stones, up to 6ft tall, set into a circular bank with an entrance on the west. Two of the stones are now missing and one has fallen. An excavation in 1958 made some fascinating finds. A stone cist near the centre contained a well-made, decorated pot that would have been used for food. Inside this pot wasn't food, it contained the cremated remains of a child who was around 10 years old. Two more pots were found inside the circle. One contained the remains of another child of similar age, along with a knife. The other was in a pit lined with whetstones which showed traces of knife sharpening, but the remains were too decayed to provide information. What was happening here? The remains of children being buried with knives do lead the mind towards dark images of sacrifice in return for protection from a difficult world. Local legend says that one of the stones was a



1. Tre'r Ceiri hillfort.

sacrificial alter. Although this was probably made up by people from a later time, they may well have been on the money.

People also placed huge stones, called standing stones, upright and alone in the landscape. Their exact function is unknown to us, although surely there is a reason for their location. The majority are slabs, not pillars, allowing them to face in a certain direction. Some are clearly related to each other such as a set above Harlech that lead us to the summit of Moel Goedog, where there are two ring cairns and a hillfort (although the hillfort may well have been built later). Other examples are found at Maen Twrog (not far from Tremadog) and all over Anglesey.

At this time people lived in roundhouses. These were large, often with a diameter of around 10 metres. The walls were made from stone or wood and were filled in using Wattle and Daub. The roof would have been thatched, using animal hides, turf and straw. Inside was a central fire making life quite cosy, I imagine. People lived in clusters of these houses with different family groups living and working together.

Bronze tools meant that agriculture became more efficient. Land could be ploughed faster, allowing farming of larger areas, and so the deforestation continued as more areas of forest were cleared for farmland; although this was restricted to the mountains slopes where the soil was soft enough for the bronze plough. By the end of the Bronze age they had domesticated horses, with the ponies of the Carneddau believed to date back to this time. They grew wheat and barley along with malt which they used for alcohol. Trade, wealth, technology and the population continued to grow.

The Bronze age way of life became well established and lasted for around 1,500 years. However, around 1,000BC life became unsettled. This may have been due to population growth or changes in climate leading to competition over resources between tribes. Whatever the reason hillforts started to arrive in the landscape, with the first ones being built around 1,000BC and life in North Wales began an era of change.

The forts were usually built on natural tops and used the contours of the land to provide the shape of the fort. Deep ditches were dug around the top and a wall of earth was built behind the ditch to form a rampart. Wooden stakes were then driven into the rampart to form a strong defensive wall. Gates were built to control entry in and out of the fort. Inside the forts people still lived in the roundhouse, or they lived close outside with the fort able to provide protection when needed. These forts ranged in size from a small defended settlement to large and complex sites, such as Tre'r Ceiri which sits on the hilltops at the entry to the Llŷn Peninsula.

The hillforts were rarely built in the higher mountains, but Snowdonia was surrounded by defences along its coastal flanks with forts dotted around the Carneddau and in the entrances to both Ogwen valley and the Llanberis Pass. People often lived outside the forts and spent much of their time farming.

Change was also happening in the population with a new group of people arriving in Wales from around 500BC. The Celts arrived from Europe in waves, some arriving from France, others from Northern Spain. They arrived with a language and a strong culture which over time came to dominate the area. The language is the basis for modern Welsh, and lots of Welsh culture can trace its roots back to these people. The Celts were farmers and warriors and settled across the west coast leaving their mark on Cornwall, Wales, Ireland and the west coast of Scotland. As warriors they are legendary and would have used shields, spears and swords and fought on both foot and chariot, although realistically most of their time would have been spent in the more relaxed pursuit of farming.

The Celts brought iron working and therefore the Iron Age to the area. This included iron ploughs that allowed them to work the rich soil of the lowlands and valleys that had been too heavy to work until then. Outside the hillforts the surrounding area would have developed fields for farming, where both livestock and crops were farmed. Life was generally stable during this period, although not for everyone; there is evidence of slavery from this time, such as some leg irons that were found in a lake on Anglesey.

This stability could not last forever and once again change was coming from the South East. This wasn't to be a slow change due to migration or ideas travelling from one community to the next, but one due to the expansion of an empire. The Roman empire was growing and came to include the mountains of North Wales. ■



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WORDS BY KEVIN ALBIN  
PHOTOS BY BRUNO BERTHEMY

# EATING *the* DEAD



1



2

**Can you picture the vulture scene in the film, *Jungle Book*? Four vultures sat on a dead tree in a macabre background trying to decide what to do next. That's how vultures are seen by many, and they are very misunderstood.**

Vultures have an important ecological role in maintaining the health of the ecosystem where they live. Wild and domestic animals die all the time, and their carcasses create a health risk; as well as an expense in removal and safe disposal. Vultures do that in short time; they can clear a deer carcass in about 20 minutes, and they do it for free. Vultures are generally not affected by disease; they are the dead-end for pathogens – Nature's creation at its best.

In fact, these natural cleaners are only threatened when they come into contact with human practices. The main threat is illegal poisoning; not so much directed at the birds (although that does happen), but where poisoned traps are left out for other animals, such as wolves, or anything that has been taking livestock. Griffon Vultures feed in groups of between 50-100 birds, and all can be wiped out with a single poisoned carcass.

Electric cables and wind farms also pose a threat; these are problematic for soaring birds. And finally, food availability: and that often relates to human practices such as when Mad Cow's Disease spread across parts of Europe and carcasses were ordered to be removed.

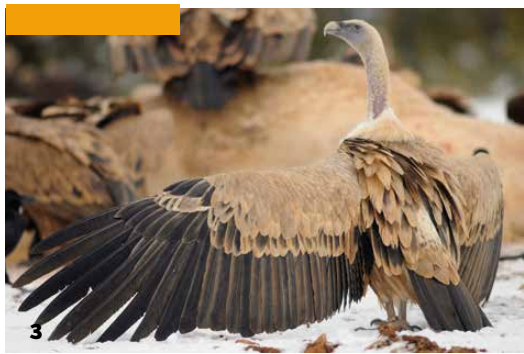
In the 1980's the Bearded Vulture or Lammergeier became extinct in the European Alps, mainly through persecution. A group of scientists tried to re-introduce it by taking birds from the Pyrenees. This noble gesture was unsuccessful, and so they embarked on a captive breeding programme, raising chicks taken from zoos. Now there are around fifty breeding pairs, but it has taken forty years and a huge amount of money and effort. It would have been far easier not to eradicate them in the first place.

Between 1992 and 2007, the vulture population in India and surrounding

MAIN PHOTO A bearded vulture bringing home dinner.

1. That haunting look – a cinereous vulture.

2. A young bearded vulture enjoying flight.



countries took a dive, and animal carcasses were left out to fester. Feral dogs and rodents took the opportunity of moving in and feeding, and this resulted in an outbreak of rabies. What caused the vulture's rapid decline? They were nearly wiped out by the drug Diclofenac, which was being used in cattle, and caused renal failure in the vultures.

The Vulture Conservation Foundation, (VCF), is a small group based around Europe actively working against the threat, and for the re-introduction of four species of vulture: the Bearded, the Griffon, the Cinereous and the Egyptian. The latter migrates to Africa and is the most endangered, as its numbers are in strong decline. The VCF is currently involved in re-introduction programmes of the Griffon and Cinereous Vultures in Bulgaria, Sardinia, Italy and Cyprus. They also co-ordinate breeding programs, collate data of vulture monitoring from a variety of sources, and all of this, of course, needs funding.

The use of poison, or pesticides as a poison, is illegal in most countries, and Jovan Andevski, the Vulture Programme Manager at the VCF, speaks

of the difficulty in trying to co-ordinate across different countries and their governments, who do not warm to spending money unless there is an impact on human health. As an example of the far-reaching impact: poachers in Africa regularly poison vultures as they give away the poachers' position after they've killed an elephant. Without the vultures, they have more time. Poisoning is indiscriminate and can get into the human food chain and into water supplies. So, the VCF have embarked on a public awareness campaign and encourage governments to legislate. Jovan also states that the problem is multi-dimensional and understanding the motives of the people is equally important. It can't all be about legislation.

