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BOLIVIA 2001

expedition report


THE UNIVERSITY OF EDINBURGH

01/05

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BOLIVIA 2001

MOUNT EVEREST FOUNDATION

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BOLIVIA 2001

expedition report

The Organisers

The Organisers of Apex: Bolivia 2001 outside Chacaltaya laboratory, Bolivia, April 2001

From left to right:

Kenneth Baillie: Leader

Roland Partridge: On-site preparations and logistics

Roger Thompson: Deputy Leader

Martin Schnopp: Mountaineering, safety and equipment

Alistair Simpson *(crouching)*: IT, design, photography

Matthew Bates: Secretary

Contents

'I remembered dreaming about bringing a resear
expedition to this beautiful place, and above a
remembered how farfetched the whole plan seemed to b
JK

Introduction

Human function at altitude is one of the most neglected, and consequently least understood, aspects of physiology. As the medical students who created it have discovered, this is not because of any lack of interest, but because of the huge practical difficulties that must be overcome in order to conduct any meaningful research. Warm, waterproof and served by a road, the 5200m high Chacaltaya laboratory removes many of these difficulties. The remaining obstacles were overcome in this expedition by a combination of careful planning and a great team spirit.

Our biggest obstacle in organising Apex. Bolivia 2001 was uncertainty. There was something to worry about at every stage. Would we raise enough money? Would we recruit enough volunteers? Would they enjoy themselves or would they resent the research? Would the expedition be safe? Would my tenuous arrangements with total strangers in Bolivia fall through, leaving us to find another laboratory at short notice? I even spent weeks scanning news on the internet, worried that Bolivia was going to fall into civil war!

Perhaps dealing with these uncertainties has made us better people, but the idea of running an expedition without those nagging worries is very appealing. And that is exactly what we could do if we organised another expedition to Chacaltaya. We will have to repeat lots of the same tasks again – design our research, arrange publicity, find sponsors, raise money, recruit volunteers – but now that we know it is possible, doing it again almost looks easy.

Our next expedition, although it might not happen for a few years, will build on the success of this one, continuing our present research, and starting new experiments. Whilst Apex 2 may lack the novelty of the original, it will better in other ways.

In this report we hope to answer some of the many questions we are asked about Apex. For that reason we describe not only the expedition itself, but also how it came about, from a speculative e-mail to a Chilean scientist to a team of 25 people living in a laboratory at 5200m.

Kenneth Baillie
Expedition Leader

RESEARCH

More and more people travel to altitude than ever before - skiing, trekking, climbing

We will conduct ***cutting-edge*** medical research in this field

6 separate research projects - all original, ***practically applicable*** work

Looking for the cause of ***Acute Mountain Sickness***

Massive ***international collaboration*** with world famous scientists

On the summit of Illimani

EDUCATION

We aim to make science interesting to schoolchildren via ***school talks***

We will deliver ***open lectures*** to the public

We will present a dynamic image of medical research

The team members will receive a ***unique opportunity*** to participate in, and learn about, medical research

Further, the organisers will gain experience of implementing original research

"I am sure that the results of [Apex's] *studies will make a useful contribution to the subject of high altitude physiology"*

- HRH Prince Philip The Duke of Edinburgh

COSTS & SPONSORSHIP

Total cost of the expedition:	£35000
Contribution from participants (including flights and accommodation):	£25000
Breakdown of remaining costs:	
Chacaltaya laboratory fee:	£5000
Research equipment:	£1500
Subsidy of Transport for Volunteers:	£2500
Educational resources:	£1000

In order for the charity to be able to achieve its aim of medical research, it is essential that the necessary funds are raised from corporate sponsorship.

This expedition offers an unrivalled opportunity to fund medical research and education in one exciting project.

Any donation represents an opportunity for our sponsors to share in Apex's extensive publicity, as outlined overleaf.

A full Apex: Bolivia 2001 prospectus and further details are available from:

Apex: Bolivia 2001
c/o Faculty of Medicine Office,
University of Edinburgh,
Teviot Place,
Edinburgh EH8 9AG

e-mail: altitude@doctors.org.uk
website: www.altitude.med.ed.ac.uk

Apex: Bolivia 2001 is a recognised Scottish Charity. No. SC 030345

apex
BOLIVIA 200

"This expedition combines cutting ed research with the stunning high altitu environment and the energy of yout

-Reinhold Messn

apex
BOLIVIA 2001

PATRONS

Sir James Black

"Beathtaking expedition; inspired science; brilliantly conceived"

Professor Sir James Black OM FRS FRSE, a pioneer of modern pharmacology, was awarded the Nobel Prize for Medicine in 1988

Sir Chris Bonington

"These young men deserve every encouragement. They have my full support"

Sir Chris Bonington CBE is Britain's most accomplished high altitude mountaineer

HRH Prince Philip The Duke of Edinburgh

"I am only too happy to offer this "APEX" expedition my whole-hearted support and encouragement"

PUBLICITY

Tomorrow's World

Mentorn Barraclough Carey
-one of the UK's biggest production companies

Watch and Tell filmproduktion
-the famous German production company

Hour-long documentary, broadcast to:
-Britain
-Germany
-USA
-Also **worldwide** by satellite

National TV news
Newspapers
Magazines
Internet

The above demonstrates that this expedition commands considerable public interest. We are therefore able to offer ***sponsor-driven publicity*** - we will approach any publication in which our sponsors would like to be advertised.

Apex (Altitude Physiological Expeditions) is a charity (Scottish Charity number SC 030345 which has been created for the furtherance o medical knowledge of the effects of exposure t high altitude, and for the education of others

Since we are a charity, all donations made t the expedition are tax-deductible

EXPEDITION

19 March 2001 - La Paz, Bolivia

25 March - 3 April - Chacaltaya laboratory: At 5200m, the highest lab of its kind in the world.

4 - 10 April - La Paz, with 4 day climb of Illimani (6462m)

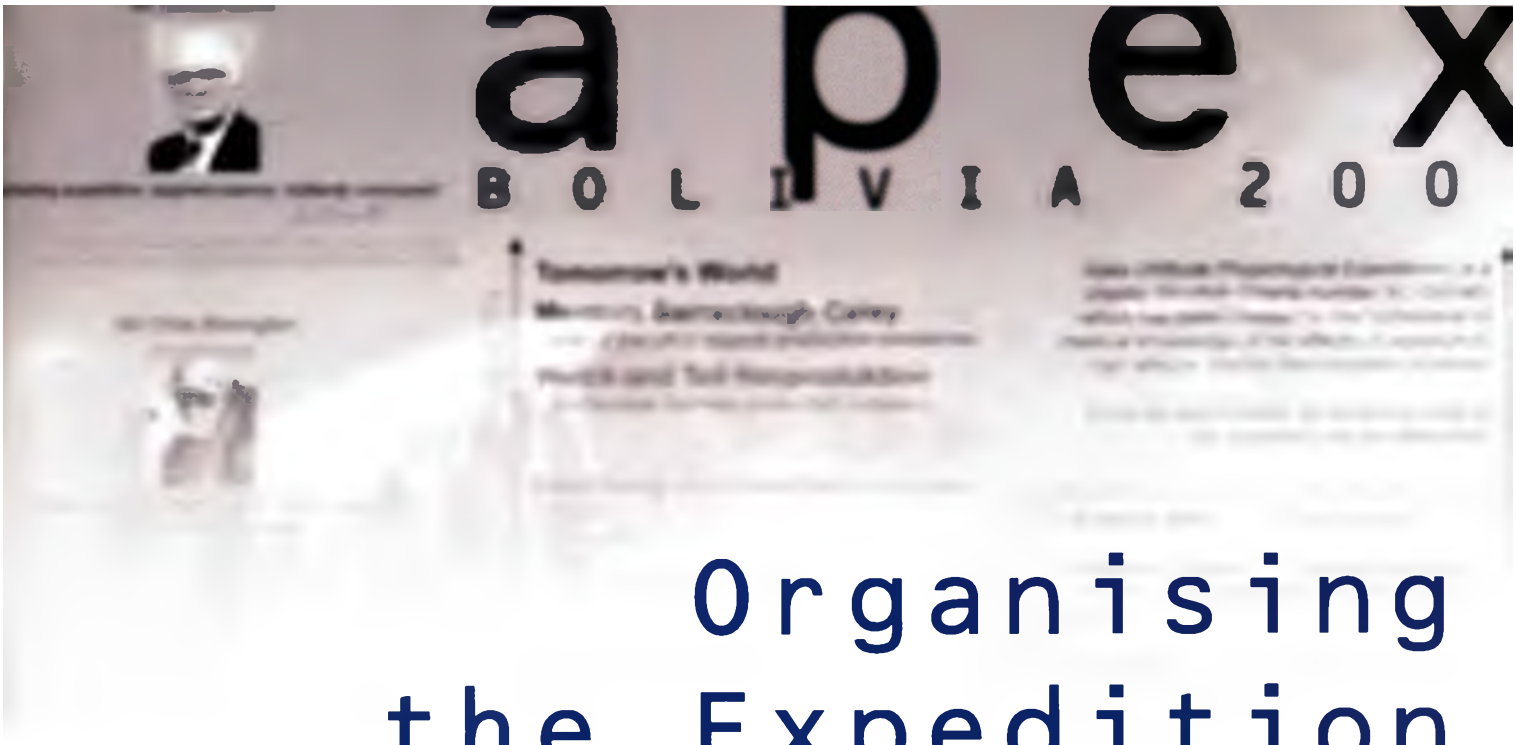
11th April - Return to UK

The use of Chacaltaya laboratory will afford us an unrivalled opportunity for exciting new research.

Further measurements will also be taken during the ascent of Illimani, giving us even more valuable data.

Breathtaking expedition; brilliantly conceive

The Apex publicity leaflet: outside (above) and inside. The document was printed A4 size and folded vertically twice



Organising the Expedition

Where It Began

Kenneth Baillie

The first drive behind this expedition was not a desire to travel, not a love of mountains, and certainly not wanting to be on television. It was simple enthusiasm for science. Our eagerness to discover something new inspired us to devote most of our spare time for more than a year to organising the expedition.

I contrived to meet Prof. Claus Behn, and international expert in high altitude physiology, when I was travelling through Santiago, Chile in July 1999. Prof. Behn and I agreed provisionally to organise a collaborative expedition - he would arrange the facilities at Chacaltaya, and I would provide the subjects.

After visiting Chacaltaya, I made several attempts to organise an expedition before the successful effort of March 2001. A plan to organise an expedition in Easter 2000 with the Army failed because of the growing conflict in Kosovo. Another early attempt to organise an expedition, with our eventual team doctor, Andy Sutherland, failed because we couldn't predict the dates of his holidays a year in advance.

Then Roger said he would join me in organising an expedition for March 2001. We set about selecting the cream of Edinburgh medical school to involve in the project. We asked Matt and Martin to join us, and after some deliberation they agreed. During this period the reputation of the project spread, which turned out to be of great benefit to us because our future artist and IT expert, Ali, whom I had never met before, introduced himself to me in a lecture and said "please, please, please can I come?".

Our First Meeting

Alistair Simpson

February, 2000. After some consideration, and some prompt e-mailing of prospective supervisors, we had our team complete. We met to find out what the expedition would

"Some of the organisers met each other for the first time, and none of us really knew what we were starting. I began by describing the laboratory at Chacaltaya and a rough plan for the expedition. This broad structure hardly changed at all in the following year of debate and contemplation. The plan was 25 volunteers to the Chacaltaya laboratory for about two weeks. As an incentive for them to come, we planned to offer them a climb, and of course we would try to cut the cost of the expedition as much as possible.

"We then discussed each other's intended research projects, before allocating tasks for Easter. Over almost all of that 4 week Easter holiday I lived in the university computer labs, writing a makeshift Prospectus, applying to become an official University of Edinburgh Expedition, and drafting letters to be sent to prospective sponsors. Matt and Roger were also in Edinburgh for much of the holiday, and the three of us set about applying for sponsorship with naïve enthusiasm."

Kenneth Baillie

involve, and to discuss what research we were planning to do.

Present were J Kenneth Baillie, Roger Thompson, Matthew Bates, Martin Schnopp, myself (Alistair Simpson) and Zeeshan Sheikh. I felt slightly tense, as I was acutely aware that the ensuing discussion would involve me having not only to present my proposition of what I would like to research during the expedition, but also having my plan quizzed and queried by the group.

The projects were described in turn. At this time, the ideas were relatively embryonic, and it took several months before our ideas became hard plans.

We concluded the meeting with some discussion of our various tasks over the coming Easter holidays. We allocated tasks to each of us, depending on our availability over the vacation. Cunningly, I happened to be leaving for East Africa a matter of days later, for the entire month, and would be totally unavailable... Matt, Kenny and Roger would be in Edinburgh, and decided that they would meet up to start forming a prospectus that they sent out to prospective sponsors.

It was over a month before the next gathering, in which time the other lads had created our first prospectus, and even our first website. Many, many more meetings followed, with tension, depression, irritation, tiredness, optimism, joy and laughter featuring in varying degrees throughout. But the common feature of a determined sense of purpose remained constant, and still remains even when we meet months after the expedition.

Coming Up With a Name

Roger Thompson

It was one of those meetings. We had something important to discuss and ONE important decision to make. So it lasted about 2 hours. But, I remember sitting in my flat, laughing a lot and thinking it would be one of our better meetings as we pondered what our beloved expedition and charity would be called. We really had to find something a bit catchier than University of Edinburgh High Altitude Medical Research Expedition Bolivia 2001.

There were ingenious suggestions, all stemming from a seemingly unending list of words from which we could get an acronym: Bolivia, Medical Research, Altitude, Physiology, Education, Chacaltaya Laboratory, International, Expedition, High Altitude...lets not get into how we tried to get Summit...

Our top five:

5. CLIMAX: Chacaltaya Laboratory International Medical Altitude Expedition

Aside from other insinuations, we couldn't really fit the words.

4. **ARMEX**: Altitude Research Medical Expedition

Probably too similar to AMREE, an American expedition to Everest.

3. **ASPIRE:** Altitude Scientific & Physiological International Research Expedition

Too corny for me.

2. **BAREX**: Bolivia Altitude Research Expedition

It almost got there but sounded far too much like an expedition to a bar.

1. **Apex**

And the logo? It looked eerily familiar but was definitely only a product of Ali's imagination.

"I remember the name choosing meeting as one of the early comedy highlights of the Apex experience. For one of the first times everyone was able to let their hair down and show a bit of personality within the usually rigid context of a meeting. For me it was a watershed point. Throughout the rest of the planning and conduct of the expedition, similar senses of humour undoubtedly kept us all pulling in the same direction. And that similarity was another fortuitous factor in the success of Apex, since we can all laugh at some very strange things indeed."

Matt Bates

Founding a Charity
Matt Bates

One of the few positive discoveries from those early meetings was the existence of our collective ambition. Personal and shared objectives for the nascent venture of Apex clearly extended beyond those of a standard research project. With all too little encouragement we were nourished by each other's ideas and rapidly became fascinated by the potential for the enterprise. Meetings of six over-excited students were only rarely punctuated by moments of trepidation for the ardour ahead. We wanted to make important discoveries in an exciting field of medicine. We wanted to communicate our ideas. We wanted to inspire young scientists. And, with our educational opportunities and prospective profession suffering through the public perception of medical research, we wanted to present a positive and exciting image of science. We also had vague perceptions of possible 'tax exemptions'.

The establishment of a charity seemed to represent the ideal answer to these desires, and it also served to demonstrate the success complete amateurs can have in initially overwhelming fields. Indeed the whole process was straightforward. The Scottish Council for Voluntary Organisations (SCVO) provided phenomenal support; describing the options available to us and assisting with our application. Administration, proforma and correspondence are inherent to the process but to minimise this hassle we decided to establish a simple 'voluntary organisation' and during some of our more inspired moments we managed to articulate our organisation's objectives of research and education. With these ideas in mind and model constitutions available from the SCVO it really was quite easy to produce our first official charity document; we had some teething problems with wording of the constitution but on the 28th March 2000 Apex became recognised Scottish charity number 030345. It was neither the first nor the last time that an element of good fortune played a role in the success of Apex, since our location north of the border undoubtedly simplified the whole process - recognised Scottish Charities are easier to establish and simpler to operate than the Registered Charities that are their English and Welsh counterparts.

Weekly Meetings

Matt Bates

We had a charity, we had five people, we had weekly meetings; these were the defining features of our organisation for many long months. Yet, tired as some of us became of those circular ceremonies, in hindsight they probably kept us going as a group in the early days. It was somehow therapeutic to be reminded that, although we each had nothing to show for seven days spent writing, telephoning and researching, there were other people out there doing similarly thankless tasks. We were a group that would achieve things because we met to discuss what those things would be.

Initially we were largely nomadic. Usually on Sunday or Monday nights we would gather in someone's room perched on beds and chairs, tables and sofas, pouring out our weekly woes. Personal targets would be set and missed, deadlines decided and extended. Little was achieved but a communal sense of the need to achieve was definitely growing. I can remember driving back to my flat after meetings at midnight or later, struggling to find a parking space and with a new list of things-to-do. The one consoling factor was that there were four other people in exactly the same frame of mind scattering themselves across Edinburgh.

Eventually we began to become organised. We started to regard Kenny's bedroom as our spiritual home, much to the chagrin of his flatmates no doubt; this was to be the Apex nerve centre. Thankfully Kenny's bedroom also contained a legendary chairman in the making and meetings had some focus. We had an agenda, points for discussion and the fabled 'hand' to truncate wordy monologues and prevent interruptions. A flat palm became a powerful weapon and the 'double hand' rarely had to be employed. I still found it difficult to justify to myself why I added four hours to my weekly Apex workload to tell other people about my relative failures but did at least sense that others understood the difficulties.

We became more and more organised and with organisation came direction. People started arriving for meetings with indexed files of important documents, notes were taken of weekly tasks and we began to develop personal areas of expertise. When your responsibilities are listed in a full-colour Excel file somewhere as x, y and z, you do begin to care about x, y and z and miss a lot less deadlines. You even start to achieve some aims.

