Makalu 2003 Expedition Report for the Imperial College Exploration Board

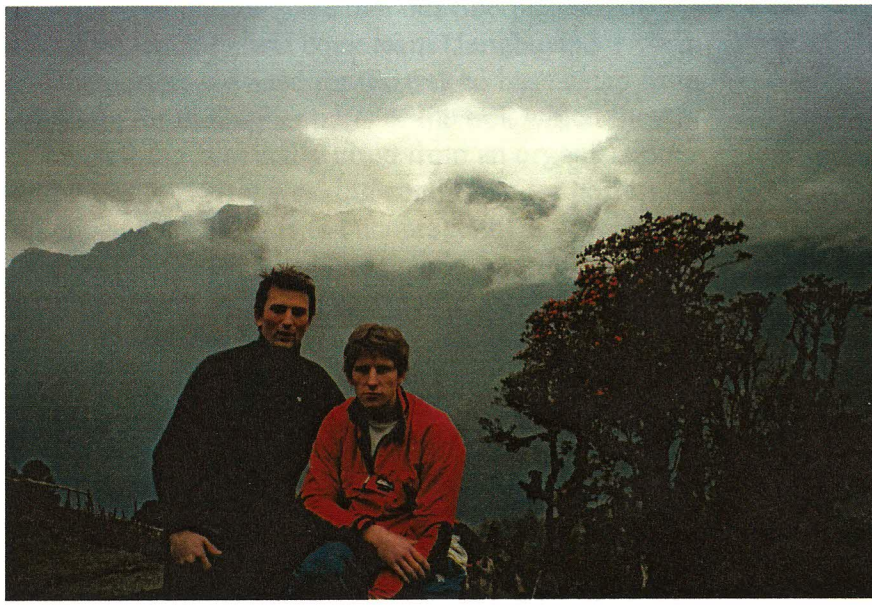
Oliver Kemp and Neil Richardson

Introduction

Expedition members:

Neil Richardson
4th Year Medical Student

Oliver Kemp
4th Year Medical Student



The expedition was run as part of the Medex Makalu Expedition

Dates:

March 21st to May 3rd.

Objectives:

1. To carry out research into the use of Glyceryl Trinitrate (GTN) as a predictor of individual susceptibility to Acute Mountain Sickness during the trek to Base Camp
2. To carry out research into the changes in haemodynamics of GTN at altitude
3. To climb Mera Peak (6495 m)
4. To climb Ombigaichan, also known as Puma Dablam or Jim's Peak (6250 m)
5. Minimise environmental impact of the expedition to the region