As is so often the case, human activity can have complex consequences, and especially in the current climate. We need to be fully aware of those consequences and to be able to communicate this to others. ■

Website of the Vulture Conservation Foundation  
<https://www.4vultures.org>

3. A Griffon spreads its wings to warm itself. 4. An Egyptian Vulture surveys the ground. 5. Griffons can feed in a frenzy. 6. Egyptian Vulture – a cute scavenger. 7. Bearded Vulture – essential to the environment.



**Kevin Albin** is a member of BAIML. In 2011, he won the Bronze in the *Wanderlust Magazine* World Guide Awards. He is the author of the Eco-fiction novel, *Stonechild*.

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# THE Garmin InReach Mini Satellite Communicator System

WORDS BY MARK SNEDDON



ABOVE The InReach Mini. © Mark Sneddon.

Historically, travelling in remote areas required complete self-reliance with no easy options if things went wrong, an ethic that should still prevail in the 21st century<sup>1</sup>. However, communications have changed dramatically, and while mobile phones work in a surprising number of places, they do not work everywhere. For such locations, satellite phones can provide near worldwide coverage but are expensive to buy and use<sup>2</sup>. Satellite communications should in no way be considered a substitute for being properly equipped and prepared, but they can increase the margin of safety<sup>1</sup>. In some locations, not having some form of satellite communication would be considered bad practice, especially if you are a company deploying multiple leaders in remote locations; we must all move with the technology<sup>3</sup>.

For those of us who live, work, and lead in remote areas, the decision not to carry some form of satellite communication, whether that be a satellite telephone (e.g. Inmasat or Iridium) or satellite communicator system (e.g. the Garmin InReach family, SpotX) is becoming increasingly difficult to justify. Therefore, in this article I want to examine the Garmin InReach Mini satellite communication system and share my experiences using it.

The InReach Mini has worldwide text communications coverage through the use of the Iridium satellite network, an SOS function, and is compact in size (it fits in my shirt pocket.) – all at an affordable price.

However, this device is much more than an emergency communications system, it is also a full-fledged GPS device in its own right.

To get the most from the device it should be used in conjunction with the Earthmate App (downloaded onto your smartphone) and your account with the [explore.garmin.com](http://explore.garmin.com) website (accessed from your home computer). Both of these are included in the package. What is not included in the package is the monthly subscription plan. Price

varies by how many text messages and/or 'track points'/location data you want to send.

## On the Hill

In my experience, the InReach Mini needs to be used with the Earthmate App. The Earthmate App connects to the InReach Mini via Bluetooth. I have found that this link is best established at home before you set off rather than at the trailhead. With the Earthmate App, I found it much easier to access the InReach's functions, such as sending/receiving text messages/email or viewing travel information (such as speed, bearing, elevation, and coordinates). Text messages can be pre-programmed and uploaded to the device from the Explore website ready for rapid use on the hill. Free typed messages are best done from Earthmate. The InReach Mini device has a monochrome screen and no ability to display a map; however, you can view the map with the Earthmate App. You are also able to send real-time tracking information to allow friends/family/colleagues at home/office to follow the progress of your trip on Garmin's Map Share Page; great for those with a strong social media presence.

The SOS function can be triggered from a button on the device itself or from the Earthmate App. Either way, your GPS coordinates are then sent to the emergency services via Garmin's International Emergency Response Coordination Center (IERCC). You are then able to exchange text messages with rescuers to inform them of the nature of your emergency. The SOS signal is regularly re-sent until the SOS is cancelled or the batteries die, thus allowing rescuers to track your position should you be forced to relocate for any reason<sup>4</sup>.

Because of the need to use the Earthmate App on a smartphone, this does require you to have your smartphone switched on, and as smartphones are not noted for their long battery life, even in flight mode, some form of portable power device is advised; however,

- Up to 90 hours at 10-minute tracking (default)
- Up to 35 hours at 10-minute tracking with 1-second logging
- Up to 24 days at 30-minute tracking power save mode
- Up to 1 year when powered off

TABLE 1. Summary of Battery Life.<sup>5</sup>

- 1 Orientate the map to the ground
- 2 Set the compass to magnetic North. Start the datum line from the edge of the compass
- 3 Complete the datum line with a ruler
- 4 Draw in the rest of the vertical grid lines, at equal distance from the datum line
- 5 Draw in the horizontal lines, 90° to the datum line
- 6 The map can now be used to take bearings

TABLE 2. Summary of How to Draw Grid Lines.<sup>2,9</sup>

the InReach Mini's battery life is excellent (*Table 1*).

A nice touch is the ability to download a weather forecast, very useful on a multi-day trip. When on land, the types of forecast available are Basic and Premium and when at sea, Marine. The Basic forecast provides a 48-hour forecast. For the first 24 hours, this is broken down into two-hour blocks and for the second 24 hours, into six-hour blocks<sup>6</sup>. Included in the forecast are the daily high and low temperatures, percentage chance of rain/snow, air pressure, wind speed, precipitation, and humidity. This information can be for your current location, a waypoint, or a set of GPS coordinates. Premium forecasts include a seven-day forecast reported in 1-2 hour blocks for the first day, 3-6 hour blocks for the next day, and 12-hour blocks for the remaining five days. I haven't used the Marine forecast feature as the user needs to be at sea, but according to Garmin's website<sup>6</sup>, the Marine forecast includes everything that the land forecasts do, plus wave heights, ocean currents, and visibility details. These forecasts can be viewed on Earthmate or the InReach Mini.

### Off the Hill

Once back at camp/home, you are able to upload your tracking data to your explore.garmin.com account as a souvenir for you or your clients or to create a record of the local trails. The Explore website is where you manage your satellite subscription, review previous track logs, design new routes, and share your adventure on social media via Garmin's Map Share.

Map Share is a core feature of the InReach devices allowing friends, relatives, and clients to follow your trip progress. If desired, followers can see your progress and send you messages in real time, via *share.garmin.com*. The Map Share page can be public or restricted with a password or you can set up links to your Facebook, Twitter, or email accounts,<sup>7</sup> perfect for those who maintain, or are developing, a strong social media following, blog, or similar.

You can also design and plan your next trip on the map page, in much the same way as you could on the old Garmin Basecamp. Explore, however, feels less 'clunky' and less cumbersome; unfortunately, with Explore there is not an inbuilt option to print off hard copies of routes/maps. According to the Garmin Explore website, this requires additional software/apps such as a screen capture and cropping tool<sup>8</sup>, which adds another layer of complexity in an already complex system. The screenshot also lacks grid squares or even a North arrow. These will need to be drawn in by hand onto the hard copy before it can be used as an aid to navigation (*Table 2*). There is, however, a scale bar (*Figure 1*).

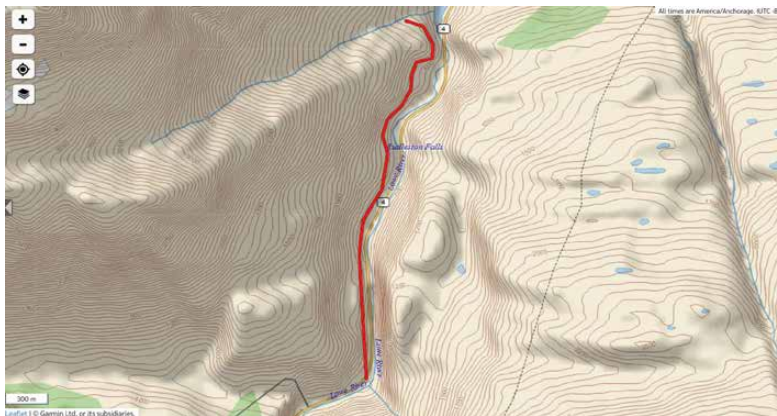


FIGURE 1. Screenshot map of the Goat Trail, near Valdez, Alaska. Originally established to provide an 'All-American' route to the Klondike Goldfields in 1898<sup>10</sup>. Note the absence of grid lines and North arrow. These will need to be drawn in by hand before the hardcopy printout can be used as an aid to navigation. Also, note the scale bar in the bottom left corner of the screenshot. On the hardcopy printout, this worked out to be a scale of 1cm equals 300 meters.

### Conclusion

Failure to carry satellite communications or a GPS unit is becoming increasingly difficult to justify in the 21st Century<sup>3</sup>, and everyone should consider carrying these when in remote areas<sup>1</sup>, not just for safety but also as a business opportunity for live feeds to social media. The advantage of the InReach Mini is it is a GPS unit and a satellite communicator all rolled into one and much more affordable than buying a satellite phone and a GPS device. The downside is the complex interaction between the InReach Mini device, Earthmate App, and the Explore website, which can take a little while to understand. However, it is not the only satellite communicator/GPS combo on the market, and with a little research, everyone should be able to find a system to suit their needs. ■

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FIGURE 1. Default display once location has been selected (red pin); plus button zooms in to see the geology better.