However I don't wish to portray an unbelievable image of robotic efficiency and self-sacrifice. Meetings weren't always dour and depressing. Many meeting ended with pub trips or table football 'grannying' sessions, we all still turned up late once or twice (some sweatier and more wild-haired than others) and sometimes even the 'double hand' could not silence an argument.

But importantly we all recognised the need for meetings, even at the time of volunteer selection, when our meeting frequency became quite obscene with five or six nights in a week completely occupied with Apex. We needed to discuss things but also needed to keep morale up and I think our blend of efficiency and comedy just about kept us sane. I personally have been through the full range of emotions in that meeting room but would gladly go through the whole experience again. Except holding the duvet covered in sick but that's beyond the call of duty.

The Lowest Low

Kenneth Baillie

As will already be clear from this report, in the first seven months of organising the expedition we did most of the work that brought it into existence. We founded a charity, we made the initial arrangements to use the Chacaltaya lab, we applied to most of the trusts that eventually funded us, wrote to some of the companies who sponsored us and started to arrange publicity with the BBC. When we met at my flat on Monday 2nd October 2000, we had set in motion many of the things that would eventually make the expedition such a success. But we did not know that. At the time, the past seven months seemed to have yielded only a host of intangible arrangements and probable sources of funding, and £500 from the Post Office Young Scot Action Fund. It looked as though the expedition might not happen.

In order to explain our predicament, it is necessary to describe the plan for organising the expedition. Our first aim was to conduct meaningful research at high altitude. To do that, we needed 25 experimental subjects. It was recruiting these volunteers that drove us to do everything else. We arranged publicity, in order to generate sponsorship, to cut the cost, to help us to persuade 20 impoverished students to participate. The end-point of most of our work at that time was recruiting these volunteers. Our problem at the start of October was that although we had several grant applications pending we had not cut the cost of the expedition; although our letter was sitting on a desk in Helly Hansen Marketing Department we had not finalised any sponsorship, and although Tomorrow's World were considering the project we had not arranged any reliable publicity. Although the expedition was on schedule, we had very little to offer prospective volunteers.

At the meeting, I drew this to the attention of the other organisers. I remember that meeting better than any other. We agreed that we were in no state to recruit anyone, and that we would have to act fast because we were running out of time to book cheap flights to Bolivia, and to do that we had to know what names to put on the tickets. Despite all the hard work we had already done, it was clear that we would have to work even harder, for longer, to make the expedition a success. I will never forget the way I felt after the lads left my flat late that night. I went out for a walk in the darkness, trying to calm down and come to terms with the possibility that the project I had started more than a year before, might come to nothing.

It was this realisation that galvanised us into a month of obsessive activity. Roger, Matt, Ali, Martin and I met on average every second day in the month of October. We prepared and rehearsed a presentation to give to prospective volunteers, and we were overwhelmed by the response. We had greatly underestimated the enthusiasm and sense of adventure of Edinburgh's students.

Shortly after that meeting Tommy Hartley, whose job it was to go to Bolivia one week before the group and make sure that everything was in place for our arrival, decided to quit organising the expedition. He arranged for Roland to take his place on the organising team.

"October was one of the busiest months of my life. With GP and Psychiatry finals near and an international research expedition looming there was constantly something new to think about, plan, attempt or actually do. My last thought in bed every night and first thought in the shower each morning was always Apex. Sad but true."

Matt Bates

Money, Money, Money: Part I

Roger Thompson

I handed Kenny a cheque in the Erskine medical library one Saturday morning.

He kissed me.

I don't think that this is Kenny's reaction to every cheque that he receives. It was our first major breakthrough in the long battle for expedition sponsorship. (And it was on the cheek). Many more were to come (unfortunately without kisses) and it was only these generous contributors that made the expedition the success it was, but how did we do it?

"One *meeeeeeeillion* dollars!"

I wish I had a simple answer, but it wasn't easy and took a long time. Kenny asked me right at the very start, "How can we raise money?" Then, I didn't have a clue, but I told him I'd have a go. I hope that in this section of the report I can now give you some ideas and hints based on our experiences. They were very much OUR experiences and the most important thing I could advise about fundraising is to surround yourself with a team of the most talented and dedicated people. I had one.

Set yourself an ambitious target

First, set yourself an ambitious target based on as accurate costs as you can project. When we first did some sums on the projected expedition costs, I had the horrible feeling we wouldn't be able to recruit enough volunteers as the cost would be prohibitively expensive for students. We decided to get as much as possible of the expedition sponsored so that the volunteers would only have to pay a reasonable fee to participate. After all, for ten days they were to be subjected to the rigours of our research.

Where can you get money?

Secondly, find out about from where you can get money. I started with my project supervisors, asking for ideas and suggestions. The University was a great help, not only by having several sources of funding available for innovative student enterprises but for providing a great deal of information through the Department of Research and Innovation and the Development and Alumni Services. There were several avenues of funding available:

Grant-making trusts

There are three volumes to the book, "The Directory of Grant-Making Trusts". But there is no point in making random applications. Only those trusts whose criteria were met by the expedition were even considered (and the criteria are generally quite strict).

As an expedition, the obvious place to look for money was the Royal Geographical Society's Expedition Advisory Centre. There are many trusts that fund expeditions, but again the criteria are strict and frustratingly, high altitude physiological research is seldom among them.

Our first cheque...

By chance I saw a leaf about the Young Scot P Office Action fund. I becam a Young Scot and applied f the £500 they offer peop starting up imaginative n groups. A lady phoned m congratulating me on excellent application b asking, "Where are y going to get the rest of t money from?"

Concealing my doubts, proclaimed that we cou reach our target (at that sta £10,000). She agreed to le us the support of the fu and Apex had its fi cheque!

Roger Thomps

Medical research grants

There are numerous medical charities with a huge variety of grants that can be awarded. Supporting our research was not without difficulty, mainly because it would be conducted outside the UK. However, the analysis was all performed back in Edinburgh and thus Chest Heart and Stroke Scotland kindly awarded three of the projects money. After he spent several months neck-deep in references typing his "baby", Kenny's research won a Project Grant from the British Heart Foundation.

Corporate sponsorship

At the start we were naive enough to hope that some huge corporate company would come along and pay for the whole expedition. After hours at "Hollice's Sponsorship and Donations Yearbook" and several hundred applications...think again. We had superb marketing proposals:

"Red Bull gives you wings at 20,000ft!"

but not a single company gave us money directly. (We did get some Red Bull!) Sending shotgun letters to these companies was not without frustration. One came to expect the barrage of rejection letters that hit the Faculty Office after each wave of applications. But without this aspect of fundraising we would perhaps have missed out on our biggest supporters.

Most of the companies from which we were successful at obtaining sponsorship involved phone contact initially. This is much more personal and although expensive, you will get a pretty good idea if the other person is interested or not. Email is also useful, but consider how many people will be begging for money every day...expect a low return of replies.

Helly Hansen

Matt Bates

This humble sheet (overleaf) effectively gave birth to the document you see before you. In conjunction with Kenny's infectious enthusiasm, the above words were pivotal in the involvement of many of the organisers in the expedition. For despite the obvious inadequacies, there is something tangible about written facts. We were all enticed to join the venture by such matter-of-fact phrases as '26 male volunteers will ascend to the laboratory at Chacaltaya' - we could envisage it happening because it was in front of us in black and white. However we were aware that for our formal approach to national bodies and commercial organisations, a more professional statement of intent was needed. In hindsight, we had remarkably little to say at this point but we did feel that we ought to say it in an impressive and interesting way. Some of us attempted to botch together a prospectus and, after much critical appraisal from friends and family, we eventually produced a four-page document containing some pictures of Bolivian mountains and little else. Embarrassingly for us that document, with

Dr Sam Patel sporting the Helly Hansen clothing

Kenny / Roger.

C1

High Altitude Medical Research, Bolivia, 2001
Brief Profile

INTRODUCTION

We intend to take around 25 young male subjects to 5200m for three weeks in March-April 2001, at the end of which, as an incentive for the subjects to participate, we will attempt ~~Illimani, a~~ magnificent peak which towers above the Bolivian capital, La Paz.

ITINERARY

We will fly from Britain to La Paz (3800m) and possibly spend a few days there to acclimatise before ascending by jeep to the rudimentary laboratory at 5200m, where we will stay for the next fortnight. During this time, in order to occupy the subjects and acclimatise them, we will probably trek around the area, and perhaps arrange day trips to interesting sites. This would involve at least a few hundred metres descent. After this fortnight, we plan to climb Illimani (6460m). If we cannot climb Illimani, we may attempt Huyana Potosi (6091m), which is technically easier. We will then return to La Paz before flying home.

CHACALTAYA

The laboratory at Chacaltaya has power and space for equipment, and a dormitory. The primary aim of the base is cosmic physics research, although there have been several physiological studies performed there in the past. We hope to obtain some relatively simple equipment and freezing materials from the hospitals in La Paz.

WEATHER

The rainy season in La Paz lasts through the high sun months from October to March. We intend to climb Illimani in mid April, when rainfall is below the La Paz monthly average. Furthermore, there is a strong tendency for this rain to fall in the evening, so it should be clearer for an early morning ascent. Each April, La Paz has an average 9 days with rain (33mm), compared with 21 (114mm) in January, and 5 (13mm) in May (all data from Graeme Loudon, Met. Office). We plan to have enough time to select a good spell of weather in which to attempt the climb.

SAFETY

In addition to a comprehensive first aid kit, we will take drugs for the treatment of high altitude pulmonary oedema (nifedipine) and high altitude cerebral oedema (dexamethasone). We will conduct minimally invasive procedures such as venous blood sampling and breath tests, on a daily basis. During the climb, the group will be led by several local professional guides.

"Helly Hansen saw the potential in our original makeshift prospectus, and by the time we presented the expedition to them in person, we were able to promise them television publicity. Having Helly Hansen on board took the heat off the organisers – now we had something tangible to offer the volunteers. It was a timely boost to everyone's morale."

Kenneth Baillie

covering letter, was sent to 43 companies. Rather fortuitously for us Helly Hansen loved it. Six months after posting those letters, we had become all too used to the effects of rejection replies. You could almost feel what they were going to say even before you had opened the slim, smart envelopes. Email responses were more novel but usually equally polite and containing similar sentiments. Helly Hansen emailed their reply, but it really stood out - it is not every day that an internationally famous brand name expresses an interest in supplying clothing for your the expedition. We had had such little experience of this kind of success that we did not quite know how to respond.

Eventually, we managed to arrange to meet representatives of Helly Hansen's marketing department down in Lymm. Filled with apprehension, we presented our plans and an outline of the expedition and they showed us endless lines of clothing. We were shown thermals, inner fleeces, outer fleeces, jackets, trousers, and hats, and all the time struggled not to look too keen or too desperate. We played it cool but managed to exchange a few wide-eyed expressions - they couldn't seriously be offering us all this equipment. Excitement eventually had its effect and we started to model the clothes, knowingly muttering complimentary statements about the quality of the outer wicking mechanism. We were completely out of our depth but enjoying the experience.

To our initial disappointment nothing was decided on the day. We crept back up the motorway barely able to speak. They had liked our amateurish prospectus, so they must have been more impressed by our personal presentation and they wouldn't have made us drive a 400-mile round trip for nothing. But we couldn't lose the feeling that we were a group of students asking for free stuff.

It was with some surprise and the odd hint of elation that I received a telephone call from Helly Hansen head office, saying that they really wanted to support the expedition and would be supplying ALL the clothing that we had been shown in Lymm! This was too much to take. And when I got a message from my flatmate on the way back from the Royal Edinburgh Hospital I completely lost the ability to control myself. Apparently there was an articulated lorry outside the flat and the driver was asking were he could put two palettes from Helly Hansen. Two 4-foot square palettes piled over head height; not a few measly boxes! I couldn't quite believe it and it took me several minutes to realise that our flat was not equipped with the necessary hoisting devices and forklift trucks to handle palettes. My flatmate and I worked joyously for the rest of that afternoon unloading those palettes from the pavement into the flat and checking the delivery list. I had never

What's in the box?

Matt at Chacaltaya

seen anything like it in my life.

The moral of this tale is that no matter how disillusioned you become with writing letters to companies, write more. Since those early days are letters became more slick, our prospectus more professional and our website was born, yet few responses were as ultimately successful as that early reply from Helly Hansen. Just goes to show small things impress and you too could develop the bizarre love I now have for cardboard boxes and shrink-wrapped clothes.

The Tiso Story

Martin Schnopp

One of our classic success stories was Tiso, the Scottish climbing and outdoor retailer. I had always considered them as a potentially interested company as they are based in Edinburgh (just like us) and they always seem to have an open ear for young active outdoor ventures (which was exactly what we were). On phoning Tiso I was told that all 'special' requests have to go through the CEO, Chris Tiso himself. When I managed to get through to him in person, he invited me for an interview to give me the chance to present our expedition and its worthiness to him - scary prospect with so much depending on it. I arrived for the interview and tried to calm my nervous self with a cup of strong coffee. I never considered that this might have a rather different effect.

Anyway, Chris greeted me with a friendly smile and a firm handshake and I gave a caffeine-fuelled presentation of what in my opinion Tiso could get out of us – not why we wanted them (which I am sure he knew anyway). He listened carefully and was immediately impressed. He promised to give us his full support and helped us to approach gear manufacturers. However, at that point we were not too optimistic concerning the response of the various companies. After all we were talking about £40,000 – 50,000 in equipment. To our great surprise, Tiso soon got back to us with fabulous news: pretty much all the gear requests we had were met, and even better, all of it was for free. Throughout the preparation Tiso has always given us good advice and had staff working full-time on our venture. We are more than grateful for everything Tiso has done for us, indeed I see it as one of the main steps towards a successful expedition.

Recruiting the Volunteers

Roger Thompson

For our experiments we needed some research subjects. We hoped we could persuade around 20 students to come with us, although early on some allocations had been made. Our first was probably Yolanda. Being my girlfriend and enthusiastic about the idea of going to Bolivia, even before most of the other organisers knew about the expedition, gave her an outside chance of coming. For a time, girls were not going to be considered as volunteers. This idea ended abruptly when Martin joined the team. Dr Andy Sutherland was another special candidate, having volunteered for the important position of Expedition Doctor. Dr

Sam Patel also commanded a reserved position and was keen to do some research. So we had 17 places to fill from the student population. Shortly after we had recruited the volunteers, Roland Partridge joined us to replace Tommy Hartley as our advance envoy in Bolivia.

In May feature article on the expedition was published in the student newspaper, Hype. We had a good response from readers and had a somewhat forgettable meeting with around 20 of these early interested individuals.

The main recruitment drive started in Fresher's week of the next academic year. We had, can I say, a popular stall at the societies fair. A feat that was not unremarkable as we were not a University society. Quite a significant number of students expressed their interest at the Societies fair, signing up for our open meetings scheduled for mid-October. Mass emails and lecture announcements featured in our publicity for the open meetings and stylish posters were deposited all over the University. In the meantime we prepared by practising our presentations in the RMS to a captivated (*captive?)* audience that consisted of Kenny's unsuspecting flatmates (when they managed to not fall off their chairs).

The three open meetings were very professional and well attended. Probably about 90 students in total heard Ali's phrase, "Bolivia is where the Incas come from". At the end of the meeting, we gave out application forms and were pleasantly surprised that, even after a pessimistic cost presentation of well in excess of £1000, many people applied. Having promised to interview all candidates that returned forms, this left us contemplating numerous gruelling hours of interviews.

But the interviews turned out to be great fun. Most of the candidates were superb and we had a real headache deciding who should come. The questions seemed to adopt a similar theme from each organiser. Kenny always asked if the volunteers would be prepared to go the library to read about the research. Did he expect an honest answer? Ali always asked about climbing experience... if that was crucial then I should not have been selected! I always asked about ideas for fundraising and Matt either asked about what was appealing about the expedition or stole one of our questions.

From Buddhist monks, to amateur football journalists and PhD Statisticians we listened to their stories and why they wanted to come on the expedition. Perhaps the most interesting interview was where we turned the tables on Mr Croft. Medical students posing searching questions in the direction of a consultant surgeon is not a common practice.

At the end of the interview they ALL listened attentively to Kenny's carefully prepared sermon. Let's have it one more time:

"Rapid ascent to high altitude is dangerous and increases the risk of developing the potentially fatal illnesses, high altitude pulmonary oedema, and high altitude cerebral oedema. Also, Bolivia is a third world country and travelling there is unsafe, and mountaineering, particularly at high altitude, is inherently dangerous. The five of us [the organisers at the time] are going to expose ourselves to these risks, and you have asked to join us. If you do, we will not be responsible for your safety during the expedition." JKB

In the end we got our 20 volunteers although along the way we had to make use of our reserve list with people pulling out for a variety of reasons. I hope Claire, Tessa and Michael don't regret it too much.

I reckon we couldn't have done much better with the group we selected. They were fantastic.

The whole team together at Chacaltaya. From left to right. Back row: John Somner, Johnnie Balfour, Jonathon Heggie, James Read, Ian MacCormick, Peter Hall, Ruth Mottram, Andy Sutherland. Middle row: David Dorward, Jenny Fleetwood, Amanda Maple-Brown, Yolanda Bennett, Sarah Grant, Cath Mountford, Hazel Batty, Heather Smith, Sonia MacCallum, Trevor Crofts, Catrin Meurig. Front row: Alistair Simpson, Matthew Bates, Roger Thompson, Kenneth Reilly, Martin Schramm, Sam Patel, and Roland Partridge.

Meeting the Volunteers for the First Time

Alistair Simpson

Undoubtedly one of my happiest moments of working within Apex was the few hours, spent largely in the Teviot Middle Bar, after the first meeting with the volunteers. I remember distinctly speaking to Cath Mountford, now a close friend of mine, about the optimism I felt on seeing the group together for the first time. We drank, chatted, and familiarised ourselves with the people who we would see increasing amounts of before we spent a month together, often in restricted surroundings, on the other side of the world.

The meeting had started 7pm. Kenny, Matt, Martin, Roger and I were waiting as the first of the new recruits arrived. This was also our first meeting with Roland, whose job it would be to go to Bolivia a week before us and check that our arrangements were all in place. I spent some of the time as we waited trying to remember who each person was, and what had endeared us towards them.