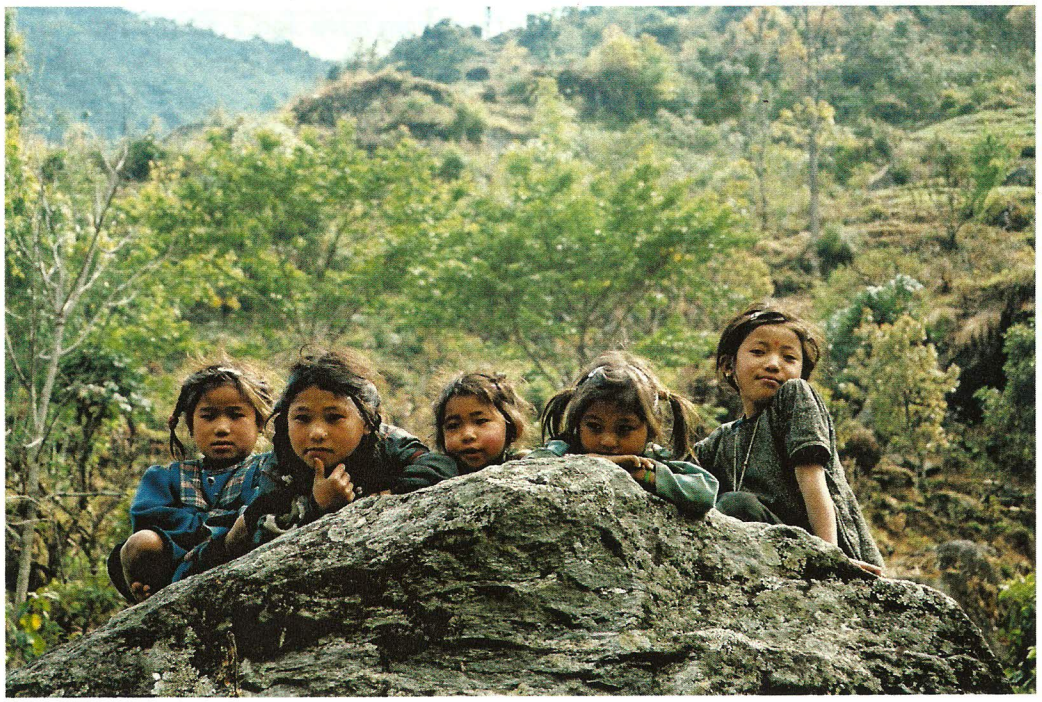
Expedition Diary

Saturday 22nd - Monday 24th March: Having only two full day in Kathmandu before our flights to Tumlingtar, we used the time to check our scientific equipment that had been shipped out several months in advance. Fortunately it has survived the journey so far…hopefully it can survive the helicopter ride to base camp. We also met up with our trekking group and it is the first time all 13 of us have all been together at the same time. The group is mainly comprised of young medical doctors who also had an interest in altitude medicine. Two members, Matt and Stephan, have just found out they have passed finals and are now doctors, and we help them celebrate in the Kathmandu bars! The group is already getting along excellently.

Tuesday 25th March; Kathmandu-Tumlingtar (440m): The baggage limit is 16kg per person. Even with inventive packing and the discarding of much clothing we struggle and have to pay excess baggage charges. Plastic boots, crampons etc that should have gone with the rest of the climbing gear have to be left in as one of the passes is glaciated and may require them. That aside, we clambered into our bus and headed back to Kathmandu airport for our early flight to Tumlingtar where we would begin our trek to base camp. The flight was on a "Twin Otter" type turbo prop aeroplane

and we were all apprehensive about it having heard of many crashes and near misses in climbing literature. However it turned out to be a pretty smooth flight and the airstrip was flat. Our in flight sick bags were unused. We met our Sherpa team of Sirdar (Sunam), climbing Sherpa (Latpa), cook (), and cook team (Jengbu and Mingma). Sunam recruits most of the porters we need for the trek to base camp from the village. They get their warm clothing for the higher parts of the trek which they duly put in the blazing sunshine. The clothing is actually hired from an organisation called Porter's Progress which campaigns for better working conditions for porters. If the clothing is returned they get a deposit back. This is to encourage them to wear the kit and not sell it on which was the norm until recently. This practice caused regularly fatal consequences for porters due to their lack of inadequate clothing since they sold the clothing before they even got above the snow line. We set up camp and enjoy relaxing for the rest of the day.

Wednesday; Tumlingtar – Katigar (384m): Everyone was pleased to be starting the trek in. All the preparation had been done and now all was left was to enjoy the walking. What would become a ritual of breakfast, filling in the data books (which consisted of various measurements of pulse, blood pressure and acute mountain sickness (AMS) score that was essential for many peoples studies including our own) and packing up camp began today with enthusiasm that would wax and wane throughout the trek as the insidious effects of altitude and temperature took their toll. The walk was a short one that followed the course of the Arun river. Many Nepali kids met us, though the usual shouts of, "One pen" or "one rupee" were almost absent indicating that this wasn't a touristy route. The temperature was uncomfortable to walk in, especially with a heavy pack but the nights were chilly, though not enough to warrant our heavy down sleeping bags yet.

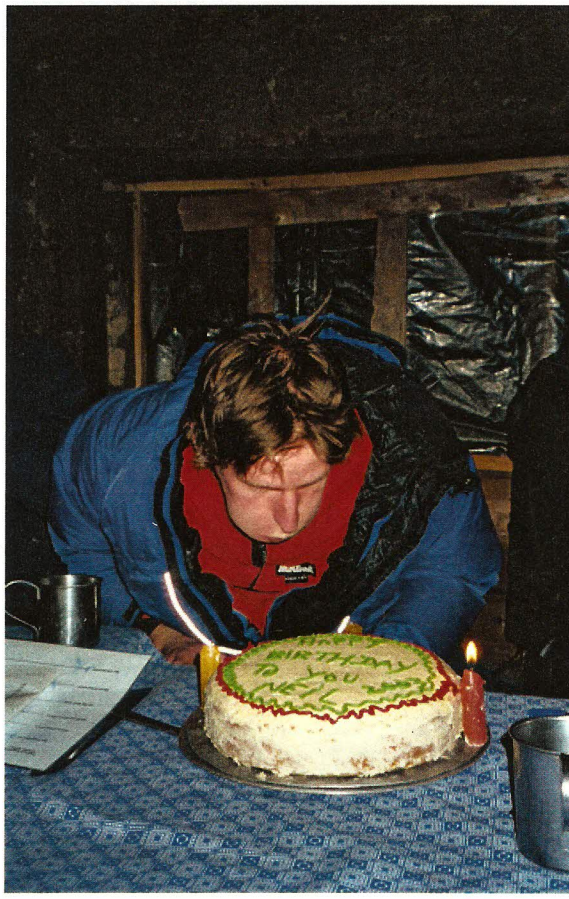


Thursday; Katigar – Gothe Bazaar (788m): Olly's not feeling well, though this could be attributed to the 2 glasses of tap water he drank in Kathmandu after our night of exam celebrations with Matt and Stephan! The scenery is incredible in this low land area as we head west away from the Arun river. It is very green, with many well