# GETTING TO GRIPS with GEOLOGY

WORDS BY PETER LOVATT

## using *Geology of Britain Viewer*

**Geology can be a daunting topic for leaders in the mountains. Even for an experienced geologist, to walk up to an outcrop in an unfamiliar area, identify the rock type, and say something interesting about it will often be a challenge! One thing that helps me is to do a little bit of preparation before I head out.**

British Geological Survey (BGS) have been making maps of UK geology since 1835; they still produce paper maps, and now they also allow access to their mapping via the *Geology of Britain Viewer*. BGS describe this Viewer as “a simple tool aimed at the general public that helps you explore the geology around where you live”. Below I’ve given an introduction to this free tool that can help you get to grips with the basic geology of your area.

BGS also offer a mobile app called *iGeology* which allows you to view geology mapping in the field (though unfortunately only available for iPhone). However, there is an advantage to doing some research before you set off, and the larger screen of a laptop or tablet means that you will get more out of using *Geology of Britain Viewer*.

**It’s worth saying that some areas of the UK have more complex geology than others. If you are lucky enough to live in Snowdonia, the Lake District, or the Highlands of Scotland, you may find it easier to start somewhere with less complex geology, by looking at the sedimentary rocks in South Wales, the Pennines, or southern Scotland.**

### How to use *BGS Geology of Britain Viewer*

As an example, I’ve taken an area around the High Force waterfall in Teesdale, County Durham; this is an area popular with both hikers and geologists.

Go to <https://www.bgs.ac.uk/map-viewers> and click through to launch *Geology of Britain viewer*.

To start, click on **Go to Location** and enter a location name or grid reference in the box. I used [www.gridreferencefinder.com](http://www.gridreferencefinder.com) to get the 12 figure grid coordinates for ‘High Force’ (387990, 528372).

The view is ‘zoomed out’ initially, showing you a fairly large area (*Figure 1*). Click the **plus** button 5 times to zoom in, until there is no geology visible, and check that the base map features look like what you were expecting – in this case the River Tees and the B6277 road to the north. Now click the minus button once to make the coloured geology re-appear.

Buttons on the left of the screen allow you to switch between three display options: **Superficial Only**, **Bedrock Only**, or **Bedrock & Superficial**. When looking at a new area, I always start with **Superficial Only** as this is the simplest one to understand.

Now move the **Geology Transparency** slider until you can see some features and some of the colours that show the geology. The superficial deposits are quite subtle colours so you may need the slider near to 0%.

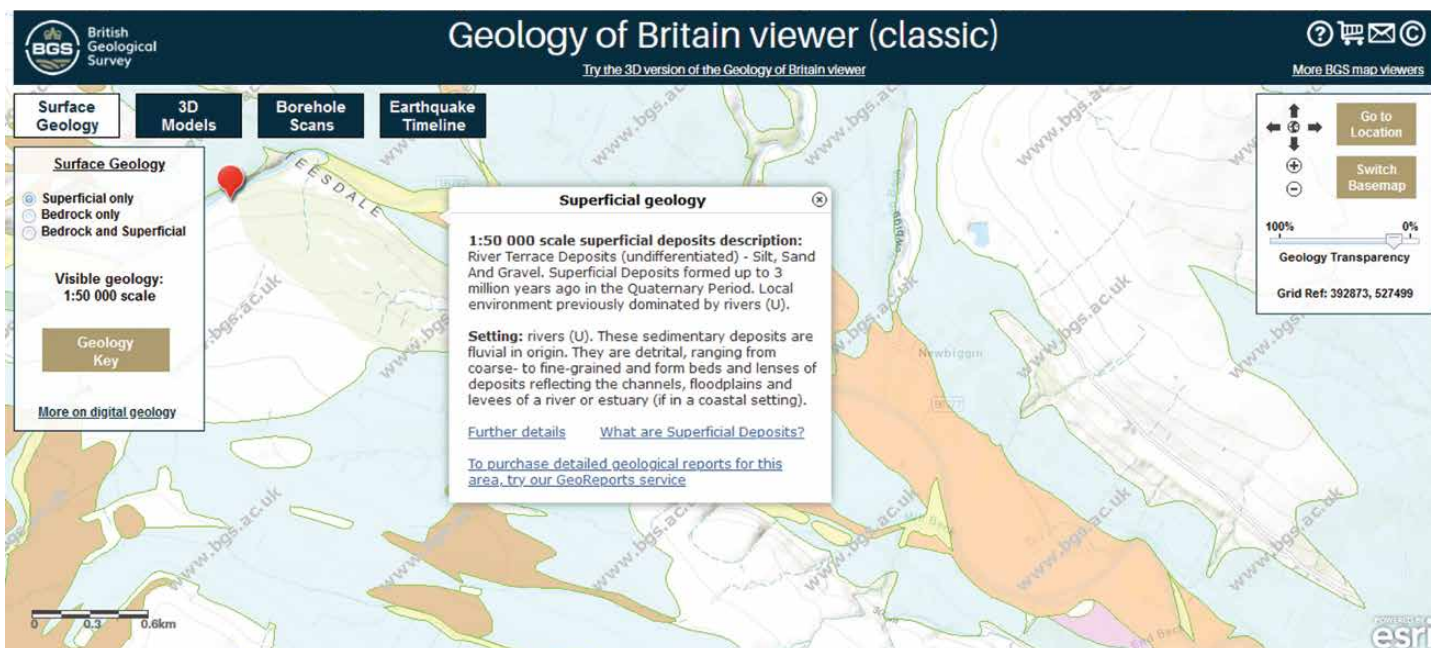


FIGURE 2. Superficial Only display: reddish brown shading to right of box indicates River Terrace Deposits.

The present channel of the River Tees is visible passing through these older flood plain deposits.

### Superficial Deposits

Superficial Deposits are defined as natural materials (such as clay and sand) that are not part of the bedrock but lie on top of it. Superficial does not necessarily mean thin – in Northumberland we find glacial till deposits over 40 metres thick.

Place your cursor at the tip of the red location pin and click the left mouse button. A box will appear with 'Superficial Geology' at the top and a description of the deposits at that point. In this case it says 'None recorded', meaning that there are no superficial deposits (Figure 2).

Now try clicking in the pale green area just to the north – a box should appear with the following text:

*1:50,000 scale superficial deposits description: Till, Devensian – Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions (U). Setting: ice age conditions (U). These sedimentary deposits are glacial in origin. They are detrital, created by the action of ice and meltwater, they can form a wide range of deposits and geomorphologies associated with glacial and inter-glacial periods during the Quaternary.*

If all this jargon is a bit confusing, a Dictionary of Earth Science can be very useful. MTA members have access to some great webinars in the online MTA resource library, so you may already have an idea of what is being described here. The old term for till was 'boulder clay', which gives a good description of material left behind by a glacier, comprising a mix of clay, sand, gravel and boulders. Large areas of Northern Britain are covered by these superficial deposits.

To the east there are several areas shaded reddish brown; clicking on one of these will display the term 'River Terrace Deposits – Silt, Sand and Gravel' (Figure 2). Looking at the contours on the underlying base map, it's clear that these old river terraces form level areas, close to the present River Tees channel.

To the south west, there are large areas of peat (appropriately shaded brown), a deposit that will be familiar to visitors who like to walk in the high Pennine fells.

### Bedrock deposits

Now click the button to switch to **Bedrock Only** view, and move the **Geology Transparency** slider to 50%, to show some of the underlying features.

You will now see the bedrock geology displayed *as though the Superficial Deposits do not exist*. This is sometimes useful but can also be confusing in terms of what we can expect to see on the ground.

Now click the button to switch to **Bedrock & Superficial** and we can again click to take a look at two examples of the bedrock geology.

**Example 1** Where our red pin lies there is a large area shaded purple. Clicking on this will bring up the same box as before, but now with two buttons at the top (Figure 3). The 'Superficial Geology' again says 'None recorded'. The bedrock geology at this point is named as 'Great Whin Sill – Quartz-microgabbro, Igneous Bedrock formed approximately 272 to 331 million years ago in the Permian and Carboniferous Periods'.