Eventually, we were all gathered around the table, with the organisers monopolising the far end, and Kenny sitting at the head of the table. He addressed the assembled group: the first time the whole team had been present in the same location at the same time, and then got everyone to introduce themselves. This still didn't help me to remember everyone's names.

The main topic was fundraising. We were by now spending great deal of our free time trying to glean money from often tight-fisted corporations, and frequently with little success. We were pleased to find that not only did the volunteers have quite a few ideas, there was also an air of enthusiasm, and everyone seemed genuinely interested in helping out.

And at the end of the meeting, we adjourned to the pub next door, and everyone started to get to know each other. There was a long way to go, but things were finally starting to come together. And we had now gone from six busy organisers, to a 26-strong motivated team.

Television

Kenneth Baillie

Kenny confronts the cameras

In summer 2000, our applications for corporate sponsorship had been wholly unsuccessful. The reason for this was undoubtedly the lack of a concrete promise of publicity. Although we had great plans and the literature that we produced stated with confidence that we intended to publicise the expedition in newspapers, on radio and on television news, we had nothing tangible to offer. With this in mind, I sat down to write to television companies. I had written hundreds of letters selling the expedition, but this was a new challenge. I knew nothing of the television industry, and I didn't even have a television. So it took me four whole evenings to write that one letter. Four long evenings, of blank, absent staring broken by frantic paroxysms of typing. I spent much of the following week tinkering with it obsessively, before tailoring three different versions to Channel 4's *Equinox*, BBC 2's *Horizon*, and BBC 1's *Tomorrow's World.*

To his eventual regret (see "Fantastique!" below), Roger spent a considerable amount of time altering this letter and sending it to many

production companies. Our combined efforts were so effective that by Christmas, television companies were fighting with each other for the rights to film the expedition.

The first news of success came on a scrappy note stuck to my bedroom door. "Saul Nasse called." The simple note had fantastic implications for our expedition - Saul is the editor of Tomorrow's World, and he was clearly interested in the expedition. The best publicity we could have hoped for was almost within our grasp. Publicity would earn sponsorship, and at the time that was what we needed more than anything else. I have to admit to being more than a little excited to see the note.

A few months later I flew to London to meet the editorial team of Tomorrow's World. I revised some altitude medicine and went into the meeting armed with an array of dramatic stories about altitude illness.

I spent about an hour cautiously answering their questions about the expedition. The seemed to particularly enjoy my portrayal of what the viewers would see if someone became seriously ill.

I also described the drowsiness, lethargy and irritability that I expected to see within the group in Chacaltaya, and how fights might break out within the group. I found myself in the bizarre position of predicting, and describing with enthusiasm, the very last things I wanted to happen during the expedition. I was selling them a disaster that I worked every day to prevent.

During one animated monologue about my experiment I was abruptly interrupted. "Will there be snow?" an interrogator snapped, with a decisive tone that suggested that the absence of snow from my experiment would render it completely uninteresting to any normal person.

I had no choice but to answer "Yes". I took a gamble with global warming and with the absolute conviction of a wilful liar I promised them a covering of snow on Chacaltaya. My hasty prediction was correct – the snow cover began about twenty metres below the lab buildings!

'Fantastique!'

Roger Thompson

For a short period in the last year someone managed to phone me more than Kenny.

"Hello, Edward" I would say without waiting for the caller's name.

"Rogerrrrrrr! I have more question" was invariably the answer.

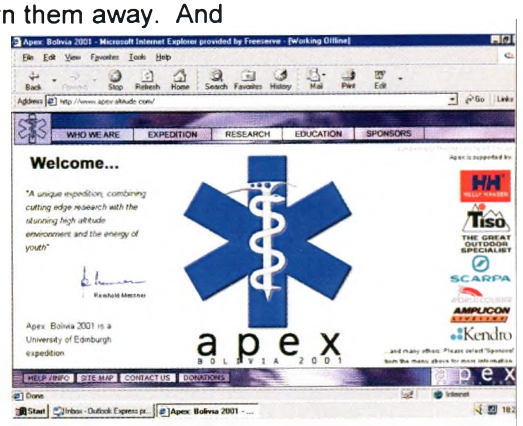
In our quest for publicity, while Kenny contacted the major broadcasting companies, I wrote to a number of randomly selected production companies that made documentaries. A producer called Edward from a large production company took a keen interest in the project from September 2001. His broken English and accent (which I still cannot place) often turned my ear for hours. Edward greeted each minuscule piece of information I gave him with "FANTASTIC!" shouted in a way that only he could. From the cognitive testing to his film crew having 24-hour supplementary oxygen we discussed how an exciting TV show could be made. For a while this was great fun, but after the fourth phone call in one evening it could grow tiresome. I was relieved when he started to phone the other organisers. "I have form relationship with Roger....I must form relationship with you", they were told. "FANTASTIC!", I

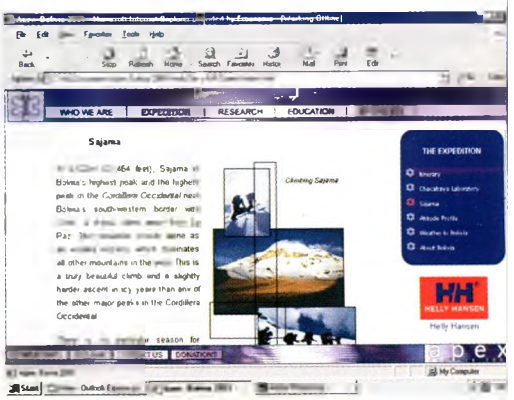
said. Soon the volunteers were getting phone calls too. Indeed with all this research and with all his work on the 'treatment' that he sent out to broadcasting companies, (a document selling the possible production, which in fact contained a lot of text that would be familiar to Kenny) Edward put a lot of time and effort into making a documentary about the expedition. However early on I told him that we had an arrangement with the BBC. "No problem" he said "my boss was big in BBC".

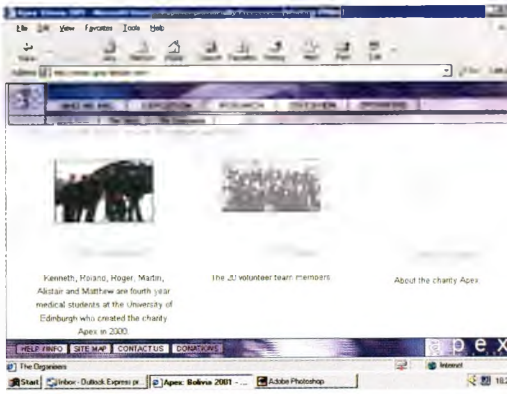
Edward hoped that two crews would be able to film different documentaries. He thought collaboration would save money and therefore interest the BBC. But he didn't have a buyer for the programme. Only in February, did he get the go-ahead from a broadcaster, and only the week before the expedition was the funding finalised. It was too late to start negotiations with the BBC. The Beeb were already coming and we weren't going to turn them away. And despite stern conversations between Edward and myself and remarkable exchanges between his boss and Kenny, nothing would change that.

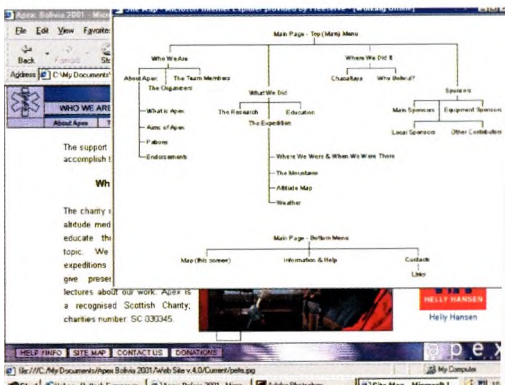
It saddens me to think that I may never meet Edward. At one stage we were on stand-by to put him up for a weekend so he could "see how we live". Now, I only hope he will forgive us enough to cover the sequel...and break the old sequel-is-always-worse trend.

Screen-shots of version 4.37 of the Apex: Bolivia 2001 website









Creating the Apex Website

Alistair Simpson

My main responsibility for Apex was the creation and maintenance of a website. It was a task that was to excite, worry, depress and thoroughly tire me out. But I am exceptionally glad to have done it.

When I made the first site, it was to replace the rather rudimentary affair that was created by Matt and Kenny over Easter 2000, which was hidden in the Edinburgh University website. I was determined to create a professional site, which not only worked, but would also look good and create the sort of image for the expedition which would make us stand out, even on the confused plain of the internet. The one I made was not bad, and had a simple menu, and some appealing graphics. It even worked... But there were several design faults, and it did not view too well on smaller resolution screens. And I wasn't happy with the appealing graphics... I was pressured into making continual changes to our site, and ultimately, I decided that the only way to progress was to create a completely new one.

It took me a long time. By this stage, we had a lot of information on the website, and that meant a lot of pages to be re-made, and a lot of pages to be fitted onto a menu system. And I didn't know how to make the menu system I wanted.

I spent days wondering around bookshops and libraries trying to find the code I needed to make the menu system, and nights in front of computer screens trying to make it work. There was one night when I didn't sleep at all, working in a haze of semi-consciousness, writing screeds of

unintelligible code. I was so tired the following morning that I nearly walked into the wrong flat on my street. And I was not happy.

I added the new Apex logo I had made to give us the essential corporate identity we needed, and eventually, version 3.0 was born. Improvements were made, and the textual content updated as necessary, but none of that took too much time. Despite this, there were still times when a significant number of updates would have to be made, and these would often result in more late (and some absent) nights spent in front of a buzzing computer in my tiny study room.

Just before we left, there were a great number of such updates and improvements to be made, to ensure that the website looked slick and sexy whilst we were in Bolivia, when people would hopefully be looking at it, since both ourselves and the BBC hoped to upload regular updates of the expedition's progress.

And so as the bus pulled away for Heathrow, I left online a new version, 4.0, which included a new URL: www.apexbolivia2001.com, which we had purchased just a few weeks beforehand, and a redesigned layout.

Whilst in Bolivia, I made updates to an online diary on the website. We had originally hoped to be able to broadcast live from the laboratory via a webcam; however, the satellite phone and other equipment and services we would have required were too expensive and logistically impossible to arrange. Still, the diary entries I wrote in Chacaltaya lab were enjoyable to write, and hopefully entertaining to read. Sadly, when we headed off for the climb of Sajama, I was no longer able to make the updates, since I couldn't take the laptop with me. As a result, the diary entries ended somewhat prematurely.

There were, predictably, many changes to be made to the site once we returned to the UK. I spent at least one solid week producing an animated introduction and menu system, only to later find that these loaded too slowly, and had to be abandoned. The guys gave me changes to be made to their project summaries, including some of the results, and I put these, together with some photos from the expedition, online.

At the moment of writing, the website is at version 4.37, and there are still some updates to be made. Such is the nature of the work, the site is never static, and constantly being updated. I have learnt an incredible amount about HTML programming, having picked up a huge variety of useful codes and also learnt how to create Flash animations, even if we couldn't use them on our own site as yet. I have, despite the sleepless nights, and desperate depressions, found it an incredibly rewarding process: after all, I have created something tangible which forms a cornerstone of the expedition's publicity. Just don't ask me to do Version 5 yet.

Planning the Climb

Martin Schnopp

How do you get 26 inexperienced people who have no equipment whatsoever safely up a potentially dangerous 6,500m mountain? This was exactly the question we were asking ourselves. We were literally faced with a huge mountain to climb. To ensure a safe expedition, we would have to make sure that the whole group has:

a) the clothing and equipment,
b) the skill and knowledge,
c) the enthusiasm
d) and lastly, a watertight safety backup

to climb one of the biggest mountains in the world. Easier said then done! In the beginning, a lot of people called us crazy for even attempting this. However, we were convinced we could make this work and even more importantly, we were convinced we could make this work safely. But where to start?

How about approaching famous climbers to get their support? That was exactly what we did! And why not start with the world's most famous climber, Reinhold Messner (first man to climb Everest without Oxygen, first man to climb all 8000+ mountain, etc)? We managed to get him interested in our venture and he offered to officially endorse Apex: Bolivia 2001. It took many, many tries but eventually I made it. For me, it was a marvellous experience to speak to Reinhold Messner, one of my childhood heroes and to find that he had an open ear to what I had to say. Up to this day I still consider this step as one of the key ones to a successful Apex expedition.

Clothing & Equipment

The climbing hardware was our first target. In the first six months of the preparation of Apex we contacted every possible source of equipment including all major manufacturers, retailers and private equipment pools with no apparent success.
Then, as described below, things started to kick off. Helly Hansen agreed to give us a full clothing system, and then Chris Tiso, of the Tiso outdoor retailers, offered us his full support. With his help and generosity we quickly managed to persuade other manufacturers of the worthiness of Apex: Bolivia 2001 and all our climbing equipment problems were solved.

Building Skill, Knowledge & Enthusiasm: Training Weekend

Probably the most exciting bit of the preparation was the training of the volunteers, a few of them having never been up any mountain before. We involved Scottish Mountain Guides in the training of the volunteers by organising a training weekend in February, two months before the start of the expedition proper. This weekend covered all the mountaineering skills and safety aspects necessary in detail. Unfortunately, I did not have much joy on the weekend as I managed to injure myself on the first trip up the mountain – as the group chose to describe it, I "schnopped" myself. So for me, the weekend was over before it had even started. But that did not keep me from going to the pub at night for some group bonding. Even though I had to be carried the 2-3 miles there and back by Andy who then collapsed. A few days later I was diagnosed with two torn inner ligaments and one overextended outer ligament, the effects of which I still feel. However, everybody else really enjoyed the weekend and volunteers and organisers the same got a good start to becoming friends. Now, the whole group was eager to get to Bolivia and was really looking forward to the climb. This way we managed to kill three birds with one stone (and one we ran over on the way back): Skill&Knowledge, Enthusiasm and injured the Schnoppman. To reinforce skills our plan was to train more on Chacaltaya with the local guides.

Training in the Cairngorms

Safety backup

For arrangements in Bolivia we decided that we would liase with local Bolivian climbing companies to help us with all the logistical work and safety backup in the Andes. With the publicity that we could offer, we soon had quite a few offers and were able to choose freely. That sounds quite positive but unfortunately we were spoiled for choice and really did not know who to choose. It eventually came down to two options with Bernardo Guarachi, a Bolivian national hero on the one side and Carlos Escubar & Eric Miller on the other. For me that was an internal conflict, as I knew that the decision would eventually depend on who I favoured. But that of course also meant that I would be responsible (or rather: feel responsible) for everything happening on the climb. One of the most important decisions in my life! In the end, we set the decision for group vote and I decided to favour Carlos & Eric (but not without changing my mind at least 5 times) who then received the majority of votes. In close collaboration with them we worked out all subtleties and in the end had all eventualities covered.

With all these preparations we confidently left for Bolivia and were hoping for a good and enjoyable climb.

Money, Money, Money: Part II

Roger Thompson

Why would anyone give you money?

Thirdly, think about why people would give you money. Set out your aims and objectives clearly on paper and think about how the company or trust would benefit by supporting you. One of our early applications was to the British Council Youth Millennium Awards. Although unsuccessful, for me this application made us define both our personal aims…

"To demonstrate in a novel challenging context the extent to which the motivation teamwork and efficient organisation of young people can overcome logistical obstacles that at first seem insurmountable." MGDB

…and the overall aims of the expedition including how we would realise these ambitions. Paragraphs from this application have been used again and again. However, it also taught us that you couldn't bend the aims of the expedition to fit the criteria of a fund.

Presentation is important

Fourthly, present yourself in an appealing way. Whether a letter, email or phone call, make sure you make a good impression. Aside from being polite, professional and patient, we did this through our leaflet, website and prospectus.

Get help

Finally, recruit 20 or so willing volunteers who will gladly organise raffles, fundraising nights and pub quizzes and devote time to collecting money in the street and in pubs.

Now wait for the money to roll in

…and wait

…and wait

Fundraising

Yolanda Bennett

I expected that being a volunteer for the expedition, I would have to make a fool of myself at some stage. In the name of charity and the willingness to do anything for a laugh, a group of hardened volunteers and myself collected money from some local pubs dressed as doctors and scantily clad nurses.

Following the success of that night we planned to repeat the experience, only this time Amanda and I hoped to convince the organisers to dress as the nurses.

I was amazed when Martin and Roger put on their bras and donned their pantyhose. Here were two guys so devoted to their research and Apex that they were prepared to sacrifice their dignity and their buttocks (much pinching took place)... or was there some other deeper seeded explanation for their enthusiasm to dress in womens' clothing? Either way, the fundraising was a success and thanks to the generosity of the drinking public in Edinburgh, approximately £700 was collected over the two nights to help with the research costs.

A normal Saturday night. Left to right: Martin, Yolanda and Roger

Preparing to Go

Roland Partridge

The first few weeks in March were fairly hectic for all involved in the expedition. All of the organisers and most of the volunteers had exams of some sort, and there was still a shed load to do before we would be ready to leave the country. No matter how well in advance everything is planned there are always little and unexpected things that crop up at the last minute. Much time was spent collecting, logging and packing all the equipment we would take with us, and then distributing it among the 26 of us such that no one would go over the allotted luggage allowance. Finalising the experimental protocols that we would need to be able to carry out faultlessly in very challenging conditions took another hefty chunk of time. Labelling blood tubes and sealing them in individual bags for each member on each sample day was a particular favourite. A week before leaving the six organisers met to run through a 'mock expedition' and develop contingency plans for all that could go wrong. When taking 26 people and thousands of pounds worth of borrowed equipment to one of the harshest environments in the world, all under the scrutiny of a BBC film crew, this is a sobering experience. Despite this, there was a massive buzz as the months of planning were finally coming to fruition. We all felt confident that our meticulous planning would see us through most potential obstacles, but not without a little fear and trepidation we left that last meeting, the last time we would all be together before La Paz.

The Blood Team

Matt Bates

By January, things really had started to take off and the expedition finally looked like it might actually take place. This was satisfying. But any satisfaction was inevitably tinged with a growing sense of trepidation about the logistics of research at altitude.