irrigated rice fields on terraced land. The walking is fairly flat but the need to cool of in the river helps (a tributary of the Irkhu Khola). Another short day ends in a chin up competition with the porters! The loads they carry are incredible and put us to shame. The group have to take GTN for the first time this evening. Although we are ascending more than 300 metres tomorrow it is still too low for any real AMS but the group are already complaining about the unpleasantness of the test. We hope the other trekking groups comply with the protocol as they will not have any encouragement from Olly or I.

Friday; Gothe Bazaar – Salpa Phedi (1610m): Still no sign of the Himalayas proper yet as the high sided valley we a walking westwards in shields them from view. The distance we are walking is still quite short but the heat makes it harder.

Saturday; Salpa Phedi – Salpa Pass (3040m): My birthday! Get a home made birthday card and a bag of sweets. It is a lot of ascent today as the undulating terrain add to the net gain of around 1400 metres. My ascent is slowed by the birthday present from the group, 3 heavy stones stashed in my rucksack…cheers guys. Stephan manages to knock over an urn in a sherpa house we squeeze into for lunch, sending the ashes of the owners distant relatives sprawling over the floor. We quickly make our excuses and beat a hasty retreat to our camp site! The weather pattern is beginning to emerge, and what starts as a clear day usually degenerates by 4 O'clock into a storm. We shelter in a make-shift shelter until dinner. Cook even manages to bake me a cake! No one is complaining of any altitude related problems yet.



Sunday; Salpa Pass – Gudel (2049m): First site of the Himalayas. Far off in the distance Kasum Kanguru (6370m) is visible, though it still looks incredibly massive. The pass was quite icy, with many porters slipping on the way down under the weight of their heavy loads. Huge thunder storm and the heaviest rain we have ever experienced greet us

in the afternoon as the weather continues. Concerns are that it might be falling as snow higher up complicating the approach and setting up base camp. Managed to squeeze into a small hut to sleep as conditions too bad to erect tents.

Monday1st April; Gudel – Kiraunie (2613m): Initially a long descent in very alpine scenery. The Hongu Khola flowed along the bottom of the gorge and a spectacular bridge spanned the two sides. After crossing the Hongu Khola we take a brief rest at Bung on the other side. Dan remarks that a small child is dressed like a Maoist! Ten minutes later and we are handing over 250 rupees "donation" to some rather serious looking Maoists with pistols and loud speakers. It is a small price to pay, and we even get a receipt! It is a rest day tomorrow and we see our camp behind conifers surrounding a Buddhist temple. It is another long day of about 7 hours walking.

Tuesday; Kiraunie (rest day): This rest day is much needed to sort out oneself as well as kit… clothes are getting unsociable now. Unfortunately weather is bad all day and clothes don't dry properly. Meant to be going over the Zetra La but there is too much snow which means at least a days detour.

Wednesday; Kiraunie – Basmar (2749m): Rhododendrons are flowering and as the valley opens up it gives spectacular views. Another long descent, this time into the Inkhu valley which is crossed by an even more spectacular bridge then a long ascent to camp. A shop selling beer and whisky makes the evening very entertaining and we sing and dance with our Sherpas and Porters. They teach us a Nepali song called Isum Pheride. We teach them the Hoky-koky!

Thursday; Basmar – Noosa: We can see south-west face of the Mera Massif. This side looks very impressive, though we will be tackling the straightforward other side as an acclimatisation to Ombugaichen, our main mountaineering objective. It is a short day but as usual weather deteriorates after a clear start. The first group who are setting up base camp are delayed by the bad weather which means we will be delayed further. We hear on the radio transmissions that someone in a group behind us has suspected high altitude pulmonary oedema (HAPE) though we are dubious since we are still relatively low. The diagnosis of HAPE is later confirmed indicating the unpredictable nature of altitude sickness.

The Mera Massif, we would be attempting the centre peak.