Although it seems like a lot of terms, you might remember that there are three main groups of rocks – igneous, metamorphic and sedimentary, so for now we could just note that this is an igneous rock.

**Example 2** Just to the right of our red pin there is a small lozenge-shaped area shaded pale blue. The bedrock geology is recorded as *Alston Formation – Limestone. Sedimentary Bedrock formed approximately 328 to 337 million years ago in the Carboniferous Period. Local environment previously dominated by shallow carbonate seas*. This time the description is a bit more self-explanatory.

Looking a little way to the north of our red pin, we see that the area that was previously shaded pale blue is now shaded grey. This shows that the Bedrock geology (the Whin Sill) has glacial till lying on top of it in this area.

It's worth taking some time to get used to how this works – for example, if you switch to **Bedrock only**, you'll see the purple area (Great Whin Sill) appears much larger.

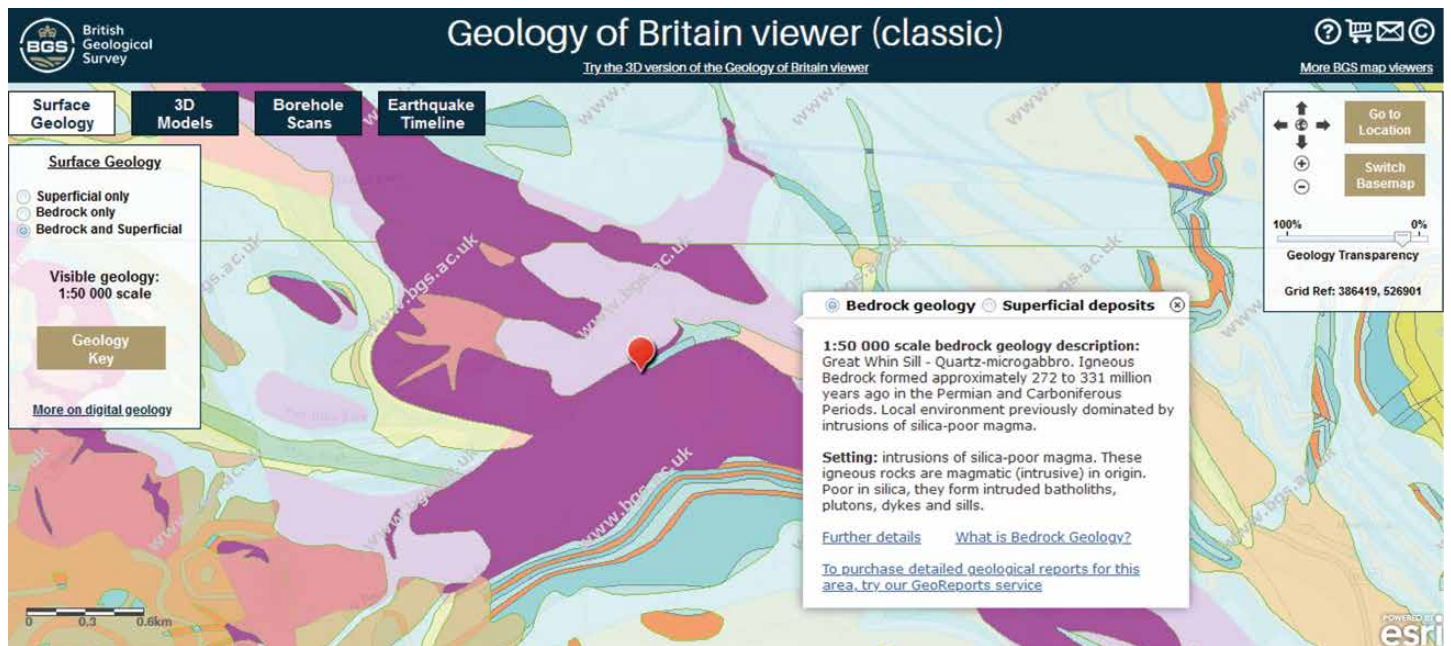


FIGURE 3. Bedrock & Superficial display: Great Whin Sill description [grey shading indicates where glacial till lies on top of the rocks].

Whilst we can see where the superficial deposits are absent, this doesn't necessarily mean that you will find any exposed rock to look at. This is because there will often be vegetation or other things that prevent us from seeing the rock. Generally, a river gorge like we have on the Tees will give us a good chance of seeing some rock, because the water removes the superficial deposits and vegetation.

### Summary

So, if we were planning a walk in this area, here are some things that our brief research has shown us and some topics that we might talk about with a group:

- There are superficial deposits in the area, left by processes that occurred in the last 3 million years. These include glacial till, so the area must have been covered by ice (see my previous article *Time Travelling in Teesdale*, Summer 2021 edition).
- There are also river terrace deposits shown to the east (downstream), so if we walked along that section we might expect to see level areas, above the present river level.
- We can expect to find two types of rock in the area, one igneous, the other a sedimentary rock (limestone). The Viewer doesn't tell us what these rocks will look like, or how to tell them apart, so we'll need to find other ways to do that. It does tell us the age

of the rocks – around 330 million years old. If you find a geological timescale on the internet, you'll see that these rocks are fairly 'young' relative to the age of the earth (4500 million years).

Hopefully this brief introduction to using Geology of Britain Viewer will help you to start getting to grips with the geology where you are.

The Geology of Britain viewer is available to use under the Open Government Licence, which can be found here:

<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>. Contains British Geological Survey Data © UKRI 2021. Base mapping is provided by ESRI. <https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/> released <http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/> ■



**Peter Lovatt** is a member of MTA based in Teesdale and works freelance as a Mountain Leader and as a Chartered Geologist to the construction industry. He has recently started providing geology workshops for mountain professionals.



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WORDS BY PETE EDWARDS  
PHOTOS BY EMILY SLATER

# Replication TRAINING ■ A METHOD FOR FOCUSING COACHING

ABOVE Using video analysis can be an excellent method of reducing noise around specific movements.

## Introduction

As the days become shorter and the clocks soon go back an hour, summer adventuring comes to a close and we may find our clients' attention drifting more to performance and training. For many climbers, the winter season is more a time to train than to climb, with a shift in focus and different motivations meaning if we are to retain these clients over the long winter months, we will need to change what we are teaching too.

This can be a daunting prospect for some professionals, switching from instruction and guiding to coaching and even for those of us who have completed either the Mountain Training Coaching schemes or the BMC FUNDamentals, finding the right aspects of climbing to work on with any one individual can still be difficult. It is worth stressing that coaching and training needn't be exclusive to strength gain, nor related solely to competition climbing and many climbers who are now seeking coaching are looking to use the winter months to hone both their technique and the mental aspects of their performance. Indeed, many of these climbers are the very same clients for guiding and instruction during the nice summer weather. However, simply rolling out a series of drills for them won't step up their technique; we need to offer something with a touch more substance.

I would like to share a method of simplifying coaching that I have been using for several years that I call Replication Training. It is a term I coined (I think, please do tell me if there are other references elsewhere) that gives a method for refining specific techniques and can be combined with what is largely a normal climbing session on a wet and cold day. You might even get the chance to get your shoes on the wall yourself.

Here, I'll look at how we employ Replication Training in all aspects of the TTPP model, and how we put it into practice. But first, we need to look at the concept of Noise.

## The concept of noise

In coaching, we often talk about noise in terms of what we can hear; indeed, Paul Smith and John Kettle discussed this in a previous issue of this magazine. However, noise can relate in a broader and more metaphorical sense. If we think of noise in its typical sense as unwanted sound in any given context – much like weeds are simply unwanted plants in our garden – noise in its broader sense is anything that is unwanted in the context we are looking at; anything that draws focus away from what we want to talk about. And climbing movement is much like an orchestra, with a multitude of instruments all playing their part in the performance. But if we want to refine just one instrument of the performance (one specific technique for example) then we need to temporarily silence everything else that's going on.

Crucially though, in order to perform again later, we will need to bring all the other instruments back into the fray at some point and this is the concept of noise. While we are focusing on one single aspect, everything else becomes noise but once we've finished, we bring it all back together where hopefully our focus will be improved, thus improving the performance as a whole.

We can then apply this principle to our chosen area of focus for any episode of coaching; a whole session, a small section of a session or even over a longer period of time such as a warm up drill over several weeks or months.