We had all read books filled with tales of woe concerning the effects of hypoxia on organisation, and desperately wanted to eliminate as many sources of cock-ups from our precious little expedition as humanly possible. Also, it became pretty clear that to fit all the individual research protocols into single days was going to be a mammoth task. Time to get involved. Kenny set about constructing the document that was to become the infamous 'schedule' in an attempt to coordinate all the research projects, Roger and Martin fought their respective research corners and it fell to me to oversee the collection of blood samples during the expedition.

Roland, Kenny and I all required blood samples from the volunteers but it seemed an age before we were able to establish the volume of blood we each needed, let alone the collection conditions and storage temperatures necessary for each assay. It was truly phenomenally complicated and made all the more difficult because we rarely got a definitive answer as to how we should collect the blood -apparently people don't have much experience of working in the field at 5200m! This was probably all to the good however as we had to think for ourselves, uncover solutions to problems and proceed via trial and error.

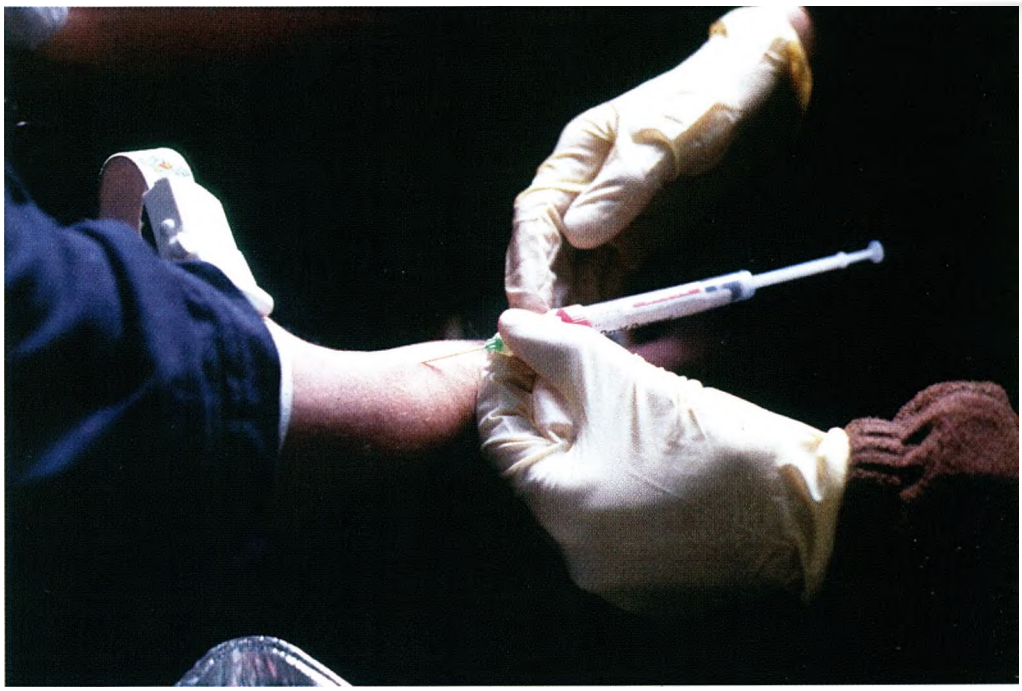
We began to work out the necessary volumes of blood and some idea of how the process would run - we realised very quickly that we would need a team of people working pretty much throughout the day to achieve our objective. The whole idea of blood sampling had taken on a new dimension. Suddenly we needed a 'Blood Team' involving everyone from enthusiastic first-year medics to eminent consultant surgeons and we required litres of blood to be frozen at altitude - it was quite a challenge.

With Tomorrow's World coverage now a certainty and the expedition imminent we were able to approach many companies with a great success rate. We decided to use Sarstedt Monovette blood tubes for blood collection as we all knew these worked well and could be spun directly in centrifuges. Sarstedt were extremely generous and provided us with innumerable needles, syringes, collection tubes, pens, labels and the like. However this meant that we needed to source special centrifuges that could handle these particular blood tubes. With weeks of hard work, Roland pulled out all the stops and managed to persuade Kendro Laboratory Products to give us the centrifuges.

With equipment rolling in (or should that be Roland-ing) we set our minds to developing written protocols for the 'Blood Team' and making the whole process more slick. This is where the well-intentioned but deeply distressing idea of 'pre-labelled' tubes began. Members of the blood team could cope with most of their responsibilities but labelling sessions in my kitchen really were pretty trying.

Incomplete sections of blood team met a few times for long sessions at the Western General Hospital. We had to test protocols and train people to use the centrifuges and to take blood properly, but we learnt together and even managed to stave off a few potential problems. While in the labs at the Western, we realised that we were going to have difficulties keeping our samples stored at the correct temperatures for three weeks in Bolivia and that the 'shake, poke, shake' method of removing sample vials from large containers was really not very efficient. However we also came across the name of World Courier for the first time during

those training sessions. And, with some fairly cunning negotiations following this initial recommendation, Kenny persuaded World Courier to become one of the major sponsors of our expedition. Their representatives arrived at Chacaltaya three times to collect our samples and transport them back to Edinburgh. It was a remarkably generous offer and made the expedition much more manageable for us all.



"...you'll feel a slight scratch..."

With equipment and transport organised, the only remaining weak link in the blood team chain was our own inexperience. We practised endlessly and tried to remember the protocols but the true test came when we conducted our first sampling day in Glasgow. Apex: Bolivia 2001 moved en masse to a random room in a Glasgow hospital for 12 hours and we learnt several lessons. Number one: the blood team worked, in fact it was a pretty slick operation; number two: tiny, silly mistakes can ruin huge amounts of hard work. Roger's experiment had to be postponed because we left one piece of equipment in Edinburgh, but it was an extremely valuable lesson to learn. Haunted by the image of Roger's face in Glasgow that morning, I packed and unpacked, checked and re-checked the blood kit before departure. The centrifuges travelled separately but the rest of the equipment was contained in one big barrel, one small barrel and a big ass bag. The responsibility of quartermaster status nearly killed me and it is the last time I will ever be up until 3am cutting polystyrene on the night before departure, blood team or no blood team.

'It had taken us over a year to plan, and had taken over our liv
But I still didn't feel that we were really leaving for Boli

The Expedition: Chacaltaya

Meeting in George Square

Alistair Simpson

I had not slept much the previous night. I remember distinctly careering down Regent Road on my bike towards my flat, returning as I was from Matt's, into head on snow at about 1 or 2am. I had not intended to be that late, and still had unchecked bullet points on my post-it note task list. Including packing... And so when I arrived with my flatmate Ruth at our meeting point I was pleased to find that I felt quite lucid.

Several members of the expedition had already arrived, and many others arrived in the ensuing few minutes. Deep down, there was probably a feeling in me that this was it: this is the start of what we had worked for the previous 13 months to achieve, we were finally about to leave. Mind you, it was so deep down that I didn't actually notice it, and instead simply wandered around, taking a few shots with my camera and greeting people as they arrived.

We had recently taken delivery of a few items that we hadn't yet dished out to the team, and so Sigg bottles from The Gorge Outdoors were handed out, and for those of us who hadn't had much of a breakfast, some extremely tasty Dorset Flapjacks and Red Bull were to hand. Our four barrels were topped up with a few last minute additions, and labelled 'Hostal Republica, La Paz, Bolivia'. I even wrote two of those labels, and still it didn't really feel like we were leaving.

It was a cold morning, but when it started to snow, it was just simply not on. It was, therefore, with a certain satisfaction that we got the group photos out of the way, and ran, eyes screwed up against the wind, onto the warmth of the bus. I felt distinctly smug at leaving the cold, snow and darkness behind...

Centrifuge capers

Hazel Batty

[Two of our group volunteered to look after our precious Kendro Laboratory Services centrifuges, or 'fuges, for the journey to Bolivia. One of them, who may have been driven mad by the experience, describes the journey below.]

"Well it was extremely early, on a cold Sunday morning in April. In George Square surrounded by the bustle and excitement and lots of other bags and boxes huddled two lone centrifuges. These are the main characters of the story: our centrifuges, which we named Les and Tino.

"They were assigned a guardian each, in the form of David Dorward and me to carry them around and make sure they were doing OK.

"The overnight stay in Heathrow didn't bother Les and Tino. They had addresses written on them and were decorated with pretty tape. They were always guarded by two people and with all the ice axes around they knew they were well protected.

"Unfortunately David and I had to carry the 18kg 'fuges for a long expedition through Heathrow airport. As the 'fuges were delicate large souls they wouldn't fit in the lockers on the plane, so with a bit of help from a personal BBC letter they were boarded early. This meant they got to meet the pilot and look round first class, before being placed in the stewardess's lockers.

Hazel with her 'fuge

An Ode to a Gas Cylinder
by Roger Thompson

You are a tiny metal can
And yet you mean so much;
Needed for my Normocap,
Your story hearts should touch.

It all began in February:
You came from Datex-Ohmeda.
For this to rhyme I must inject
Acetazolamida.

I checked that you were safe to fly
And Datex said, "that's right".
"No problem!" said our airline,
"We'll take you on our flight".

Your little, silver, unpierced form
Got safely to Miami,
But on that humid Monday night,
Guards panicked when they found ye.

Though tired and a little mad,
I argued for your freedom.
But reason did not sway the guards:
They sent you to hell's Kingdom.

If you were for a life jacket
And not for my research,
I might have stopped them taking you,
But they left me in the lurch.

And when I came to rush onboard,
The door had closed, oh shit!
My heart sunk as the guard then said,
"Its my job to destroy it".

[Some further evidence that a stay at altitude can induc transient insanity]

"In Miami the 'fuges decided against the beach as the salt and sand didn't agree with them, also their pants weren't white enough or big enough to be able to fit in with the rest of the swimmers.

"Les and Tino were literally spinning with excitement on arrival in Bolivia and didn't seem to be affected by altitude (although their carers were when they

carried them off the plane). They were flattered by the Bolivian airport workers' desires to push them on the luggage trolley. They made it to the hotel and had survived the journey. Their helpers had been careful with them as they were the only centrifuges and without them the blood experiments couldn't be done."

Arriving in La Paz

Martin Schnopp

I came off the plane in La Paz and immediately started feeling a bit queasy in my tummy. "Lucky I didn't really have any substantial food on the plane", I thought to myself. I felt so dizzy and weak that I had to concentrate on walking straight. Hmm... Why was that? It took me a while to realise that by getting out of the pressurised air cabin we ascended by more than 1000m. And all that in a matter of seconds! "Very impressive that the human body can cope with such pressure differences", I thought.

Anyway, after more than 48 hours of no proper sleep – this was not really the way you want to start a day in a new country! And to make matters even worse, as soon as I came out of the terminal there was a camera in my face. "Hey, who are you? You shouldn't do that, should you?" Well, here they were, the *BBC camera crew* - Waiting for us like lions wait for their prey. I tried my best to produce a smile or two and give a small interview but I just couldn't be bothered.

Above: No sleep, no oxygen and there's the BBC

Left: Arriving at La Paz airport

Below: Kenny in contemplative mood

We all picked up our luggage and were just one the way out of the airport as something caught my eye. A little Bolivian man was standing there with a big sign saying 'The South American Adventure & Trekking Company'. As he spotted me he came walking towards me to greet me with a firm handshake and a huge beam on his face (can a little man have such a big smile??). It was Carlos Escubar, our mountain guide who I had been really looking forward to meet. He had been waiting with two of his brothers, their smiles just equally as big. We exchanged all the necessary details and after loading all the equipment onto the bus a few of us including me got the honour to snatch a lift with the 4-wheel drive Jeep Carlos brought along. With our appalling grasp of the Spanish language and their lacking English skills we tried to make conversation, which must have been one of the funniest things for any outsider. But hey, we were in the jeep, each of us just as bad as the other in the foreign language but with hands and feet flailing about you can always make yourself understood. The picture just before we descended into the smog of La Paz I will never forget – such a contrast of overcrowded city life and desolate landscape in the background. "Just like a film set", I thought.

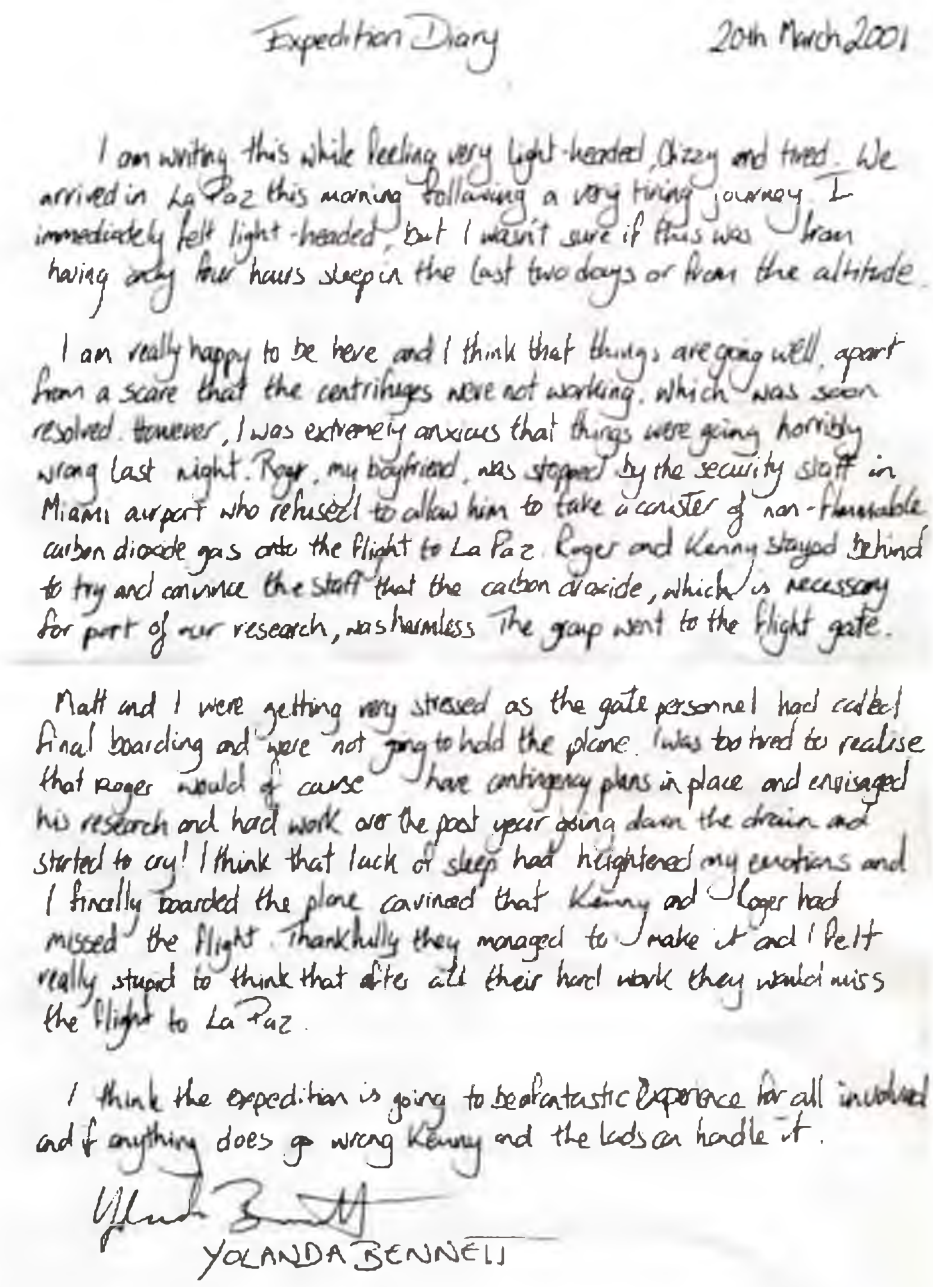
We arrived at the hotel and it seemed like an eternity before we could move all our baggage into rooms. Now, finally at our

destination a lot of things had to be sorted out on site. Once all the important things had been taken care of, most of us enjoyed the rest of the day by getting sunburned, food-poisoned or the like.

La Paz Advance Envoy

Roland Partridge

Four days after my first batch of medical finals, I found myself on a plane to La Paz. Accompanied by my father who had escaped the rigours of general practice for 10 days, we touched down in Bolivia. As the advanced envoy to Bolivia, we would spend the next 6 days sourcing equipment and finalising the arrangements that Kenny and the team had made from the UK. Using our best 'Fast-Show' Spanish and many hand gestures, we checked the arrangements for travel, accommodation and food.



Expedition Diary 20th March 2001

I am writing this while feeling very light-headed, dizzy and tired. We arrived in La Paz this morning following a very tiring journey. I immediately felt light-headed, but I wasn't sure if this was from having only four hours sleep in the last two days or from the altitude.

I am really happy to be here and I think that things are going well, apart from a scare that the centrifuges were not working, which was soon resolved. However, I was extremely anxious that things were going horribly wrong last night. Roger, my boyfriend, was stopped by the security staff in Miami airport who refused to allow him to take a canister of non-flammable carbon dioxide gas onto the flight to La Paz. Roger and Kenny stayed behind to try and convince the staff that the carbon dioxide, which is necessary for part of our research, was harmless. The group went to the flight gate.

Matt and I were getting very stressed as the gate personnel had called final boarding and were not going to hold the plane. I was too tired to realise that Roger would of course have contingency plans in place and envisaged his research and hard work over the past year going down the drain and started to cry! I think that lack of sleep had heightened my emotions and I finally boarded the plane convinced that Kenny and Roger had missed the flight. Thankfully they managed to make it and I felt really stupid to think that after all their hard work they would miss the flight to La Paz.

I think the expedition is going to be a fantastic experience for all involved and if anything does go wrong Kenny and the lads can handle it.

YOLANDA BENNELL

We visited the lab itself to check out accommodation facilities, power supply and cooking arrangements. After digging part of the track clear of the previous night's snowfall, it was awesome to finally be at the lab around which the whole thing was based. While basic, it was clear that the lab would be more than adequate for our needs. And in an absolutely beautiful place. Concerns about cooking arrangements were answered when we managed to negotiate with Martha (the lab's part time cook) to stay at the lab for the full 10 days. This turned out to be a great boon and saved us a lot of hassle.