Friday; Noosa – Zetra Khola (3158m): The steep sides of the Inkhu valley and the many waterfalls make for beautiful scenery and an enjoyable if long day of trekking. Camp is in a forest of bamboo. Keeping clean is becoming harder as the temperature of the rivers is now far too cold to attempt any sort of wash. Luckily Olly and I are students and used to not washing.

Saturday; Zetra Khola – Kothe (3631m): It is now snowing in the afternoons though it is still comfortable to walk in a t-shirt. Olly manages to be seconds away from falling around 60 feet into the Inkhu Khola as the rock he has just been standing on plummets down the side of the gorge. I hope he doesn't use all his luck up on the walk in! The nights are now very cold and we feel we are at last getting into the mountains.

Sunday; Kothe- Tang Nang (4268m): Ladpa holds a ceremony in a Buddhist temple we pass on the way to Tang Nag. Prayer flags are erected and juniper burnt to bring us luck. The altitude is beginning to take its toll. Various people are suffering from headaches. People are becoming increasingly unwilling to take the GTN as they fear worse headaches.

Prayer flags to bring us good luck on the mountain.

Monday; Tang Nang – Khare (4873m) – Tang Nang: Fantastic views of Kusum Kanguru (6370m), Kang Tega (6783) and Thamserku (6818m) on the approach to Khare. Even did a spot of bouldering that left us feeling extremely breathless. This was a warning that any sort of technical climbing was going to be extremely hard work. Poor communications, mainly due to ambiguous radio transmissions with the group in front of us meant that we were going to arrive at base camp before it was set up. Some of the research required experiments to take place on the day of arrival to base camp so we have to descend back to Tang Nang. Unfortunately this conflict of interests means our study is being compromised. This day was important since we are now high enough for AMS to be a real possibility and the height gain was enough that symptoms could be triggered. We have to compromise and record data at our high point (4873m) before descending though this breaks with protocol. This is an unfortunate occurrence but one that was likely to arise with the many different research projects being conducted on this expedition.

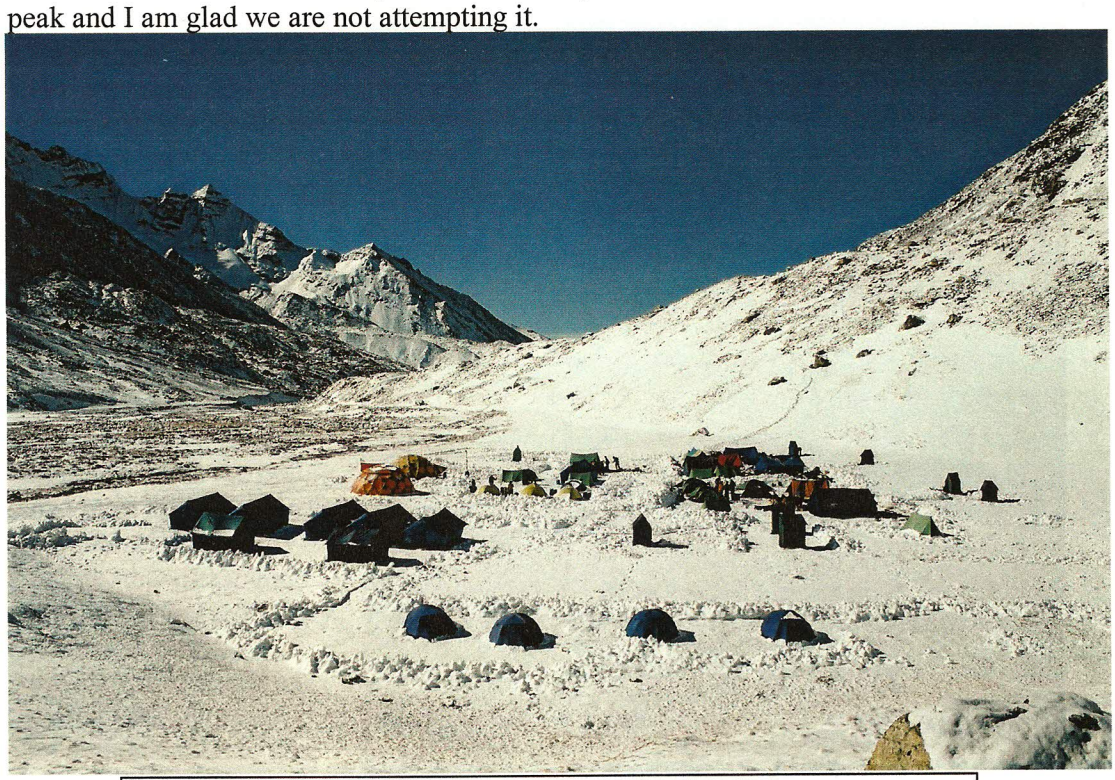
Tuesday; Tang Nang (Rest day): Group 3 arrives minus a few members who are struggling with AMS.