## Application using TTPP

The TTPP model is a popular and well established model used to differentiate independent aspects of performance and it is covered by sections 1.6-1.9 in the Development Coach syllabus, very briefly, it is an abbreviation that stands for: Technical; Tactical; Psychological; Physical. Much like the Concept of Noise, the TTPP Model allows us to isolate specific aspects of performance and employing Replication Training works differently for each of these facets.

## GUIDANCE

1. A demonstration of replication training for climbing movement, using visualisation on the floor.

### Physical

Replication Training to improve physical aspects of performance is nothing new and has been used – and is very popular today – to work on specific weaknesses an athlete may have. Fingerboards, campus rungs, even warm up routines are used commonly to strengthen and condition specific muscle groups to increase the chances of success. Effectively this is overtraining the necessary muscles for the project climb so they no longer become the weakest link in the performance chain.

To bring it in to this specific vernacular – i.e. how is it Replication Training – the coach will identify which muscle groups need replicating for any given situation and treat everything else as ‘noise’. For example, the climber may seek stronger fingers and so this is replicated using a training routine that removes any other major muscle groups and is conducted on a fingerboard.

The replica for physical training should be harder than the original.

### Tactical

Again, Replication Training for tactical improvement is not new and is used by coaches nationwide with competitive climbers by creating mock competition scenarios in training sessions.

However, tactics are still an important aspect of rock climbing performance for any climber, including attributes such as rest times, route selection and intrinsic feedback and are often underestimated. Getting those tactics right can be the deciding factor between success and failure for many climbers.

Utilising Replication Training for tactical improvement can be tricky but again, we come back to the concept of noise and this hinges on decision making. Coaching primarily looks to develop autonomous climbers who are able to make their own decisions in their own sessions across all the TTPP facets, but to improve a climber’s tactical skills, the coach may take on many decisions, leaving the climber to focus only on specific tasks at one time. If your climber needs to work on their pacing through their session, for example, it may be that you as the coach select the climbs to be attempted/completed and leave the climber to choose when to try each climb. While this isn’t Replication Training as such, it does build on many of the same principles.

The replica for tactical improvement should be at a similar level to the original, with reduced noise.

### Technical

Improving a climbers’ technical skills, for me as a coach, is where Replication Training really comes in to its own. Climbing is immensely complex, being conducted on an infinite combination of holds and movements, in three dimensions. However, there is a repertoire of techniques that we as coaches will know that we can empower our clients with to increase their chances of success.

Say for example our climber is not great at rockovers and uses their arms to pull them sideways across the wall instead of transferring their weight using their legs. Trying to coach this in context quickly becomes very difficult, with significant amounts of noise created by the other aspects of movement happening at the same time.

This is where we replicate and we can do this using a floor exercise. It will require in depth knowledge from the coach on the nature of the movement but once an exercise is found, it can pay dividends. Take our rockover example: a good floor exercise could be to stand the climber on the floor, feet shoulder width apart and move their weight over each foot in turn to be able to lift the other foot off the floor. This simplifies the task at hand, allows the climber to



concentrate solely on the specific technique in question and removes any noise from the exercise.

The key with replicas for technical improvement is to remove as much noise as possible. Once the climber has achieved a suitable in the exercise, they can go back in to context (try the climb again) to see if there are improvements.

The replica for technical improvement should be substantially easier than the original.

### Psychological

This becomes a delicate subject. As coaches, we regularly work on various psychological attributes with our clients but most of us have very little in the way of formal education in psychology. It is very important not to get too carried away and to understand our limitations as coaches and not attempt to become amateur practitioners.

Some examples of psychological coaching that are regularly addressed include fear of falling, fear of failure and refining clipping under stress. Again, as above, the key is to isolate the issue at hand and create a situation where the climber can work on these issues in small increments. Much like with technical improvements, we are looking to reduce noise as much as possible – by reducing the difficulty of climbing, for example – in order to focus solely on our focus.

The replica for psychological improvement should be substantially easier than the original.

### Summary

Replication Training is merely a term coined to become more manageable for the coach. The clue is in the name: replicating specific targeted aspects of performance by employing the concept of noise. Replication Training is simply a method of coaching to isolate and target individual and specific weaknesses in climbing, before returning our climber back in to the context of their intended route and assessing the results, before repeating if necessary.

Special thanks to Dr Rebecca Ranstead of Smart Climbing for her input on this article. For more information or to discuss this concept further, please get in touch via my website. ■



**Pete Edwards** is a professional climbing coach, who runs Prowess Climbing Coaching <https://prowesscoaching.co.uk/> as well as his Chez de la Bloc blog page <https://chezdelabloc.wordpress.com>.

# For what lies ahead



Casper McKeever & Hannah Evans  
Smith's Route, Ben Nevis  
Photo: Hamish Frost

# Dealing with TRAUMA

WORDS AND PHOTOS BY SIMON DUCZAK

**We never expect to come across a traumatic incident while we work and play in the outdoors; we might read about volunteers like Mountain Rescue and RNLI attending them but the more we take part in outdoor activities the higher the chance of witnessing an event. What happens when we do come across one and if we do experience one how do we deal with the aftermath?**

Walking on Chilean on a tourist trail, we (my then girlfriend and I) came across a group, their guide collapsed and was in cardiac arrest. I knew there was a chance we could help through working in the Ambulance service and having done a number of first aid courses. The guide's group was made up of tourists; some of who were nurses plus a doctor, out on their first walking day with him. We were able to perform CPR, each of us carrying out different tasks according to our roles.

During the organised chaos I observed the rest of the group stood fixed to the spot not sure what to do, some were holding each other, crying. In between my rounds of chest compressions I tried to rally the group: we needed to collect and organise a kit dump of their rucksacks and to keep the path clear for the stretcher.

We continued with CPR – each of us doing at least five rounds of chest compressions each. The stretcher arrived, we loaded the person, and six people came over to carry him down.'

In the aftermath of this incident I was left in an unusual situation and somewhat of a predicament. We were left with the following state of knowledge:

- We were left exhausted with return walk still to do;
- Disbelief in what we were a part of;
- Unable to get closure of the events, it wasn't like we could talk through a debrief where we stood;
- Were we ok? If we say we're ok now what about in a few hours or days – will we suffer any post traumatic symptoms?;
- Do we carry on with our own walk and reach the top? Do we take on the group and walk them up or down as they've just lost their guide – can they safely get down?

Post-event I was able to catch up with the group, they held a vigil in their guide's honour, and everyone was given the chance to speak openly about their feelings. Some days later a few of them were still having flashbacks to the incident, they found an extra glass of beer or wine helped them sleep or others were more irritable.

Following an incident like this we can experience a number of normal reactions such as these mentioned, that can stay with us for anywhere up to a month.

## How the body reacts

Following a situation like this our body can react to the stress, some may experience different levels and different symptoms, others may

not be affected. Those who are affected do so because (in a simple explanation) we are rewriting how our brain performs. Initially, our body releases hormones to help us deal with such an event at that moment (fight, flight or freeze). After the event we can continue to have the same hormones released and over time these build up in our bodies, causing negative effects leading to long term health conditions.

We can expect to experience one or more of the following not long after, which can last for a couple of days or weeks:

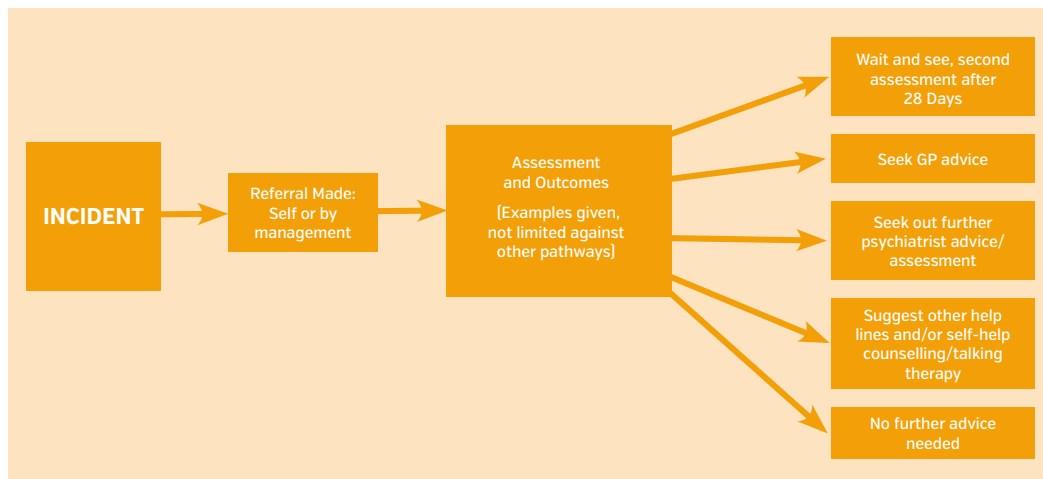
- Pulse racing, palpitations
- Rapid breathing
- Headaches, migraines
- Stomach aches
- Changes in our sleep pattern or lack of sleep.
- Increased alcohol consumption
- Changes in our everyday habits: such as going to the climbing wall less, watching the TV more, generally staying in more.
- Flashbacks to the incident.
- Changes in mood, we can become more irritable.