Vital pieces of equipment we had to get hold of were a couple of CO_2 and O_2 cylinders for Roger's experiment and some portable O_2 cylinders for emergency use. Roger had arranged this in advance with Praxair Gas, but it took us three trips from La Paz to the nearby depot in El Alto before

we had all we needed. Perhaps 'dos cylindres oxygenea grande pour favor' wasn't clear enough. Less language problems were encountered with IMBEX, the car hire company who had agreed to provide a jeep at a very cut rate. Insurance problems hit us here though. Since arranging the deal over the internet a couple of months previously, IMBEX had switched insurance companies and no longer insured under 25's. Other options were looked into but because the deal with IMBEX was so good, it worked out cheaper to stay with them and hire one of their drivers for the whole time. So Raul joined the team, kept company by the driver already hired by the BBC to pilot their jeep.

Our time was hectic and a little stressful at times, not least on the second day when my Dad's wallet was stolen in La Paz, and then promptly returned by a mass street gang who rounded on the thief and returned the wallet. A couple of days before the expedition arrived, we were joined by Nikita and Sian, the director and producer of the Tomorrows World programme. I received some training on use of a small hand held camera, which I would later use to take footage of the climb, and we finalised the arrangements for filming and meeting the main party at the airport. With a nervous excitement I went to sleep the night before the rest arrived, looking forward to the challenges and experiences that lay ahead.

The Film Crew

Martin Schnopp

The film crew – our always present shadow for the time of the expedition. We had first met them at the training weekend in Aviemore and at that point we could not imagine them ever making it up into the Andes. They were a jolly lot, always up for a laugh and an integral part of the group. They stayed with us during the expedition and joined us on our nights out – or shall I say we joined them (as they were always the first to be out).

Kenny with Sian Griffiths, producer of the *Tomorrow's World* programme

Sian, Nikita, Gill, Scott and Sophie were always eager to capture everything on camera. As soon as something was going on they were there – often before other people knew what was going on. Their filming work, sometimes sinister, now and then funny, occasionally arty, often provocative but always professional. A classic example was when they interviewed me on my research and I told them about all the intricacies of the project (which of course involves attaching an ECG recorder to the chest) they suddenly asked: "Did you do this project because you like breasts?" And all that on camera – one can imagine that I turned bright red within an instant.

However, there were also downsides to the cameras. One was constantly aware of being watched which was exciting at the start but became quite vexing towards the end. Sometimes one just is not in the mood for being filmed: calmly watching a beautiful romantic sunset on 5,500m when suddenly the camera is in your face and you are bombarded with questions. But at points like these we always had the option of telling them to stop and in most cases they actually did.

Altogether I have to say we truly enjoyed having them with us. They made the expedition just that little bit more interesting.

Deciding to Go to Chacaltaya

Kenneth Ballie

"It's crunch time", said the skinny guy in the World Courier T-shirt.

"If there are any of you who believe you are too ill to go to Chacaltaya tomorrow, please put your hand up." Silence. No hands went up.

"Would those of you who would like to go to Chacaltaya tomorrow please say, 'Yes', now". To my relief, every one of the twenty-five faces looking at me said, "YES". One of my biggest worries about the expedition had been resolved. We were to stick to the plan and travel to Chacaltaya on day 5. I smiled to myself and began to reel out a list of instructions about the following day's journey.

The team, complete for the first time, at Hostal Republica, La Paz. (Photo taken by Jim Read)

"Could you just do that again please?" said the girls from the BBC.

This eminently broadcastable moment was probably unnecessary. The safety of the group was as assured as it could be - I was aware of which members of the group had suffered at the altitude of La Paz, and both I and expedition doctor Andy had spoken to each of them about the planned ascent. But I wanted the group to meet and see for themselves that everyone wanted to go up to 5200m. So although much of the responsibility for that decision, rightly, rested with me, at least everyone would know that it was also the will of the whole team.

Journey to Chacaltaya

Martin Schnopp

Finally we were travelling to Chacaltaya – the expedition proper was about to begin. The whole group on one hand eager to get into higher regions, on the other hand unknowing and dubious about what to expect going up to 5,200m altitude. Only a handful of us had ever been up that high before. So the nervousness was understandable especially after a group of us had been up on a base camp on one of the mountains close to La Paz two days prior and most of them came back with searing headaches and nausea. The thoughts: What will happen to me when we go up? Will I cope?", crossed everybody's mind.

Well, but here we were, the bus was packed with all our gear and off we went through La Paz and El Alto and soon left all civilisation behind. The roads got worse and worse and at many points we could have walked faster than the bus was driving. The closer we got to Chacaltaya the narrower the 'path' (by that point not worthy of being described as a road) became. A few times the wheels on the right were only half on ground (the rest in midair) with a 100-metre drop directly underneath us while the wing mirror scraped on the steep rock on the left side. It left us gasping.

But as all journeys come to an end this one did too (fortunately by reaching the top). However, when we reached the gate to Chacaltaya and only 100 metres were left to go the bus driver realised after a few tries that the bus did not fit through the gate. So, we had to carry all the gear up the hill for the last metres, resulting in many of us not feeling too well afterwards. Now, 1,500m higher than that morning, the effects of altitude were just overwhelming: severe breathlessness on minimal exertion (just standing!!!). Jim, one of the group members described it as 'feeling like after a 100-metre sprint without actually having done the sprint'. We were all aware that there were limits to our bodies capabilities – taking it slowly would be the key for the near future.

Above: On the way up

Below: The Chacaltaya Laboratory

The Chacaltaya Laboratory

Roland Partridge

Perched on the southern most tip of the Cordillera Real at 5200m, peering into the vast canyon of La Paz, 2000m below, the Laboratory is awesome. Just 200m beneath the summit of mount Chacaltaya and surrounded by cosmic-ray collecting dishes, the three buildings provide a base for international teams of astrophysicists. For 10 days though, it was invaded by 26 foreign students and doctors, a couple of Bolivian

Above: Bolivian rules fussball

drivers and a varying number of BBC film crew. The one building allocated to us provided a kitchen (complete with cook), a dining room, a number of lab / living / bed rooms and a table football table. Only at this altitude can fussball leave you out of breath. Dividing the rooms into lab space, sleeping space and a sick bay, the accommodation was ample but not quite the Hilton. Or even the Travel Lodge. Had the lab had a cat there would barely have been room to swing it. There was, however, a lab dog. And one with a fine set of canines as my left sock, trousers and shin can testify. As the lab staff congregated to admire my wound, the only solace offered was that at least it hadn't been my genitalia. Great. Now the purpose of having a guard dog at 5200m can be debated ad infinitum, but having one that bites it's own did nothing but ensure that it remained tied up for most of our time there. At least the chance of it having Rabies up there was pretty slim.

Below: IMBEX rent-a-car jeep on standby

While the view from the lab was pretty amazing, especially looking north to the towering mass of Huyana Potosi, the panorama from the top of the mountain was something else. Many dawn and dusk trips were made to the top, each time different as the changing light emphasised different aspects. The summit ridge and its spurs allowed for many walks and explorations in between sample days to keep us entertained. Probably some of the best moments at the lab were had on such jaunts. Having been worried that the time at the lab might turn out to be 10 days of hypoxic misery, the combination of a great group of people and an amazing location made it a week and a bit of great fun and camaraderie, albeit a little hypoxic.

Emergency Evacuation

Johnnie Balfour

On day 5 we loaded a bus and crawled our way up a track towards the laboratory that was to be our home for the next 10 days. Although most of us had headaches, I think they could be put down to pollution from the bus and dehydration. The laboratory at Chacaltaya was above the snow line and after a minor episode of getting stuck we had arrived in the pink, zinc roofed building. Having learned that the best way of keeping altitude sickness from your body is to rest and to drink, I sat on a chair watching the more healthy members set up the lab drinking a bottle of water. It was a hive of activity but there was no feeling of guiltiness about feeling like the queen bee as I was most useful to the research as a healthy body than an active one.

After about an hour the headache hadn't disappeared and I was feeling dizzy and nauseous. Lying down, I felt cold and shivery. I knew that I was coming down with AMS but didn't want to leave the laboratory although I sensed that Andy, our expedition doctor was getting increasingly worried as I couldn't walk in a straight line any more and the BBC television crew was very interested in me. I was given oxygen as the room in which I was lying became filled with people. True to my word, I offered blood for the research before taking acetazolamide and being given an injection of dexamethasone to alleviate my symptoms.

I was shepherded out of the laboratory towards the jeep to take me down the

mountain. I felt guilty about leaving the people that I had not really met properly and about leaving the research. I had been preparing for this expedition for 6 months but now I was leaving before it had even started.

On the way down towards La Paz, I felt normal again by the time I was out of sight of the laboratory about 250m below where I had felt as bad as I ever have. Sian and Sam who came down with me could not believe the transformation but I had been confident of feeling fine from my previous experience. I spent 4 days in La Paz before I was allowed back up to the laboratory. Even though it was not part of my plan, I learned some Spanish in that time and helped with the television programme. It was very interesting to see how the producers would put together a programme that would only be half an hour in duration but that required many hours of footage including some mundane shots that would be enhanced and some repeated shots.

When I was allowed back up the mountain, I felt fine. This annoyed me slightly because I knew that I could feel good at this altitude but because everything had happened so quickly, I was not part of some of the experiments any more. The consolation was that I could be a case study for some of the projects but my results, as I understood it, were never going to be used in the papers because my altitude profile was different.

After a few days living with everybody in Chacaltaya, I felt as though I was part of the group again as I took sponsorship photographs, I played some marathon games of bridge and honed my skills at table football. Unfortunately, the skills weren't as good as I'd hoped and following a 10-0 thrashing, Andy and I had to run around the laboratory in our boxer shorts for all to watch us. This humiliating experience at the hands of Martin and Jennifer was caught on camera and I've now learnt never to take on Martin at football when there's anything at stake!

Above left: Johnnie feeling better in La Paz

Below: Martin's Schnopp at Hostal Republica

Schnopp Evacuated

Martin Schnopp

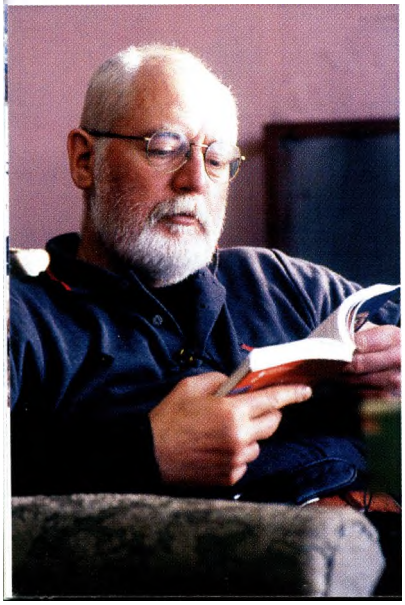
The evening of the first day up on Chacaltaya was quite an experience. And it was not only Johnnie who felt terrible. In actual fact, there were only a rare few of the group who were not affected by the altitude. Volunteers and organisers the same, were lying in corners tucked into sleeping bags and staring into the distance, often not moving for hours to minimise the discomfort. A great sight!

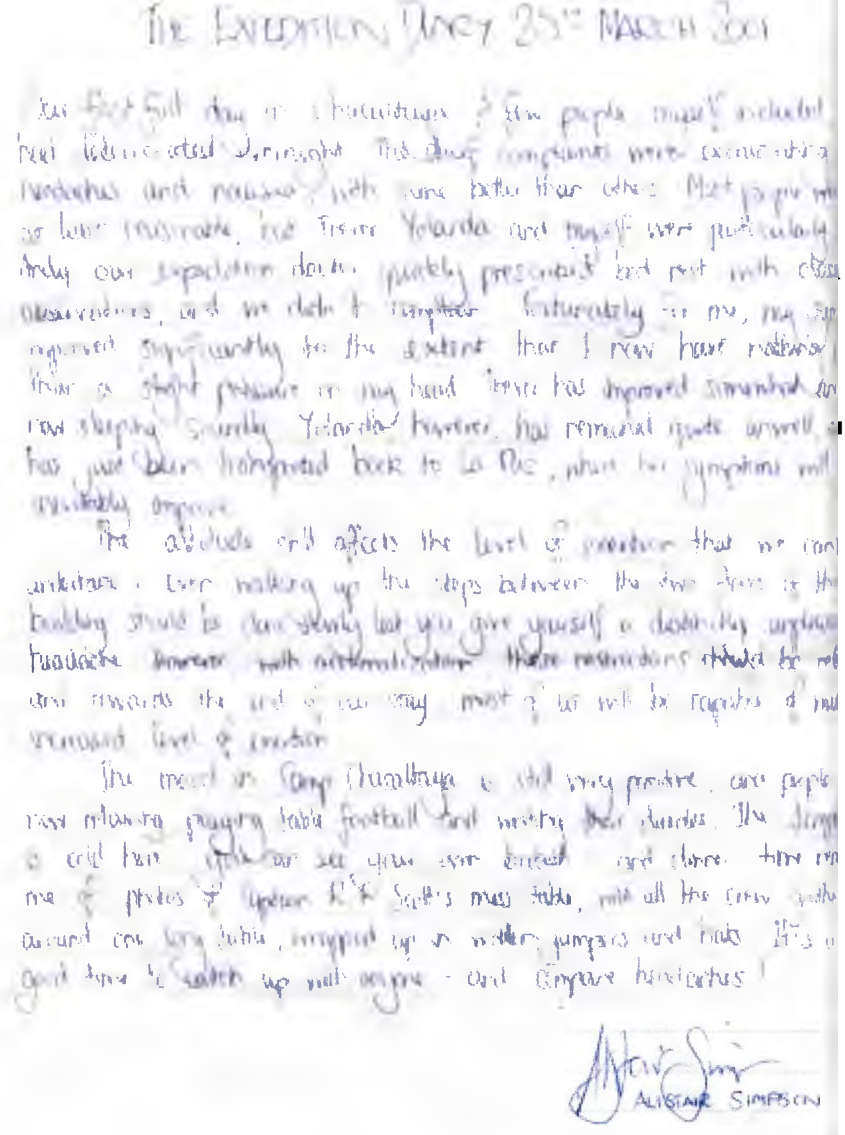
Personally, before we had set off in the morning I already had not felt that well. I just put it down to a bad night's sleep and joined the others on the journey up the mountain. Soon after we had arrived on Chacaltaya, we started to put on the 24-hour ECG recorders as planned. This left me totally exhausted and I had no energy left whatsoever. It was only because of Sonia's help that

we managed to get all the ECG's done. In retrospect I should have noticed way sooner that it was going downhill with me. However, having worked and prepared for my project for more than a years time it was hard for me to accept that there was no way I could continue on 5,200m altitude. So, I had to leave my project, my baby, alone up on the mountain to fend for itself. When I started to get rigors (very strong, uncontrollable shivers) and my temperature was distinctly raised the decision was made to get me off the mountain. Of course after Johnnie had left, our Jeep had already gone and for the first time I was glad that the TV crew was with us. So, after only 15 hours on the mountain I had to be evacuated down again. One can imagine that the Jeep ride down was not the most enjoyable experience ever. The narrow meandering, bumpy road with its vertical cliffs and my body's condition, which unfortunately failed to improve on descent. All in all, I had to spend the following 5 days in La Pay to recover from this infection but eventually I returned and still managed to gain the odd victory on the legendary 'fussball table'.

Above: Trevor being filmed by the BBC, looking less than well

Below: Trevor feeling better just a few days later





Sample Day C

Kenneth Baillie

After a restless first night at 5200m, we arose early and were almost conscious by the end of a hot breakfast provided by Martha, our Bolivian hostess. I posted the schedule for the day on a prominent wall in the laboratory. A creation of beauty, elegance and precision, the schedule stood six feet high and detailed which subject was to be sampled in every section of the lab at every minute from beginning to end of the sample day, from *t* to *t*+502minutes.

Anxious that all of the experiments should start at roughly the same time lest the schedule should collapse, I hurried around the laboratory checking that everything was going to work. Matt arranged the "blood team" into a small room, with two beds in case of fainting, and several powerful heaters to keep our subjects' veins nice and warm. Sam set up his complex equipment in record time, and Yolanda's cognitive testing team set up the computers in a bedroom downstairs. Sonia and Cath admirably managed to conduct Martin's heart experiment in his absence.

Despite it's slightly obsessive precision, the schedule proved to be rather robust. The team had now practised it twice, and everyone seemed to know where they were supposed to be at any particular time. In fact, the team must have appeared very professional to the film crew, who may even have been disappointed that the experiments ran so smoothly. The squabbles, romance and sexual tension that I had promised them had so far failed to materialise, but at least a few people were seriously ill!

Yolanda Is Evacuated

Yolanda Bennett

We were told to take it really easy for the first day at the lab. Roger was suffering from food poisoning and asked me if I would help Jim and Johnnie set up his cough experiment. Johnnie had rather unfortunately succumbed to the altitude and was duly evacuated. I don't know why, but I was feely strangely hyper and didn't follow the advice about taking it easy. Consequently I went to sleep that night with a raging headache. I didn't sleep very well having been interrupted in the night by Roger throwing up, Andy checking that I was okay, Martin being evacuated and the sub zero temperatures. So, the next day I did not look or feel good at all. I managed to decipher the complex timetable Kenny had devised and got through most of the sample day. However by mid afternoon I wanted to curl up and die.

I think Roger realised I was sick when I threw up a bucketful of water and refused to move my head from under my sleeping bag. It was the worst feeling I had ever had, I couldn't face food and I couldn't bear to look at bright lights. I just wanted to be at home. I felt really depressed.

Andy had been threatening to evacuate me, but I didn't want to go down, I didn't want to admit that I couldn't hack it. When I was moved to the sick room and was given oxygen I thought, "brilliant, this is working I'll be okay". I think I slept and convinced myself I was going to be okay. But the feeling didn't last long. I was going down and no matter how much I protested it was happening. However, walking out to the jeep, I realised that maybe it wasn't such a bad idea after all. I felt nauseous when vertical and if going down would make me feel better it was worth it.