Wednesday; Tang Nang – Khare (4873m): Uneventful trek back to Khare, though there is large amounts of snow to be cleared before we can erect our tents.

Thursday; Khare – Mera La (5400m) – Ratura: Extremely cold night. Didn't even have the luxury of staying in my sleeping bag until the sun had risen and warmed the tent up since I had to take the rest of the groups BP, O_2 sats and other measurements important for our study. The pass was fairly steep in places but did not require crampons. A spectacular place, and despite reports to the contrary, had few crevasses to speak of. A long and hard day which was made worse by headaches and poor

visibility on the descent down to Ratura or "Tryffan" as it is being called due to the shape of the rock where the tents have been erected.

Friday; Ratura – Medex Base Camp (5005m): Followed the half frozen Hongu Khola to base camp under the shadow of Chamlang (7319m). Base camp was an awesome sight, the 2 enormous orange mountain equipment dome tents looked strangely out of place against the white of the snow. After a quick briefing, several experiments were conducted on the group by the first researchers to arrive. Peak 41 is directly west from base camp and looks formidable. Our original climbing objective, this would have been extremely ambitious to say the least for a first time Himalayan peak and I am glad we are not attempting it.



Chamlang base camp. This was supposed to be a "green field site"!

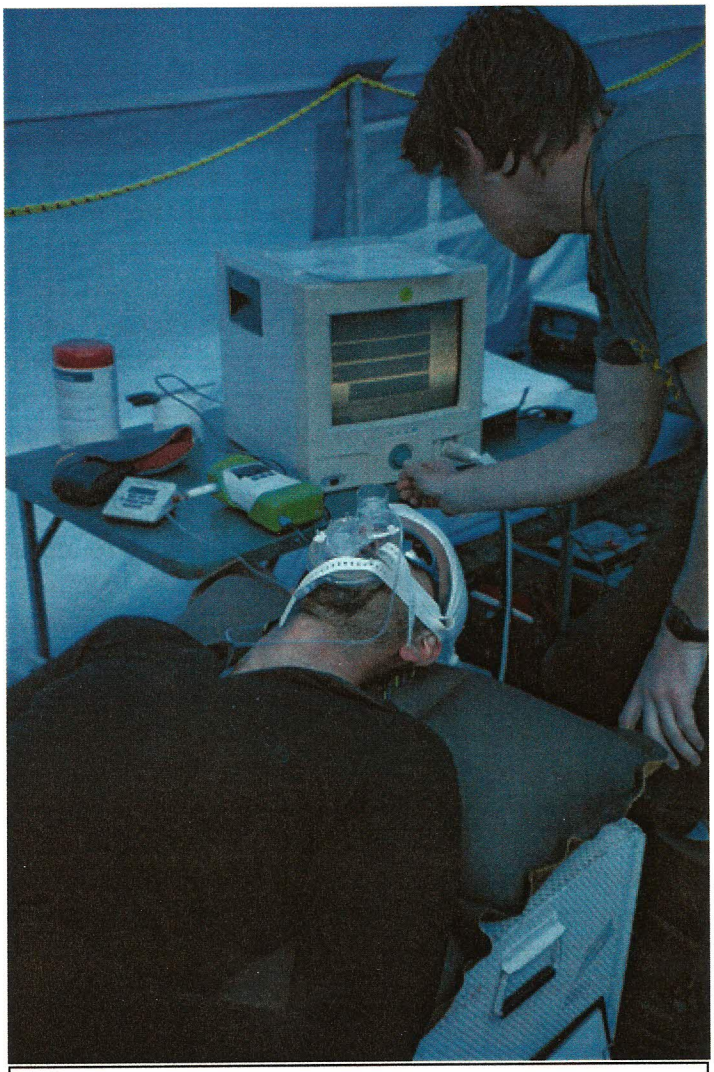
Saturday 12th to Sunday 20th April we conducted our experiments at BC

Research

This is not a detailed account of the science but is about the practical aspect of research in an extreme environment, with problems encountered, how we tried to solve them and advice on how to avoid such problems in the future.