Any of these feelings are normal after a significant event. When they start to last longer than a few weeks and/or become more severe, that's when we need to seek professional help. There are ways of intervening before it gets too far.

## What can we do?

If we look at this from a professional angle and we change the scenario to something we've witnessed as an employee, freelancer or even as management with employees who may have been involved in such an incident, we know we have an obligation to look after ourselves and employees. We can implement the TRiM process into our workplaces. Developed by the Army to recognise the signs of Post-Traumatic Stress earlier in soldiers we can use the same method in the civilian world; Trauma Risk Management (TRiM).

In order for the process to start we either self-refer or have our managers refer us in. Accepting the referral, we can then arrange an assessment (the offer can be declined at any time). A TRiM assessment is usually carried out by a peer and it is a confidential discussion between you and them, the assessor carries out a risk assessment and based on answers given recommends if further help should be offered. At the end a plan is discussed, with a mutually



1. Looking out to Torres del Paine, Patagonia Chile. 2. Reflection in the lake. 3. Taking in the view, having a moment of peace after the incident.



agreed outcome that takes into account the severity of symptoms and coping mechanisms the person is using. Outcomes vary from professional help to arranging a second assessment to knowing the person is coping well and hasn't been affected (this of course is a viable outcome; people deal with stress and it might not affect them). It should be noted that TRiM is not a counselling tool but the chance to see how a person is coping.

### Following the event

Putting the wellbeing of witnesses and those directly involved first we need to realise that they may still be in shock; incidents like this are rare and we don't anticipate dealing with them, minds are racing trying to work out what has actually happened, they'll be questioning their judgement and decision making and possibly wondering if they're going to take the blame. Once back on site/at the main office idle time spent mulling over the events alone can be destructive; firstly, get the kettle on and have a brew. Does any paperwork need to be filled in immediately? can it wait ... is there a way it can be dictated? Minimise waiting time and hanging around, use any time to get them doing menial tasks: clean store cupboards, PPE checks etc. The less time they are left to sit and mull over the events the better.

### How to implement TRiM in the outdoor industry

From my experience in the Ambulance service our prominent noticeboards carry wellbeing information with emails and telephone numbers to use. After a major incident, supervisors can notify regional coordinators who then pass on the information to local assessors; either from nearby stations or their own. As mentioned, we can self-refer by either email, phone or speaking to an assessor. This same model could be employed in this industry; when we are reporting accidents we should have a follow-up with the people involved to check on their wellbeing.

Within each organisation anyone at any level could operate to both assess and coordinate. Adapting this to a multi-site organisation requires additional assessors to cover the wider geography of the organisation. At a Governing Body level there is an opportunity to reach out to freelancers, casual staff and anyone else not employed by an organisation.

Footnote from John Cousins: The BMG has taken seriously the risk to members' psychological well-being of being exposed to traumatic events for a decade now. A key component in the BMG's response to traumatic events is Trauma Risk Management (TRiM) and in 2005 seven members undertook a two day course. In the aftermath of a fatal accident in 2012 the Association sought to enhance its ability to support members through TRiM and where appropriate referral to professional help. This culminated in five members becoming TRiM practitioners during the winter of 2014 and the BMG appointing a TRiM coordinator. AMI, BAIML and MTA Reps attended this latter course and both Plas y Brenin and Glenmore Lodge have also put a number of staff through TRiM training. AMI also currently has plans to further develop its trauma risk management capacity (contact your association for details of their current Trauma Risk Management policy).

### Please Note

If you feel that you have been affected by an incident do not hesitate to seek further help from either helplines, organisations like MIND or speak to your GP. ■



**Simon Duczak** works for the Ambulance Service and is a TRiM Assessor for his colleagues. He still enjoys being outdoors and will freelance occasionally. He is an MTA member, Mountain Leader and Rock Climbing Instructor, as well as a Mountain Rescue Volunteer.

WORDS BY JEREMY WILLIAMS  
PHOTO BY JASON RAWLES

# SUMMIT VIEWS



ABOVE Sunrise over Moel Siabod from the summit of Snowdon. © Jason Rawles.

The use of triangles to estimate location and distance dates back to Greece in the 6th century BC. Almost all national mapping agencies subsequently used ‘triangulation stations’ or ‘trig points’ in the production of maps.

The process of placing trig points on top of prominent hills and mountains began in 1935 to assist in the accurate triangulation of Great Britain. Trig points are typically concrete pillars and over 6,500 were erected by the Ordnance Survey. In clear weather it is possible to see at least two other trig points to form the triangle. This is then repeated across the country until an entire network is produced. Triangulation works by determining the location of a point by measuring angles to it from other known points. To avoid distortion from heat-haze, measurements were often made at night with lanterns placed on the trig points to aid observation.

When installing a trig point, vegetation and soil are cleared to expose firm rock. On the highest point of this natural bedrock a small hole is drilled and a ‘brass bolt’ is tapped into place. It is the position and height of this brass bolt (the actual trig point) that is recorded on maps. The concrete or trig pillar is then built to protect the brass bolt and to provide a firm support for the surveying equipment. The design of the trig pillar allows the

bolt to be viewed from above (*Figure 1*). When the circular boss on top of the pillar is removed the brass bolt can be seen in the bedrock below. Tubes at the level of the bolt allow light in to aid viewing. A theodolite (an accurate protractor built into a telescope) is attached to the top of the pillar, and is adjusted until it is exactly above the bolt. Accurate angles between pairs of nearby trig points are then measured. The height of the theodolite above the brass bolt is known for each trig pillar.

The development of new technologies, such as GPS, meant that trig pillars were no longer an essential part of surveying and mapping and many fell into disuse. Regular visitors to Yr Wyddfa will remember the old trig pillar (*Image 2*). By the 1990’s both the trig pillar and its concrete base were crumbling. Daylight could be seen under the concrete base where the foundations had eroded and, with enough walkers crowded on the concrete platform, it could be felt to move a little.

Regular visitors on Yr Wyddfa might also have listened-in to visitors spotting distant mountains. ‘That’s Crib Goch’, ‘That one is Moel Siabod’,

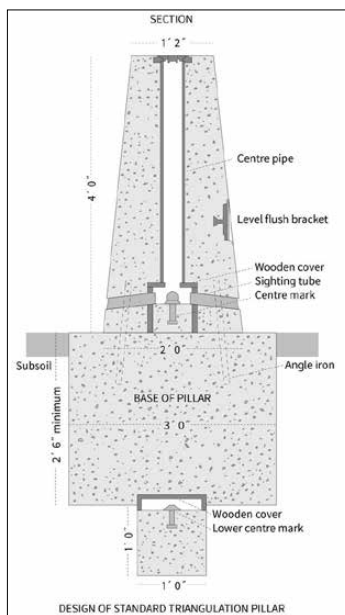
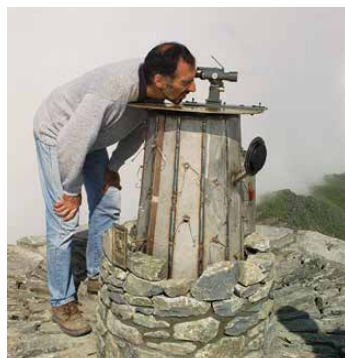


FIGURE 1 ABOVE. IMAGE 2 BELOW.