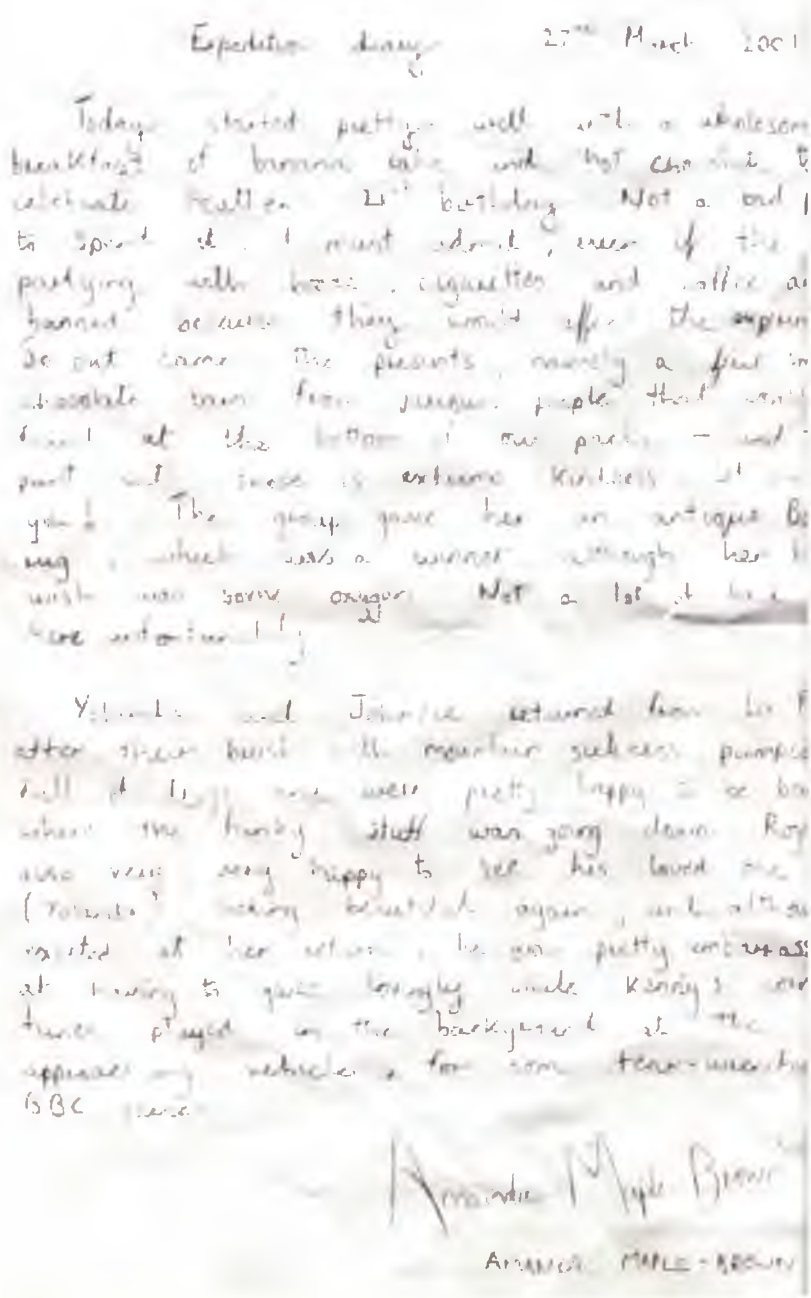
I had been told that I would feel better after a few hundred feet, however I still managed to throw up on entry to La Paz (a big thank you to Roland who took care of me and my vomit). After two nights in La Paz, several hours of playing the Bean game, a McDonalds and a novel Chinese dish containing cockroaches, I felt well enough to return to the lab. I was really pleased to be back even if I did have to kiss Roger for the BBC.

Sarah Gets Evacuated

Roland Partridge

After 4 days of headache, nausea and sleepless nights, Sarah needed a break. While the rest of the remaining group began to acclimatise and overcome their AMS symptoms, the altitude afforded Sarah no respite. After the vampires took their third blood sample, Sarah and I boarded one of the two evacuation jeeps and wound our way down the precipitous track off the mountain. Unlike Johnny's dramatic improvement with only a few hundred meters of decent, Sarah's state of fatigue would take longer to reverse. On arrival in La Paz, while lessened, her headache remained and she retired to bed. While I sourced a Burger King (any palate needs a reminder of home from time to time) Sarah slept and woke feeling much better. We met up with Martin (still

Below right: Heather's 21st birthday at 5200m



almost bed bound with a dodgy tummy) and an increasingly bored Johnny who was chomping at the bit to get back up to the lab. Raul (our driver from IMBEX Car Hire) took us all to the nearby Maccy D's and Sarah's state improved dramatically. Back on the road to recovery and with two people around to keep an eye on her, Raul and I headed back up to the lab. Now early evening, the lights of the lab looked like stars as we drove across the altiplano towards Chacaltaya.

Sending The Samples Home

Kenneth Baillie

Despite the many advantages of this format for an expedition - the lab, the road, the relatively large group and the rapid ascent rate - it was still a considerable practical challenge to freeze our blood samples and then transport them home. We examined several options. Could we obtain liquid nitrogen in La Paz, and use it to keep our samples frozen on the journey home? We found that it was possible to buy liquid nitrogen in Bolivia, and we went as far as borrowing three large flasks from our friends at Medex. We then worked out that we would need to frequently replenish the liquid nitrogen throughout the expedition, and we found that we didn't quite have enough flask capacity to store all of the 1300 blood samples that we planned to take. Persuading an airline to accept them with our baggage was also difficult. We found various ways to work through this logistical nightmare, and came up with a precarious scheme to transport our precious samples home. After a whole year of work in order to obtain them, these samples would be priceless to us, so we didn't want to take any chances with them.

Left: Kenny signs away responsibility for the samples

Below: The first blood samples prepare to leave La Paz

That was why we phoned World Courier. With them involved, freezing and transporting our samples from the laboratory at 5200m in the Andean wilderness went something like this. On the morning before we each sample day, a representative of World Courier delivered a large box of dry ice to the laboratory. We would then take our samples and freeze them in the dry ice as planned. The following day, at 0930hrs, the reliable man from World Courier would return and with much shaking of hands and photography, take our samples back to La Paz. From there they were carried via Buenos Aires and Frankfurt to the Western General Hospital, Edinburgh, and at frequent intervals throughout this journey the dry ice was replenished to ensure that the treasured cargo did not defrost. Furthermore, they did it without charge. Thanks to arrangements like this, I was more relaxed during the expedition than I had been for several months before it!

Stalactites

Alistair Simpson

Chacaltaya laboratory was ideal for the purposes of our research. Indeed, it formed a cornerstone of the success of our work. However, when we were based there for ten straight days, it was not always a particularly stimulating place. Naturally, the views were stunning, especially if one took the effort to climb the ski-slope mountain behind the lab, and there was always table football. But there were undoubtedly times when I simply felt the need to leave the company of everyone, and enjoy the view by myself.

One evening, as the sun was setting over the altiplano over a thousand metres beneath us, I decided to grab my camera and take some shots and admire the beauty and peace outside. I was wearing my dilapidated trainers, which had virtually no grip on the snow outside, and so the walk around the lab building was somewhat precarious. Managing not to fall over completely, I made it around to the area immediately in front of one of the windows of the common room. Hanging from the gutter there were two or three beautiful ice stalactites, formed as dripping water from the gutter froze in the bitter temperatures. They refracted the dying light in magnificent orange, yellow and brown. I decided to take some sunset photos using the stalactites to provide foreground interest in the photographs. This involved me balancing carefully behind them trying not to fall off the snow ledge I stood on, and at the same time staying still enough to get good, crisp shots. I'm not sure what everyone inside thought upon seeing my contorted body balancing right outside the window, but the shots turned out OK.

Below: Jenny Fleetwood being interviewed by John Somner

Radio Ga Ga: The Radio Crew

Jenny Fleetwood

Trevor, John Somner, Amanda and myself all had the task of recording footage for Radio 4. In La Paz we had great fun recording all sorts of noise and getting live action and morale was high. The first few days at the lab were the most exciting in terms of collecting radio material but it was also the time when we least felt like running around with microphones in hand. Nonetheless, I think we did a good job, especially Trevor who documented Johnnie Balfour as he got AMS. However, the minidisks mysteriously deleted no less than three times while we were up at the laboratory. The first time it was a bit distressing. After that we all became resigned to the fact that we could work hard to recover lost data but it might get mysteriously wiped again. We all lost good footage. Trevor and John did some sterling interviews and Amanda spent a morning recording people's impressions and her own problematic blood taking only for it to be wiped later that day. This of course put quite a dent in our morale and compounded the general overdose on media felt by many members of the Apex team. On the whole, however, I think having the media on board was a valuable project. Not only was it the source for a lot of sponsorship but it will provide a record of what was achieved. Although it will be a little strange being on TV, I am proud to have been a member of such an amazing project.

Sunset

Alistair Simpson

I was annoyed. I cannot now remember why, but I was not a happy camper. I decided to leave the lab and get away from whatever was causing me upset. My destination was the ski-slope mountain immediately behind the lab. It was a very short climb to the summit 100 metres above, and took me about 16 minutes. The climb was a good way of venting your anger in itself, since you could curse at the snow as you kicked steps upwards, and thrust your ice axe into the mountainside. It was getting darker, as the sun was setting, and I intended to take some photos of the dying light from the summit.

Sunset at Chacaltaya

I soon arrived out of breath at the crumbling remains of an old observatory that marked the summit. The light had decreased significantly, and there were but the remains of the sunset on the horizon. I think I took some photos nonetheless. Soon, John Somner appeared on the summit. We exchanged a few words, but for the most part we remained silent, as we watched the sky darken and the lights of El Alto appear on the altiplano, creating a dramatic waterfall of streetlights leading into the basin of La Paz. It was still on the summit, as usual, and incredibly peaceful. I soon forgot my anger, as it was gently cleansed by the tranquillity and beauty of all that surrounded the two of us. How lucky we were.

Toilets

Sonia MacCallum

So...the toilets. Well there were two, and three on a good day, all with a particularly advanced flushing system that made you very appreciative of self-regulating cisterns. Which one to use however was a difficult decision.

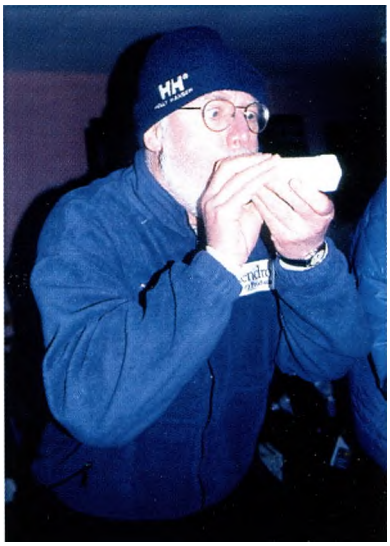
Option 1: broom cupboard, conveniently located in our building, but yet to be blessed with artificial illumination. This made WC operations tricky at any time, day or night, especially when the toilet shared floor space with an exceptionally large barrel of water (the latest in Andean cistern filling technology). It did however possess an exceptional piece of structural engineering by Partridge and MacCallum, in the form of a suspended washbasin of which Baden Powell would have been proud. Unfortunately our system left much to be desired with regard to hygiene. Well you can't win them all!

Option 2: short, bracing, walk to the other building, where a choice of 2 toilets was available.

Should such a difficult decision have proved too much for the hesitant among us, they need not have suffered long. Guru Bob [Jim Read], in his great wisdom, decided that option number 1 might be a suitable place to leave a deposit of surprising dimensions, which proved somewhat beyond the means of disposal for that facility. Amanda's fantastic sign proclaiming ' Dunny this way' had to sadly be replaced by 'Out of order'.

Sample Day D

Roger Thompson



Our fifth day at the lab produced the familiar flurry of activity that had, by now, become known as a Sam Patel day. By my standards, as far as I can remember, it was a good day. At least being less memorable means it was not a bad day. Bad days, as the reader might have picked up on earlier in this report, did indeed happen with my experiment. I should include that I had managed to collect all my data up to this point, even if it had been a struggle. However, the whole process of the experiment taught me several things.

Above Right: BLOW!

Opposite: Climbing near Chacaltaya

1. I know now that struggles are commonplace in field research.
2. Small cylinders, containing non-flammable gas, that are not used for mechanical limbs are actually not allowed on aeroplanes (I hope the American Airlines employees who give telephone advice will be taught this also).
3. There is nothing more useful than a generous research fellow with amazing technology that, with some ingenious tinkering, will serve as back-up equipment for your experiment.
4. And finally, one must not forget one's fishbowl.

Below: TV presenter Sophie Raworth participating in Roger's research

Returning to Sample day D, data collection was no longer a problem. It was not one of the two days at the laboratory when Sam's equipment was converted into mine and I made the male volunteers breathe heavily from a rubber bag. Instead, it was a day for the cough threshold side of my experiment.

On each sample day, I was the first to get stabbed by the vampires. In Chacaltaya this was a more comfortable experience than ever before, with beds, sleeping bags and heaters being provided. Following this I had my cognition tested and then proceeded to set up the cough experiment. Although the blood team has a nice section of this report and was by this stage an unstoppable machine of masterful efficiency, I also had an experienced and capable cough team. Jim, Yolanda, Johnnie and sometimes even Kenny participated in the administration of the test. Their help was invaluable (and flawless), most notably on the first day at the lab when I felt terrible and at other times when my attention was diverted towards another experiment known as the "Wolff" experiment. All the volunteers became proficient with the cleaning of the nebulisers that put a mist of citric acid into their lungs, seemingly eager to get that next random concentration that might just make them cough.

Sample day D was when most of the filming of the research was done. During the course of the day Kenny, Sam and I had interviews with Sophie and a great big camera. This camera had arrived to replace, for a few days, the digital camcorders that had been used previously. For some reason the use of this camera attracted a large audience of volunteers in the open-plan room on the upper floor of the lab where Sam and I conducted our research. I was actually quite relaxed throughout, perhaps soothed by the now familiar odour of citrate and

Milton disinfectant in the air, but in the end my interview was not televised. The edited version consisted of me giving a particularly noxious concentration of citric acid to Sophie, her resulting splutters and a big cut to me laughing. I maintain that I am not in the habit of laughing at other people's misfortune!

Below: Mountain Hardwear tent outside the lab at Chacaltaya

Bivvying at 5200m: The Most Beautiful Morning of My Life

Alistair Simpson

It was the most beautiful morning of my life, and I am unlikely ever to forget it. I awoke, and it took me a few seconds to remember where I was. It took me somewhat longer to establish what to do about it. I had just woken up after spending the night bivouacked at 5200m, near Chacaltaya lab, with Roland, Matt, Sonia and Amanda. Waking in the Gore-Tex bivvy bag, it took me a while to find the opening, and then to actually worm my way out, so that my head protruded from the bag. I could see that Sonia was awake, and that Amanda was not there (she had gone back inside the lab in the early hours of the morning), but the other two were still, for the moment, asleep. It was perfectly still, and the sun was rising, filling the valley over towards Huayna Potosi with beautiful sunlight. I wriggled around, trying to look around the place, and saw that there was a fresh layer of snow on the ground. And on my bivvy bag and in my boots, making them both freeze solid. I sat up, resembling some strange worm, and my bag flexed and cracked, still frozen. Matt and Roland soon woke, and we four sat and admired the beauty of where we were, before discussing the storm that had happened overnight (and which I had slept through). In semi-shade, there was a blue hue to all that was around us, and the crusty snow sparkled like sugar. To awake to such a scene, in the company of friends, is undoubtedly one of my highlights of the expedition.

Below: Roland after spending the night bivvying at 5200m

Bivvying

Sonia MacCallum

I suppose I should thank Martin really - there is nothing like doing captivating 12 lead ECGs all day with the most archaic piece of medical equipment in the world to drive you to total distraction. The ECG room just wasn't a fun place to be anymore - even if it was only for sleeping! I stepped outside, saw the stars in a perfectly clear sky and the Chacaltaya bivvy experience was born. And besides I had to go a bit more hardcore than those guys in the tent, no matter how beautifully engineered it was.

By the time I set out from the lab armed with bivvy bag and a sleeping bag, I had

acquired Amanda and 2 strapping young bodyguards for the adventure. What can I say – it's a skill!!!

"It was good to finally see the man that I had been dealing with for the past 6 months. Here he was, Eric... a true American. And in true American style he got up on stage and soon had the whole audience in his grip. With confidence and good presentation skills he managed to persuade the group to give Sajama, the mountain Eric favoured, a try. According to him Sajama had 'just more to offer'. But not only that made people listen. Some of the expressions that Eric was using were ...well, ...simply music to our ears to hear. Pronounced in a very distinct, broad American way he answer one of the questions about the technicalities of the climb with: "Man, u gu-ys are well ac-cla-maded (acclimated) so we could go up rauts that need tools. Translation: This group is well acclimatised so we could ascend routes that require the use of ice axes. But moments like these, where he lost us a bit were very seldom indeed."

Martin Schnopp

So there we were with lightning forks slicing through skies over the ridge in front of us, 5260m up on a bed of crystallized snow in Bolivia. FANTASTICO!!! Then the clouds kind of ate the stars and emptied a fair bit of snow on my head in a 2hr snow storm (I had suffered some conceptual difficulties with the closing of my army issue bivvy bag, leaving a large snow sized opening, which I think could have been the cause of that problem). As the night progressed one **fatal floor** in the excursion was becoming obvious, in that I was getting no sleep whatsoever, but I did have my most viewsome pee in my history of viewsome pees which was a great consolation!

Meeting Eric and Carlos – Sajama or Paranicota?

Kenneth Baillie

For days before this meeting, debate raged about which mountain we ought to climb. We had to choose between Parinacota (6330m), a conical volcano that offers a relatively uninspiring "long plod", and Sajama, which at 6552m is Bolivia's highest mountain and is more technically demanding. As our group contained some complete beginners with only one weekend of snow climbing training, I favoured the safer option, Parinacota. Several members of the group preferred Sajama for obvious reasons, so we postponed making a decision until after we had discussed it with our guides, Eric and Carlos. We arranged for the guides to come to Chacaltaya on day 12 of the expedition. Eric had travelled from his home in Colorado to La Paz that day. The whole group gathered in the laboratory that afternoon, waiting to have their say about which mountain we should choose. Eric and Carlos were delayed and we spent a couple of hours entertaining ourselves with innovations such as "Bolivian-rules" table football, a chaotic version of the pub favourite in which instead of dislodging the ball when it comes to rest our of reach, players simply add another one. The home-made table provided many places for an inaccessible static ball, with the result that games were often conducted with three or four balls simultaneously. Such tomfoolery provided entertainment as the wait continued, until at last an unfamiliar vehicle approached the lab. Martin and I went to greet Eric, and explained to him the nature of the debate.