Equipment

The research was divided into two parts. The first to be done during the trek in involved only basic equipment. The GTN spray comes in a convenient sized sprays and can be carried easily in a personal wash bag. The visual analogue scale to record headache severity before and after taking the GTN was printed on the back of everyone's data collection book along with simple instructions. This allowed the test to be carried out easily by individuals in a reproducible way and with the minimum of equipment. This aspect was a success in that all the groups managed to record their data successfully with only a few people dropping out of the study, mainly due to the side effects of GTN.



Measuring oxygenation of the brain at base camp.

The second part of the research involved measuring the effects of GTN on the blood flowing to the brain. This involved complicated and sensitive equipment. Although both key pieces of equipment (Cerebral oxygen monitor and an ultrasound machine that recorded blood flow to blood going to the brain) had been tested in a high altitude environment before, the ultrasound machine was particularly temperamental and unfortunately failed to work at BC. Our recommendation is that anyone contemplating research at high altitude should make sure all equipment is 100% reliable at sea level before considering using it at altitude. Another problem was power supply. Due to problems with customs, the petrol generator did not get shipped out to Nepal. The result was that we were 100% reliant on natural forms of energy (solar and wind). This meant that if both machines were running at the same time, as was required to conduct the experiment properly, we would be using over half the available energy for the whole of BC. This had various implications. Firstly, due to regularly poor weather in the afternoons, there was not enough power for us so we had to limit our experimentation to the mornings when there was more sunlight. Even running off a large car battery that was slowly recharged overnight by the wind generators still limited us to just a few hours work

per day when the weather was poor. The longer time needed to complete the experiments meant there was insufficient time to attempt our main mountaineering objective. Also, since the solar panels provided 110v and our equipment needed 220v, both pieces of equipment required adaptors and caused interference with the sensitive probes. Despite efforts to shield the probes from interference, the ultrasound machine was incapable of picking up meaningful signals. The other equipment such as blood pressure cuff, CO_2 monitor etc worked well with no problems. However, any face mask used in experiments must be thoroughly disinfected at altitude to prevent spreading dangerous chest infections amongst people at BC. We bought alcohol wipes but they were not sufficient. Fortunately another research group had a good disinfectant that we borrowed. All equipment had to properly stored overnight to avoid any moisture getting into the equipment. Equipment must be properly packaged to protect it from the extremes in temperature. No research could take place for at least an hour after the sun had come up as it was too cold for the displays on the equipment to function properly.

Conclusions: Keep it simple! The first part of the research worked well because it was simple. Without the extensive support of a large scale expedition such as Medex, the second part of our research would have been impossible. Any research undertaken at altitude should be with the minimum of equipment to reduce the likelihood of something going wrong. Experiments using mechanical devices such as scales to measure weight, callipers for skin fold measurement etc or measuring simple parameters such as blood pressure or respiratory rate are far more likely to succeed. If Imperial students in the future wanted to do more complex research into altitude medicine, laptop computers work fine at altitude, and require very little power so can be run using solar or wind power very easily. Add-ons for laptops such as electrical spirometer worked well on this expedition so could be easily used by an Imperial College expedition to investigate respiratory parameters. The amount of support equipment for repairing and maintaining research equipment should not be overlooked.

Another recommendation is that someone with a very good practical understanding of electrical systems, and the setting up and delivery of electrical power be a member of any expedition trying to do more complex altitude research using electrical equipment. Luckily we had an electrical engineer (Denzil Broadhurst) on the expedition, but without his help we would have really struggled.

Subjects

Getting enough subjects for altitude research is always a problem. Luckily there were many people on this expedition to choose from, but on a smaller scale expedition made up entirely of IC students, enough people have to on the trip to make the results statistically significant. Remember, there will always be drop outs for various reasons, and incomplete data sets from some subjects so it is important to have more than initially needed. Incentives such as chocolate go a long way at BC, this is especially important if the tests are unpleasant. Remember to try and get an even mix of males and females within the expedition in order to have a balanced demographic data set.

Research ideas

Medex or the Birmingham Medical Research Expeditionary Society are excellent places to start in terms of formulating a research idea. You can be put in touch with someone with ideas that you can develop further, as was our case. This way, new and valuable research gets done, but you still feel that you have had a large input into the study design as well.

Writing up

This is really important, since this is the reason why you are going on the expedition. It was easier for us to write up our projects since we were submitting our work for assessment as part of our intercalated BSc just 1 week after our return. However, if this were not the case, I could see how it would be easy to neglect this aspect with the result being nothing gets done. Therefore time should be set aside on return for writing up the research. Although positive findings are easier get published than negative ones, there are specific journals for altitude medicine which would be more likely to accept a good submission. Apart from anything else, it looks good on your CV.