'Way down there is Cadair Idris'; perhaps on clear days sharp eyes picked-out mountains in Ireland and in the Lake District. Some were correctly spotted, others not. Perhaps a 'panorama plate' would help those new to the area to identify the surrounding peaks. For safety reasons, the viewing platform and pillar needed rebuilding. As visitors to Snowdon increased in number, by train or on foot, crowds at the summit became a regular feature. Those at the Wyddfa pillar risked being pushed off the rocks as others jostled to assemble friends for souvenir photographs. It was an almost weekly event in summer for someone to fall at the summit, gashing an arm, leg or head and being helped down by train for treatment.

In 2000, as a Millennium project, the summit cairn was stripped of the crumbling concrete structures. While walkers had little difficulty scrambling up to the old cairn, many train passengers found the journey from platform to summit a challenge. Local rock was used to build 'up' and 'down' stone steps to make the process of visiting the 'highest point in Wales and England' easier and safer. A wider viewing platform was constructed using the same local rock to enable safer movement on, around and off the summit. Trig pillars, being the highest points around, are often struck by lightning. If the mortar between stones is wet this is instantly converted to steam when 'struck', literally blowing the cairn to pieces. The smooth concrete of a trig pillar is designed to shed water and to dry quickly. The new trig pillar on Yr Wyddfa is not in typical flat-sided concrete but circular and in local stone as the previous one had been. The rustic stone finish to the pillar belies an inner strength. In order to protect the pillar from wind, ice and storms, it has a robust stainless-steel internal frame. The frame has a 'skirt' which lies beneath the stone platform, anchoring the entire structure. The brass plate and steel frame are 'earthed' to ground to dissipate the electrical blast from frequent strikes. Careful inspection of the brass plate reveals small melted pits from previous strikes.

The panorama plate, designed by the author, was converted into a CAD design and cut into the brass plate by the Forestry Commission sign-making workshop in Coed-y-Brenin. The central brass boss and theodolite mount are from the original OS trig pillar. As the pillar is hollow inside the steel frame, it leaves scope for scientific experiments right at the summit point. These have included measuring natural electrical field strength, which generally reaches a maximum on mountain peaks and is one reason why they are prone to lightning strike. Also of interest are cosmic ray measurements which are more accurate above the, generally, polluted air below 1,000 metres. Visitors to the summits on still days may note a layer of air with a brown tinge below with clearer air above; this is known as the 'boundary layer' and often lies around 1,000 metres in the UK. This layer is even more visible in many of the deep alpine valleys containing major road and rail routes.

Snowdon has always been attractive as a visitor destination. Yr Wyddfa is the highest point in Wales and England, and, for some, has the added attraction of being served by a tourist railway. In good weather, and particularly in school holidays, crowds were the norm. However, in recent years, perhaps fuelled by social media, maybe due to an increase in 'stay-cations', the crowds appear to have increased. In former times, just a touch of the summit cairn was all that was needed. Certainly, the new need for an obligatory 'selfie' at the summit has produced queues down to the railway line and waiting times of up to an hour. Who would have guessed that this restoration project would eventually gain such iconic status?! ■



**Jeremy Williams** is an International Mountain Leader based in the western Pyrénées. He initiated and managed the Snowdonia Weatherstations Project, initiated the restoration of the trig pillar on Yr Wyddfa and designed the brass panorama plate.



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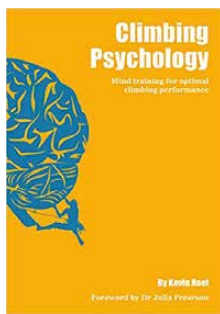
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# BOOK REVIEW



## CLIMBING PSYCHOLOGY – MIND TRAINING FOR OPTIMAL CLIMBING PERFORMANCE

by Kevin Roet

Reviewed by John Kettle

This comes as a welcome addition to the small selection of climbing-specific books on mental training. What is immediately refreshing about Roets' contribution is that it contains

the greatest quantity of practical advice out of all of them – clearly written by an instructor! Within mental training it focuses primarily on addressing the fear of falling, with most of the book aimed at helping climbers to progress in this area of their performance. While authored by an instructor, Roet has wisely engaged a trained clinical psychologist to verify its content.

The first two chapters are an insightful introduction into the neuroscience that underpins our fear response, the formation of mental habits, and the process of changing them.

These are followed by chapters which condense and contextualise the research and writing of researchers Senninger (Learning Zone theory), Csikszentmihalyi (flow), Dweck (Growth Mindset), plus journalists Kotler, Syed and Gladwell. Roet brings potted highlights of their writing into a climbing context for the reader.

The breathing chapter is great and nicely explains both how and why certain types of breathing directly affect anxiety levels, supported by sound practical interventions for improving awareness and making practical use of breath during climbing.

Its real strength comes when using it as a practical guide to fear of falling, with a strong focus on addressing it at indoor walls. It has an excellent chapter on falling safely, where the authors' experience at teaching these skills really shines through. It contains a host of fall progression exercises supported by QR codes linking to video

demonstrations. This stood out as the unique selling point of the book, with lots of original content presented in a graduated way, complete with a three-point grading system for belayer competency.

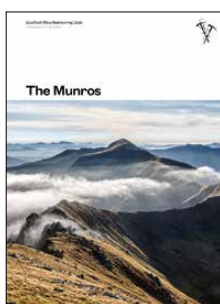
It would have been great to read Roets' ideas on managing the transition from planned falls to the reality of uncontrolled falls while climbing. Some climbers can get very adept at planned (controlled) falls but struggle to commit to moving up with an uncertain outcome – the true test of whether the practice is actually serving its ultimate purpose. I would have also liked to see a clear description here of who falling practice is not appropriate for – in my experience this is the majority of recreational climbers, for whom a more subtle intervention focused on relaxed leading, breath and attention is far more suitable. There is a danger of causing psychological harm to individuals who are not – and may never be – ready to take falls of any size. The whole process must be approached with great empathy for the climbers' emotional welfare if it is to be successful.

It is very refreshing to see the books' imagery representing a balanced range of ethnicities and gender – something sadly still rare in climbing books! I would have liked to see more than two pages devoted to mental rehearsal; this is a tool that I think goes hand-in-hand with route reading, and as such is powerful in all climbing disciplines.

Overall, the feel is of a practical guide created by an instructor rather than the psychologist/philosopher/elite climber approach you get from the alternative publications on offer. As such it will be a welcome addition to the mental training library for many climbers.

If you know your climbing is limited by an irrational fear of falling, this could expand your understanding of what's going on inside, and the steps you could take to begin changing your experience for the better.

If you are a coach/instructor supporting climbers building confidence in both taking and catching lead falls, this will prove a handy practical resource. ■



## THE MUNROS by Ran Anderson & Tom Prentice

Reviewed by Peter Edgerton

The Munros, as I am sure most people in the outdoors will know, are hills in Scotland with heights above the magic figure of 3000'. Occasional subjective assessments of what constitutes the summit of a massif decides which top becomes the Munro.

As a result of this, the number of hills counting as a Munro has varied but has always been around 280. It currently stands at 282 and the quest for reaching all of them has become a driving force for many, but it is also true that they have a magnificence in their own right so a guide like this is definitely due.

The first thing that struck me about this book was that it is a seriously heavy tome – I was moved to compare the weight of it with that of my old 1985 Munro guide and it turned out to be twice what it had been, so it should be good and it definitely does not disappoint. At over 380 pages, it is a sumptuous record of some of the most beautiful hills in Britain, with some outstanding photographs. It may be just the current lockdown situation but those pictures made me eager to be out there again as they convey the dramatic and wild nature of the mountains north of the Central

Valley. In stark contrast to earlier versions of the guide, the authors have given descriptions of the sometimes multiple routes that exist to some of the hills, shown in different colours on the well-drawn and detailed maps. The use of cycles to cover long distances on tracks is also acknowledged as a *modus operandi* nowadays in contrast to the occasional mention in past books.

The book follows the usual format of seventeen sections covering the sixteen mainland regions and a final one for the islands of Mull and Skye. There is an excellent historical introduction followed by a few pages of practical information and each description begins with an outline description of the mountain or linked set of summits that follows. Descriptions of longer traverses or popular combinations of summits feature in several chapters, with an evaluation of the merits or otherwise of each option. The book ends with a detailed list of the Munros, their subsidiary tops and those hills over 3000' in England, Wales and Ireland and a list of all of them by height permits the avid ticker to keep track of their progress. Once the task is complete, there is a list at [www.smc.org/hills/compleators](http://www.smc.org/hills/compleators) should one wish to formally record the achievement.