Despite certainly being hypoxic, Eric gave a lively description of both mountains, and he told us that he would be happy taking fit beginners onto Sajama. His responses to our safety-conscious interrogation reassured us of Sajama's safety, and everyone in the group was keen to give it a go. Carlos, who spoke very little English, served his purpose also at that meeting, as Eric listed his remarkable climbing achievements and described his huge experience of climbing in the Andes.

By this stage of the expedition most of the group were well acclimatised, and as excitement

about the climb of Sajama spread, the team quickly whipped itself into what Roland calls a "dangerous morale high". The peril of such a period of elevated spirits is that a photograph will at some point be taken of the comical goings-on...

Our guide, Eric Miller

Martha's Cooking

Matt Bates

Food is important to most people, but at 5200m it was vital. We spend 10 amazing days at the Chacaltaya laboratory and food was central to most people's lives for most of those days. When you are out all day exercising in low oxygen conditions and cold temperatures, you look forward to hot meals. In addition with similar routine tasks to perform each day, the variety provided by different dishes was important, but most importantly of all, meal times were the only regular opportunities we had to meet as a group, to talk to friends together. I can still feel the atmosphere, sense the excitement and smell my colleagues as I recall those hours spent huddled together in the steamy hut that served occasionally as a bedroom and bridge den but mostly as a dining hall.

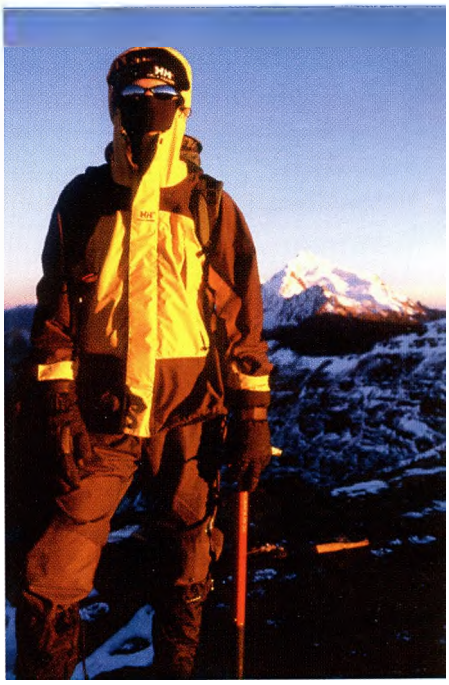
Everyone was amazingly grateful for the existence of mealtimes, particularly since the relative paucity of local shops at 5200m made self-catering a distinctly non-viable option. But over and above this, everyone was grateful to Martha for her phenomenal cooking. Kenny and our Bolivian host, Pedro Miranda, spent several days sorting out a reliable source for simple water to keep us supplied at the laboratory, yet Martha managed to rustle up endless soups and steaks, puddings and only slightly stale breads without so much as breaking sweat. Looking back at the tiny kitchen and minimal help that she had, I find the menus that she produced each day little short of staggering. Twenty-plus people had steak, eggs and fried potatoes for breakfast on our last day. Steak! Most expeditions at this kind of altitude have to survive for weeks with nothing but rehydrated rabbit poo for sustenance.

No matter how hungry the group, no matter what the meal, there was always more, even if every dish was served actually floating in a kind of vegetable soup. Everyone that wanted seconds or even thirds was satisfied. And although less varied than the conventional menu that she supplied, and usually based on the theme of 'deep fried cubes of ook', Martha even produced a daily vegetarian option. In my eyes, the feat approached miracle status.

Everyone enjoyed those mealtimes. Obviously there were some small problems - despite the relatively uniform number of diners each evening, food was always preceded by a lab-wide hunt for more chairs, and some of the tastes we encountered were slightly unusual. But each mealtime was a fantastic occasion filled with excited thoughts, shared problems and expanding hopes. We even developed a real yearning for crusty, dry and flaky Bolivian rolls - all shapes and sizes but just the one consistency.

On the Summit of Chacaltaya

Kenneth Baillie



Kenneth Baillie

On one of the later days at Chacaltaya, after all the anxiety and excitement of evacuations and the first sample days, I walked up Chacaltaya peak for the first time on this expedition. Most of the group had all been up Chacaltaya several times, but I had not felt free to leave the laboratory. It was a great relief to stroll along the ridge, away from responsibility for half an hour.

I stood on the peak for a few seconds, and remembered vividly standing on the same spot 2 years previously on a reconnaissance trip, when my girlfriend Katy and I had visited Chacaltaya. I remembered dreaming about bringing a research expedition to this beautiful place, and above all I remembered how farfetched the whole plan seemed to be. Standing there again, with 25 volunteers and a film crew back in the lab, and two crates of frozen blood samples *en route* to Edinburgh, I allowed myself a moment of premature contentment.

Our Journey from Chacaltaya to La Paz

Alistair Simpson

Eventually, our time at Chacaltaya came to an end. We had spent much of our last evening packing up our research equipment, and tidying the research area. Meanwhile, everyone individually had to pack up all their own personal kit. This was complicated, somewhat predictably, by the fact that all 26 of us had exactly the same Helly Hansen clothing. Now the sensible members of the group had of course labelled their clothing, making the whole process far more straightforward, but I must confess that whilst I had done this for some of my Helly gear, I still had some un-named kit, most notably my beautiful Helly down jacket (which was regularly pinched by some cold-feeling person in the lab...). Just *finding* all your own kit was a task in itself.

"I felt relief that we had almost completed our research and a pang of sadness at leaving the lab for the last time, uncertain about when or if we would return."

Roger Thompson

We set about loading all the gear onto the coach, which waited at the end of the approach road to the lab. This was a little irritating, since it took long enough to get the 26 kit bags and all the research bags and barrels out of the lab and onto the bus, without having to carry them down the road, and then walk back again too. But with everyone lending a hand, we soon managed. Then it was simply a case of checking that nothing was left in the lab, presenting the staff at the lab with the certificates of appreciation and commendation, and signing the visitors' book. Kenny's signature from two years beforehand (when he had visited the lab whilst on holiday; arguably the root beginning of Apex) was still in there...

As we pulled away the most important phase of the expedition came to an end. The journey back was something of an adventure in itself. The old bus was laden with people and kit, with a significant amount of the latter strapped to the roof. As we wound our way down the steep mountain road, one could not help but feel that it would not take much for the bus to steer slightly off-course, and career headlong down the precipitous fall to the side of the road to the rocks waiting expectantly far below. Soon Chacaltaya disappeared from view, and we reached the altiplano which would take us back to La Paz. Another chapter of Apex was closed.

'The procession of head torches winding its way throug
the clouds and spindrift ignited that tingly feeling agai
Hypoxic limbs, bleary eyes and tired minds failed to du
our energy and enthusiasm for the challenge ahead
R

The Expedition:
The Climb

Journey to Sajama Village

Roger Thompson

Our convoy of two jeeps and a bus headed south from La Paz destined for Sajama. The drive took us through some barren desert and past some unusual rock formations. We stopped for a fantastic lunch in the army camp of the Bolivian Mountain Division, a special treat arranged by our guides, Eric and Carlos. A few of us took a tour of the parade ground while others checked out the frescos in the village's ancient church. John Somner brilliantly translated a patriotic speech by one of the commanders on how the Chileans had stolen the last of the Bolivian coast. John was careful to disguise his Chilean ancestry.

We paused for a toilet stop with a magnificent view of our goal. Sajama was a monstrous pyramid, towering up from the flat of the desert. Late in the afternoon we turned off the highway onto a dirt track with huge potholes. After a while a village appeared in the distance. Numerous mud huts and the mandatory small church formed the urban skyline of Sajama village. Our base was a brick building into which we unloaded our kit and sat down to dinner. The boys spotted the football pitch on arrival and couldn't resist the temptation to challenge the Bolivian kids. Throwing acclimatisation to the wind, they set off to be slaughtered while the non-footballers headed off for some special relaxation at the mud baths - a big attraction in Sajama, especially for climbers. A spectacular view of the sun setting on the huge mountain while drinking a cold beer and soaking in the hot muddy spring is a great experience whether before or after an attempt on the summit. It more than makes up for the fact we all smelt like eggs for the next few days.

On the road to Sajama

The Giardia Boys

Giardia Jim (aka Guru Bob, Jim Read)

When we arrived in Sajama, the group split into two, one half heading for the hot springs and the other, not so wise, half taking on around 70 children in a football friendly – at 4000m. With The Gringos still in the game at 9-4 (to Sajama Under 7s) I began what was to become a saga of illness. Giardia. I sat out and watched from the sidelines what must have been the most scenic game of football in the world, in the shadow of Sajama with Parinacota on the horizon floodlit by sunset.

During the first course of dinner that evening, Giardia took its first victim. Ian. Midst second course I was also overtaken by the urge to poo. Fortunately I managed to make it to the toilet by my room and although gassy I was surprised by the relative viscosity of my faeces. Hell was nigh. Back in the dining room the sulphurous fumes being emitted from the 'Giardia Boys' were beginning to break up the laughter and chatter of the oblivious. Ian approached Andy for some drugs. Andy was a bit sceptical of our diagnosis, until he came within 2 meters when he suddenly agreed, threw metronidazole in our general direction and got the hell back over to Sophie's table. In London I am sure Andy has unfaltering professionalism when it comes to patient confidentiality, but I think he mislaid it somewhere on the expedition. It took only minutes for Kenny to formally announce my (Guru Bob's) 8th nickname – Giardia Jim.

Above: Velcroripripdownsquatsquirt

Right:
Sajama U12s 18
Apex 10

Below: Hot springs at Sajama...
'Who's making those bubbles?'

Unfortunately I did not have enough time to sit around and accept other humiliating name-calling, I had work to do, as my skiddies were becoming ever more increasingly defined. It was back out into the night. I knew this time something was wrong. The technical operation that is using a Bolivian toilet was going to take too long and I really couldn't degrade that poor man's property again so with Andrex in pocket I killed my lights and veered off cross-country. Have you ever tried to run keeping your butt cheeks clenched? It is difficult but I kept going until eruption was imminent. Stop. Squat. ARGH. Helly Hansen trousers. Stand. Velcro. Zip. Velcro. Zip. Velcro. Velcro. Rumble. Zip. Ooo. Velcroripripdownsquatsquirt. Relief flowed through me like a wave of ecstasy as I hosed down the nearest prickly bush. And then all was quiet. The silhouette of Sajama loomed behind me. Cath's laugh carried on the breeze from the dim lights of the village. At least I was downwind.

It was while submerged in this tranquillity that I became aware of a large black thing. There were two. One moved. For reasons unknown my first thoughts were something along the lines of 'argh, lions', which was in hindsight a little silly. 'They must be llamas,' I thought. Reassured by my own reasoning I flicked on my headlamp. Hundreds of eyes shone back at me. 'ARGH LIONS' my instinct screamed at me again and it took a moment or two for reason to override this time. Had there been any more left at that moment I would have shit myself. They were of course llamas. I had managed to poo right in the middle of a llama herd who had obviously been trying to get some kip but all stood up to see what the smell was all about when I arrived. But their soft, dopey, long lashed eyes of daytime had turned to evil, piercing, staring eyes at night, hence my confusion. When the adrenaline subsided I saw the funny side and headed for bed.

Fully evacuated Ian and I took great pleasure in releasing, without fear, the large amounts of gas our flagellates were producing. Jenny and Hazel, our roommates for the night, were not impressed. Sulphurous odours have a remarkably fast diffusion rate. No sooner had I done it than everyone could smell it. The burps were the worst. And so day one of our expedition to Sajama ended, with Ian and I burping, farting and giggling for Great Britain, Jenny moaning, and Hazel apologising on our behalf.

Walk in to Base Camp

Matt Bates

Waking up on beds of straw is a process few people ever experience. Yet for members of Apex: Bolivia 2001 in Sajama village at 4700m that prickly sensation marked the start of an amazing climb. We had all rested for the night in small pueblos across the village and navigation back to dining hut following the previous night's escapades was the first of many challenges that day. Breakfast was a feast of food and stories, everyone stocking up on bread, cakes and fluid for the day ahead but also intrigued by each other's tales. Apart for less than 12 hours, groups of people had remarkably different stories to tell - most revolving around the inaugural Apex versus Sajama football match or an especially welcome trip to the hot sulphur springs, but some rather bizarrely involving bottles of noxious, alcoholic fuel and the thrill of the chase. We were lucky to depart Sajama without much backlash from the previous night's conquests!

Left: Unpunctual mules

Below: The walk to base camp

As is usual in Western expeditions to less developed countries, everyone had too much gear. Large rucksacks had been filled by all but the most experienced and small rucksacks had things tied to the outside. And it was hot, really hot. There was some space on the donkeys and llamas still and most people jumped at the chance to jettison at least their sleeping mat, amid the rapidly spreading black market for sun cream. There was an outbreak of shorts yet some resorted to wrapping their head (and faces?) in tubi-grip to hide from the sun. Strange it may have looked but if only we had learnt from that infinitely wise individual when it came to our summit attempt.

And so we set off, bound for base camp along what looked like the longest and straightest and lumpiest track in the entire world. Conversation was the order of the day - the sun was shining, the views of our target mountain and across to the border with Chile were phenomenal and the terrain was flat. We all had the pressing sense that we should enjoy these features while we could, the peak looking an exceptionally long way away and more importantly, up. Personally I had not known what to expect from the trek to base camp. I have walked extensively in the UK and occasionally abroad but never in an environment which required 'base camps'. Apart from the power of those words, the days' climb was very similar to a basic stroll in Cumbria or Northumberland. We walked in increasingly strung out groups alongside a stream, up into a

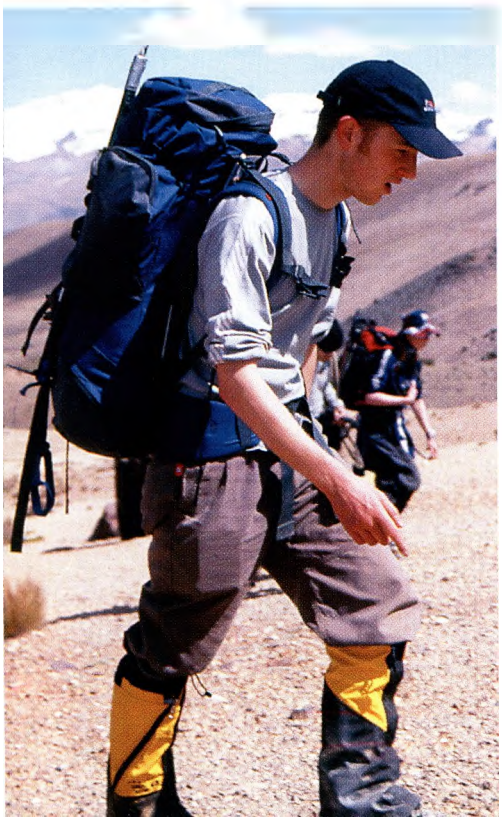
valley and then across a marshy area. The whole walk only lasted a few hours and gave us a chance to get used to the equipment, the terrain and each other as walking companions. Groups formed and changed as lunch came and went so that at least some jokes could be recycled once or twice. Mood was high despite the fact that for the last hour or so of the journey we were able to appreciate the sheer immensity of the mountain ahead of us.

Base camp itself was at the edge of a beautiful plain in the shadow of Sajama and we all found plenty to do while awaiting the arrival of the donkeys with our tents. It threatened to snow for an hour or so but after either braving it out in the open or resorting to the sheltered but increasingly sweaty confines of our bright red bothy shelter for communal high jinx, we all got stuck in to setting up camp proper.

Yet again on our Bolivian trip, we dined that evening like Kings and Queens in the most unusual of circumstances - a candle-lit three-course meal at 5200m really is quite an experience, albeit that it had to be served in two sittings. The food really was fantastic and almost on a par with the legendary creations of Martha. After food, there was plenty of time left to explore the local environs, including the all-absorbing swampy area and the long drop toilets (with walls!) up on the hillside. We even found time for the odd impromptu game of chess with almost no crotch-grabbing incidents before we retired to our tents to talk of tomorrow. Intriguingly, not all tent talk was of the climb ahead - the subject of threesomes filed the air for many hours during that long night and it was to have a lasting impact on the minds of many individuals as they took on Mount Sajama. Does anyone know #### in our year...?

Above: Base Camp

Below: Striding out of base camp



Crampons and Snow Steps: Climbing to High Camp

Alistair Simpson

It was a pleasant morning, and around Base Camp, there was a hive of activity as people gathered together their kit, and found their plastic boots in the huge pile that had been brought up by the porters from the village. Our camp was in a large, flat basin, and over the roofs of our Mountain Hardwear tents stood, majestic and thoroughly unperturbed, Sajama. We kitted up, in the slightly hazy sunshine, and filed off across the basin.

Once on the other side, we had a short, fairly steep climb to the crest of a small ridge, at which point it became somewhat easier to see the route to High Camp. It was also the first point at which we saw snow. This was an unusual proposition, since just the day before, we had been slogging up

the path from Sajama village in high temperatures and roasting sunshine, with sweat literally dripping off our foreheads as we walked.

The next stage was a large snow filled chute, which we filed along in a long line like a trespassing human millipede, with a high rock wall looming grandly to the right, and a crest of rock providing the left-hand side. We zigzagged up the corridor to reduce the incline. It was one of those sections that seems to continue for far longer than you think it should, on which you never seem to be making any progress from one short traverse to the next. It was certainly tiring.

The relief was evident on peoples' faces when we reached the top of the chute and saw the slightly less steep section (it was hardly flat) tucked in behind a beautiful peak of rock that was to provide the location of our High Camp. We sat and rested, as the porters deposited and unpacked the tents.