Funding

Most research equipment will have to be begged, borrowed or stolen since the cost of buying equipment on top of all the other expedition costs will be too much. This is where Medex or BMRES become invaluable since they can put you in touch with people who have access to this equipment. Other sources of funding depend on the type of research, but within IC you should try; The Exploration Board, St. Mary's Association, The Hammersmith Trustees. Outside of IC, The Physiological Society are very generous indeed. For details log onto their website. Generally, mountaineering equipment companies will at best offer discounted equipment but will not give cash towards research expeditions.

Sunday 20th April – Tuesday 29th April

Mountaineering Objectives

A combination of factors contributed to our decision to cancel our attempt on Ombigaichan. Firstly, the time left to climb and return for our flight back to Kathmandu was only 9 days. This was caused mainly by the bad weather adding several days to the trek in, and the extra days needed at base camp to complete our study due to power shortages. There were ideas to actually call short our research in order to give us time on the mountain but as we had stated in our objectives, the research took priority. We had various grants given to us on the basis of the research we were going to conduct and we felt that we needed to conduct our research properly. This meant we only had 2 clear days on the mountain and it was felt by both Olly and I that this was insufficient time to give it a realistic shot. In addition, we had been planning to climb Mera to acclimatise, but due to the shortage of time this was now impossible. As neither Olly or I had been over 6000m before we felt that we would be extending ourselves too much in our first Himalayan season. Lastly, we had seen photos of Ombigaichan taken by some of the expedition who went to recce the mountain, and in their opinion it looked out of condition (that person went on to fall into a crevasse unroped!). However, as one of the other medical students on the

expedition put it, "They have just looked at a photo taken through some binoculars of the wrong side of the mountain!!" We were very disappointed to not even give it a go but we knew it was the best decision. We therefore turned our attentions to Mera, which we would be much more likely to summit.

Mera is nearly 6500m, but is technically straightforward. We took 3 days to get from Chamlang base camp to high camp on Mera (5800m). Weather had been very bad a few days before, and we met other members of the expedition descending after an unsuccessful attempt. However, we set off from high camp at 4am on Wednesday 23rd in excellent conditions and roped up soon after getting onto the glacier. By 7:30am we were sitting on the summit, with excellent views of 5 of the worlds highest mountains; Everest, Nuptse, Makalu, Kanchenjunga, and Cho Oyu. We were pleased with our performance, but felt that we were well within our capabilities on the mountain. However, we realised we had excellent conditions and it could have been a different story if we had been caught up there in the storm 3 days before. Overall, Mera fuelled our passion to attempt something more demanding now we know we can operate well (if properly acclimatised) at those sorts of altitudes. From the summit, we quickly descended back down the route, over the Mera La into the Inkhu valley and back to Khare.

From Khare we took a further 4 days to get to Lukla via the Zetra la and flew back to Kathmandu on Tuesday 29th April. After several days in Kathmandu we flew back to London on the 3rd of May.

Views from the summit of Mera. In the background, the pointed peak of Makalu can be seen, with Chamlang on the right.

Conclusions

If we looked objectively at the success of our expedition we managed to achieve 4 out of the 5 objectives we set ourselves. Although the results of the project seemed to

suggest GTN is not a good predictor of susceptibility to AMS, and we had problems with our research equipment we still managed to hand our BSc projects in on time 1 week after our return. We also managed to get a 1st for our projects so we regarded the research as a success, despite the negative findings.

The mountaineering objectives were, in the end too ambitious. We feel that to combine research and climbing was too much. Our feelings were that in order to tackle a difficult route in the Himalayas, you need to have simple research that can be easily completed so as not to expend precious time, energy and reserves that would be needed later. It is a question of prioritising, and in our case research came first. We were pleased to have summitted Mera and this has given us a lot of confidence to try something more challenging next time.

We were disappointed not to have climbed Ombigaichan, especially as it has had very few repeat ascents since Jim Milledge first climbed it during the silver hut expedition of the early 1960's. However, we now feel that we have the knowledge and contacts to organise our own expedition to tackle a mountain such as Ombigaichan in the future. We hope that we can avoid the many pit falls that would undoubtedly occur had we not had this wonderful opportunity. We would also be much more adept at securing sponsorship and grants to help pay for the expedition. Above all, Olly and I had the best 6 weeks and feel extremely privileged to have been given the chance to go to on this expedition.

BUDGET MAKALU 2003

The budget was one of the hardest parts of the trip to put together having never really had to plan a trip like this before. Our initial efforts were very basic and did not include many of the components seen here in the final report. It soon became apparent to us that absolutely everything must be budget for and accounted for. If we were to give any advice on the budget we would suggest two files are needed, one for out goings and one for income. However small the outgoings or contributions they should all be recorded, it makes applying for funds much simpler in the long run.