The book is well bound in hardback and will be a handsome addition to any library. I wondered if I might find it simply a rewrite of earlier volumes but I found myself engrossed in all the new information and routes that the authors have found and shared with us. It is highly recommended for all hill-goers. ■

# BOOK REVIEW



## KANCHENGJUNGA THE HIMALAYAN GIANT by Doug Scott, Revised and edited by Catherine Moorehead

Reviewed by Mal Creasey

This is the latest offering from Vertebrate Publishing, and the final book from the pen of one of the greatest mountaineers of all time; a writing career that spanned almost five decades with the authors' classic work Big Wall Climbing published way back in

1974. *Kangchenjunga – The Himalayan Giant* weighs in at 250 pages which includes sixteen pages of photographs. The immediate picture is that this is a good solid piece of work; at least the hardback version gives that impression. In fact, the more one delves into this book the more the reader realises the tremendous amount of research this work must have taken – literally years of dedicated research.

This book is not just about the mountain and the attempts to reach the summit (Doug's own included), it is about almost every conceivable fact relating to the ancient history right through to the political development of the region and its population.

The content is divided into four parts with only the final thirty-plus pages dedicated to three actual ascents on the mountain, namely the first, second ascents and third, with what was then considered a small team and with little in the way of Sherpa support and no radio communications; a far cry from what was the norm in the late seventies.

Initially the author outlines the geographical region around the Kangchenjunga massif then goes into great detail regarding the different ethnic groups around eastern Nepal and Sikkim, their origins and what drove the early settlers to populate these

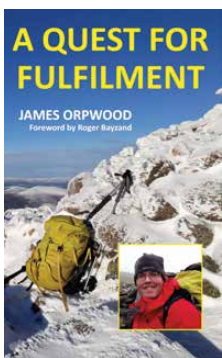
harsh regions. The book then looks at the early travellers including the missionaries, traders and politicians that helped to develop the area and bring news to the outside world of the region and of the existence of the big snowy hill. It was only in the 15th and 16th centuries that these early travellers penetrated the regions due to the difficulty of the terrain. However, as time progressed the area was visited more frequently with early exploratory expeditions, before finally some early attempts to reach the summit.

Personally, I found the early chapters a little heavy going although there is no doubting the sheer amount of research that has gone into these pages and readers will undoubtedly learn a great deal about the complexities of the indigenous population and the various ethnic groups of eastern Nepal and Sikkim. Perhaps these early chapters are to dip in and out of – and not take head on.

Part three is dedicated to the early pioneers, initially undertaking scientific studies in the region before the first tentative attempts at reaching the summit. These pioneers, some of whom were 'tourists' undertaking treks must have been a hardy breed, however as time went on some of the big players around at the time is, for me, an interesting read. Douglas Freshfield, the Sella brothers from Italy, Aleister Crowley, Harold Reaburn, Bill Tillman and of course Joe Brown all feature in the history of the massif. There is nothing like a little controversy to add to the mix.

Small, but important additions are a simple map which clearly indicates the geographical area of Kangchenjunga and the chronological list of treks, attempts and ascents of the massif. Both are nice simple additions to complete the story.

The prospective reader /listener certainly has plenty of choice with three options to choose from. Will this book stand the test of time like Big Wall Climbing? – I have no doubt. As usual this book does have the usual stamp of Vertebrate quality. ■



## A QUEST FOR FULFILMENT by James Orpwood

Reviewed by Gary Hodgson

*A Quest for Fulfilment* is a story of how one man's interest in fishing took him on a journey to a life in the mountains.

When I first became aware that James Orpwood had published a book, I was intrigued as to how he had gone from a background in Fish Science to guiding groups in the Scottish mountains for a

living; two very different professions.

Orpwood's debut book begins with childhood tales of angling in the South of England where he was born and raised. His early enthusiasm for fishing ultimately led him to the attainment of an undergraduate degree in Ecology and Sciences at Cardiff University, which in turn precipitated a career in Fish Science based in Perthshire. Highland Perthshire is, of course, renowned for fishing, but it was the hills and mountains that drew James's attention. It was during this period that he went on various trekking and climbing holidays in Morocco, Nepal and the Andes. Is this where the early seeds of a life in the hills were sown? What were the deciding factors involved in giving up his hard-won career and

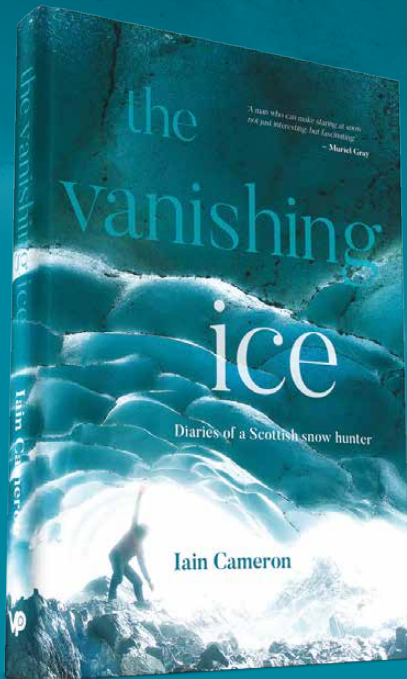
interest in everything fish to enter the precarious world of guiding groups in the mountains for a living?

James's story reveals his deepening desire to spend more time walking and climbing. Of course, a love of mountains doesn't always lead to guiding. If you are curious about this challenging transition, then you will almost certainly enjoy this book. There are many folks who try to juggle their day job with part-time work in the outdoor activity industry. It can be a difficult, competitive and uncertain context in which to find balance and fulfilment. However, Orpwood shows us, through his descriptions of his guiding experiences in the beautiful Cairngorm mountains, how this can be done.

James's descriptions of the mountains of Scotland and his travels to mountain ranges around the world are engaging, humorous and thought-provoking. They give the reader many insights into the challenges, weather, geology, culture and sheer beauty. They are very powerful and compelling for many – there is even a chance of romance if you spend enough time immersed in them!

*A Quest for Fulfilment* is a light-hearted entertaining narrative. It makes for easy reading and you don't need to have any knowledge of fishing or technical mountaineering to enjoy this book. If you're contemplating giving up your 9 to 5 job and searching for what truly makes you happy then this book is right up your street, or mountain! ■

# New outdoor narratives from Vertebrate Publishing



## the vanishing ice

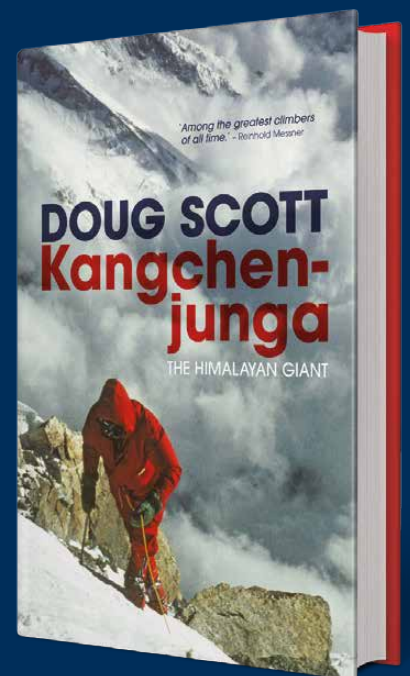
Diaries of a Scottish snow hunter  
**Iain Cameron**

There are few more beautiful places than Scotland's winter mountains. But even when most of the snow has melted, isolated patches can linger well into summer and beyond. In *The Vanishing Ice*, Iain Cameron chronicles these remarkable and little-seen relics of the Ice Age, describing how they have fascinated travellers and writers for hundreds of years, and reflecting on the impact of climate change. His adventures include a perilous climb in the Cairngorms with comedian Ed Byrne, and glorious days spent out on the hills with Andrew Cotter and his very good dogs, Olive and Mabel.

# DOUG SCOTT Kangchen- junga

THE HIMALAYAN GIANT

*Kangchenjunga* is the third highest mountain in the world and a notoriously difficult and dangerous mountain to climb. First climbed from the west in 1955 by a British team comprising Joe Brown, George Band, Tony Streater and Norman Hardie, it waited over twenty years for a second ascent. The third ascent, from the north, was made in 1979 by a four-man team including the visionary British alpinist Doug Scott. Completed before his death in 2020, and edited by Catherine Moorehead, *Kangchenjunga* is Doug Scott's final book.



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