Below the budget has been divided into the different components of out expedition – the planning stages, insurance and the expedition to Nepal. There is a brief explanation of how each stages contributed to the final expedition.

The Planning stage

OLD DUNGEON GILL (LAKE DISTRICT); Here we met the rest of the group that were going to be involved in the research part of the expedition in Nepal. They consisted of researchers and subjects. Discussions focused on logistics and the political situation in Nepal.

Description	**Budget (per person £)**	**TOTAL FOR TRIP**
Travel	25	50
Accommodation (2nts)	20	40
TOTAL	**45**	**90**

BELFAST; Here we planned our project with two Doctors whom at the time were working in Belfast. Really we focused on the methodology – how were we going to answer our proposed scientific question?

Description	Budget (per person £)	TOTAL FOR TRIP
Flights	75	150
Transport	15	30
Accommodation (3nts)	60	120
TOTAL	**150**	**300**

COVENTRY; The project required a specific bit of scientific kit (Near Infrared Spectroscopy Machine). There are very few in the country. We managed to borrow one from a Vascular Surgeon who worked in Coventry.

Descrition	Budget (per person £)	TOTAL FOR TRIP
Transport	10	20
TOTAL	**10**	**20**

DATA COLLECTION WEEKENDS; The study focused on measurements recorded at sea level and at altitude in Nepal. The data collection weekends, of which there were two took place three months before our departure.

Description	Budget (per person £)	TOTAL FOR TRIP
Transport	10	20
Research supplies	35	70
TOTAL	**45**	**90**

Insurance (45 days)

The BMC insurance was to cover our personal equipment needed for the trek in to base camp and the climb of Mera Peak. The scientific equipment was insured as a group insurance with the other researchers. This was paid for under research overheads (see Expedition to Nepal section).

Description	Budget (per person £)	TOTAL FOR TRIP
BMC ski alpine insurance	120	240
Additional equip (£2000)	50	100
TOTAL	**170**	**340**

Expedition to Nepal

This section speaks for itself. It is what we needed to pay to get to Nepal, up to our base camp, up Mera peak and then back home again.

Description	Budget (per Person £)	TOTAL FOR TRIP
International flight	470	940
Internal flight (times 2)	200	400
Excess baggage	35	70
Accommodation, food Katmandu	15 per day = 60	120

Tents, food, portering	35 per day = 1575	3150
Park fees	17	34
Peak fee (Mera)	150	300
Peak fee (Puma Dablam)	200	400
Reasearch overheads	20	40
Radio, sat phone licences	115	230
Visa	20	40
Porter's Tip	50	100
Contingency (10%)	300	600
TOTAL	**3212**	**6424**

Others

Description	**Budget (per person £)**	**TOTAL FOR TRIP**
Maps/books	30	60
Photography	130	260
Down jacket	190	380
Sleeping bag	250	500
Transport barrels (2)	10	20
TOTAL	**610**	**1220**

TOTAL EXPENDITURE FOR MAKALU 2003

PER PERSON; £4242

TOTAL FOR NEIL AND OLIVER £8484

TOTAL INCOME FOR MAKALU 2003

With thanks to all our sponsors who made our expedition possible.

1.	Imperial College, Exploration Board	£1000
2.	The Physiological Society, BSc Busary	£2000
3.	The Physiological Society, Dale and Rushden Fund	£600
4.	St. Mary's Association	£150
5.	MPS	£25

Total Income per person £3775

TOTAL SHORTFALL PER PERSON £467

Equipment

We have not included a kit list of all the things we took on the expedition but have rather picked out the key things that really helped us on the expedition. Obviously anyone who is considering a trip such as this will have experience of how to dress for the outdoors.

1. Plastic Barrel (approx 60L). This contained all our clothing and most equipment for the whole 6 weeks. It costs a mere £10. They are usually used for transporting things such as olive oil on ships and are thus very waterproof. Porters prefer them and you can sit on them during the evening.
2. Down Sleeping bag and jacket. Buy the best one you can afford. We went for the Rab Extreme 900 sleeping bag and Rab Batura down jackets. They were exceptional, even during the very coldest nights.
3. Large amounts of sun cream, sunhats and decent sunglasses for use on the glaciers.

Acknowledgements

- The Imperial College Exploration Board. For all the money and assistance thank you very much indeed.
- The Physiological Society. Thank you for your very generous grant.
- The St. Mary's Association. Thank you for your very generous donation.
- Rab Carrington Equipment.