Given the lack of flatness of the area, we had to carve out large steps in the snow for each of the tents. This was hard work after a reasonably strenuous day. The porters and guides worked very hard at this, and many of the less exhausted members of our team helped out. We then set about erecting the tents, securing guy ropes with buried ice axes (not a great idea, since finding and extracting the axes the next 'morning' at 3am in the dark was nigh-on impossible). Not long after we had finished setting up camp, the sky clouded over, and snow began to fall. Rather more disturbingly, thunder and lightening followed soon after.

Nervous, we huddled together, four people in a three-man tent, and waited expectantly for 3am to come, wondering all the while how the weather would affect on our summit attempt, or whether there would be a summit attempt at all.

High Camp

Sonia MacCallum

High Camp

It nearly killed me but I got there. After escaping relatively free from symptoms of altitude sickness, much to everyone else's annoyance, I was not really appreciating this relentless feeling of nausea on reaching 5400m. I guess I was not as acclimatised as I thought!

High camp was truly

spectacular and only got more so as the clouds rolled in for sunset and our saltire proudly flailed in the 'breeze' on the mountainside.

30 or so people are not easily accommodated by 40m^2 of flat (used in the loosest sense of the word) snow, bounded on all sides by more snow that was anything but flat! 'How many elephants can you fit into a Mini?' sprang to mind as foundations for the tents were cut into the snow and the camp materialised.

I may have been battling with nausea, but Johnnie was taking on something far worse. Courageous to the last he still managed to do an interview for the cameras and after 2hrs of feeling very rough, he had to go back down. It was miserable.

And so, with storm clouds rolling in, we went to bed at 8pm, not knowing if a summit attempt would be possible. I peeked outside as the whole scene was whipped up by a frenzied wind that had a scary vendetta against tents. I like tents. I particularly liked those tents – they stayed standing despite an incredible snowstorm. It was simply quite an amazing place to be.

Martin's ECGs

Martin Schnopp

I am proud to say that this was the only research project still taking place on the climb. Since the project was born, it had been the idea to put on portable ECG recorders on the last day of the climb. This should give us riveting information on how the electrical conduction system of the heart behaves on extreme altitude combined with the severe exercise of climbing. The most exciting bit of my research was about to happen - up on almost 6,000m in amazing scenery. What this involved I had no idea about.

After a day of strenuous climbing, we finally reached high camp. I just dropped into my tent totally exhausted. With the snowstorm raging outside, just lying in the cosy warm tent seemed like the greatest thing. Although my mind knew that I still had to put the ECG recorders on the volunteers, my body said 'NO'. If it had not been for David's enthusiasm it probably would never have happened. Well, we open the tent. It was pitch-black, freezing-cold and so windy that it could blow you off your feet. Armed with our ECG recorders and all the clothes we had, we dared to step out into the dark. The next problem was finding the other tents that meanwhile had been entirely covered in snow. Once we started, it only took half an hour or so to get all the ECGs attached.

In summary, what I thought to be one of the best bits of my research turned out to be not quite so good especially as most of the collected data was unfortunately unusable. What irony!

Decision to Climb

Roger Thompson

It was about 2.30am. I had slept for about 30 minutes, if that. The wind had battered our Mountain Hardware tent almost since our arrival at high camp and snow was still falling outside. Aside from the noise, there were other factors that kept me awake. There were four

of us in the three-man tent and we fitted too snugly together. Every toss or turn provoked a knee or an elbow from either Kenny or Yolanda blaming me for their state of wakefulness. In addition our atmosphere would be pleasantly polluted by a Giardia-ridden-Jim, adding in his own special way to the over-familiarity of the situation.

Left: The storm rolls into High Camp

I heard some voices outside and was thankful that soon we would be getting up. However, the voices did not entirely fill me with pleasure. It was Eric, and he was concerned about the prospects for the summit attempt given the menacing weather conditions. I poked my head outside the tent and I wasn't happy with what I saw. High camp was still enshrouded in misty cloud and the precipice that was but 5 metres from our tent was not visible. The wind was still howling and some snowflakes were still falling. I shoved my boots on and slowly ventured outside. Kenny followed. Others were emerging from their tents. Eric was contemplating breaking some bad news. He had 20 or so mostly-inexperienced but enthusiastic climbers on his hands and the conditions were by no means ideal. I think I had already made my decision by that stage. Eric told us he would be happier just to take those volunteers who had had previous alpine experience, if he was going to take anyone to the summit. He also didn't want anyone who had struggled the day before to continue higher. With encouragement from Kenny, he announced these criteria to the group. The announcement wasn't greeted with enthusiasm. For me, the attitude of many of the group members was summed up by Trevor who was unwavering in his decision to climb. About 16 team members wanted to take the risks and go for the summit. I respected this determination and I was almost tempted to join them, but the summit had not been my goal when Apex entered my life a year previously. Watching the weather on the mountain for the next 8 hours and looking at their burnt faces afterwards, I was glad I didn't leave high camp.

The Climb

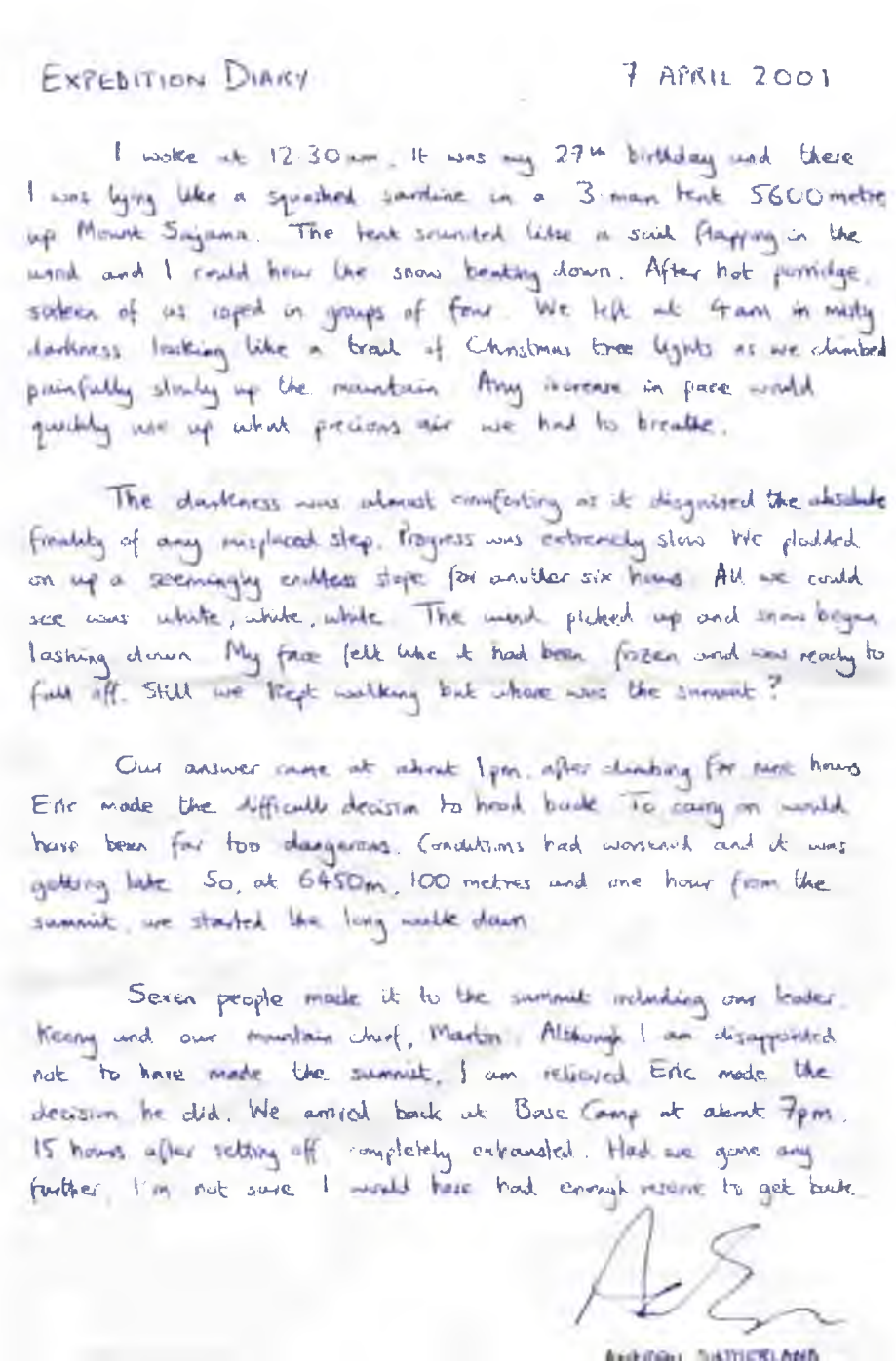
Roland Partridge

As we scrabbled between the tents to find our equipment, frosted fingers doing battle with frozen crampon straps, the wind showed no signs of letting up. Digging out ice axes that had erstwhile been tent pegs, the guides' astonishment at our enthusiasm was palpable. The first rope team was well up the steep snow slope above the tents as the last group of four climbers and a guide clipped in and set off. The procession of head torches winding its way through the clouds and spindrift ignited that tingly feeling again. Hypoxic limbs, bleary eyes

Matt's treasured summit photo. From left to right: David Dorward (crouching), Ian MacCormick, Kenneth Baillie, Martin Schnopp, Jonathon Heggie (crouching), Guide, Carlos Escobar, John Somner

and tired minds failed to dull our energy and enthusiasm for the challenge ahead. The snowfield defeated, we faced a further 200m of steep ridge. As the clouds began to break and the first signs of dawn lightened the sky, the sense of exposure grew.

The crux of the climb, a very steep section of fixed ropes followed by an awesomely exposed ridge, proved to be quite a bottle neck. While the first rope teams breezed through, those towards the rear had to wait up to 40 minutes as the cloud cover thickened and stole away any views that the day might have afforded. Kicking steps up the slope as the building wind pebble-dashed our faces with spindrift should have been hard work. But this was what many of us had come for, and now was not the time to bemoan a little bad weather. Crossing the foot wide ridge, fixed rope clasped in icy glove, the endorphins were riding high. And then the summit snowfield started. All 800m of it. On a running track this might take a minute or two. But in vertical ascent up a 40-degree slope plastered with snow the consistency of sinking sand, doing battle with the wind, the snow and wilting motivation, progress was a little slower. Some of our party later admitted to feeling 'a little rough' at this stage. Rope teams were re-arranged as a few sensible souls overcame their valour with a little discretion. Others had the summit fever badly.



EXPEDITION DIARY 7 APRIL 2001

I woke at 12.30am. It was my 27th birthday and there I was lying like a squashed sardine in a 3 man tent 5600 metre up Mount Sajama. The tent sounded like a sail flapping in the wind and I could hear the snow beating down. After hot porridge, sixteen of us roped in groups of four. We left at 4am in misty darkness looking like a trail of Christmas tree lights as we climbed painfully slowly up the mountain. Any increase in pace would quickly use up what precious air we had to breathe.

The darkness was almost comforting as it disguised the absolute finality of any misplaced step. Progress was extremely slow. We plodded on up a seemingly endless slope for another six hours. All we could see was white, white, white. The wind picked up and snow began lashing down. My face felt like it had been frozen and was ready to fall off. Still we kept walking but where was the summit?

Our answer came at about 1pm, after climbing for most hours Eric made the difficult decision to head back. To carry on would have been far too dangerous. Conditions had worsened and it was getting late. So, at 6450m, 100 metres and one hour from the summit, we started the long walk down.

Seven people made it to the summit including our leader Kenny and our mountain chief, Martin. Although I am disappointed not to have made the summit, I am relieved Eric made the decision he did. We arrived back at Base Camp at about 7pm. 15 hours after setting off completely exhausted. Had we gone any further, I'm not sure I would have had enough reserve to get back.

The first two rope teams were now storming away up the final push to the top. Kenny, Martin, Matt, Ian, Heggie, David and John, and two guides made it to the top, thus claiming the first successful ascent of Sajama in the 2001 season. The rest of the party, by now pretty much grouped together, were met by this first group as they descended, a few hundred metres beneath the top. Tired, cold and with worsening weather and softening snow the decision was made to turn back and descend as one party. It was gutting how quickly the snowfield passed. Having spent hours traipsing up blindly, always hoping the next horizon would be the last, we seemed to get back to the fixed rope section in no time. As we arrived at the ridge the cloud level lifted and opened up phenomenal views down onto the altiplano and across to the Chilean mountains just 10 miles west. The ridge that had felt exposed before now felt like a tightrope as the snow that fell off your boots whizzed

thousands of feet into the abyss below. This successfully negotiated we stumbled down the snow slope back to high camp. After a little rest, food and a warm drink we all felt much less knackered and ready to head back down to base camp. The slope which had seemed so daunting on the way up became a gentle plod, interspaced with long stretches skidding down on bottoms. The sun set gently as we headed back to camp, where a much appreciated hot meal and our sleeping bags awaited.

Summit

Martin Schnopp

"Oh no, not again! This must be the 100th time that we're stopping", I mumbled to myself in dismay. Nothing is harder than getting going again. A quick look around – where were we? Well, according to Fernando, our guide, we were just 200 altitude metres away from the summit at about 6,350m. But that was what he said the previous time we had stopped, well, and the time before… Everything was white around us. It made me dizzy.

We stopped to have another discussion whether we should continue up the mountain. The weather seemed quite strange and we were just not quite sure. But again we decided to continue just for a bit. So off we went Fernando and me tiredly singing our battle song, 'vamos a la playa' with the attempt of pointing towards the top (or at least somewhere up). A couple more breaks and there we were on the top of Sajama, the top of Bolivia and as it seemed, the top of the world. The summit was a huge plateau and visibility was approaching an amazing 10 metres, not the most impressive. But hey, we made it and we were the first this season. As we sat and enjoyed the moment of no view, frozen toes, frozen water, utter exhaustion, overwhelming hunger, cramping legs and a nose that wouldn't stop bleeding the second rope reached us. The Scotland flag out… the photos taken… and down we stumbled again.

(Out of the seven guys reaching the top, guess how many of them were wearing ECG recorders? Exactly… all of them. Coincidence?)

Descent

Matt Bates

Having reached the summit by some bizarre combination of fortune and fight, my descent did not start too well. Disregarding Ian's wise words about keeping hold of ice axes, I had managed in the space of two minutes to completely lose sight of mine. The falling snow and the fact that one rope had already moved off pretty much obliterated my chances of finding the ice axe, and it was some intense fear that I faced the prospect of 1500m descent in white-out conditions with minimal equipment. Not for the first or the last time on that massively memorable day our rope pulled out the stops for each other and John found my axe.

Confidence rushed back - we had conquered the mountain and averted a disaster, what problems could the descent now hold? The trudge down the top snow cone certainly was a lot easier than the trudge up, and we all appreciated the views that any fleeting gaps in the clouds provided us with. On the climb, we had been vaguely aware of a deep valley behind

us for the odd second or two when the clouds momentarily lifted, but during the descent we were facing the right way and more able to marvel at the extensive views across to Chile and beyond.

Somehow the depth of the snow seemed more problematic on the way down. Our increased pace and rapidly approaching exhaustion combined to accentuate the difficulty associated with wading through three-foot deep snow. To this day I still cannot believe how long that descent to the fixed ropes actually was, particularly since it implied that we had not hours earlier ascended the self-same distance. I was astonished by the height we had climbed. The ardour of that climb only began to hit home as we descended and endless metres of snow fell away beneath us - I think on the climb, I felt so bad that my mind was only able to think in terms of minutes and the hours actually slipped by unrecognised. With a clearer head and greater vertical perception due to the increasing visibility, the extent of our achievement gradually hit home.

Mood was difficult to assess on the descent. Seven made it to the summit but some would undoubtedly have swapped places with someone to whom reaching the summit meant more. We were all proud of our achievements but also anxious to get off the mountain to bring a long-overdue end to the continued output of energy. We talked little until we met other ropes beneath us, ropes that had not made it to the summit. With such evident conflict of apparent success and failure, it was a difficult time for everyone but I sincerely hope that the achievements of that day can be measured in something more than vertical height. Each rope group had tales of personal triumphs and milestones, disappointments and experiences and each rope should be proud of the way they coped in the face of great physical and emotional challenges.

At the fixed ropes bottleneck, I encountered my second major shock of the climb down: the fixed ropes really were absolutely necessary. As altitude beginners, half-asleep at 6am and virtually blinded by the weather conditions, we had come up one of the most dangerous-looking ridges I had ever seen. With sheer drops that I had not even sensed on the way up, the twisting, turning narrow route certainly quickened my pulse and we had come up this way in the dark! It was no wonder that people had slowed to a crawl since the snow was now more slippery and with increased vision, the fear factor had increased.

Above: Ali at Base Camp

Right:
"Are you sunburnt or do you have some sort of disease on your face?"

For the final hour of the descent to high camp, we trudged again through deep snow. The quiet mountain air only punctuated every four or five steps by cursing shouts as people fell groin deep into drifts and struggled to free themselves. Eventually with some considerable practice and a light-ish rope, we were able to trot down the last few hundred metres at a fair old pace. We merrily skimmed across the snow surface, only occasionally falling flat on our faces and were treated to the most fantastic welcome home I have ever experienced.

Everybody, whether they had attempted the climb or not seemed genuinely ecstatic to see one another. Roger and Yolanda were some of the first to greet me personally and I was quite overwhelmed by their congratulations

– from the warmth of their welcome, I felt that their light-hearted comments about worrying for our safety when the clouds rolled in above them were all too realistically grounded in fact. Whether summiters or not we felt like returning heroes and everyone enjoyed a tea and kit-kat bonanza before attempting to pack up for the final push.

We left as we had set out from base camp, in dribs and drabs. There was a tangible sense of finality - that to leave our lofty temporary home was to begin the end of our Bolivian experience. The relatively short trip from high camp to base camp could have taken just over an hour but most let it stretch until approaching sunset at least. Images that will remain with me forever include the sun finally disappearing over the Bolivian hills and all of my colleagues spread out over an area the size of several football pitches, using various parts of their anatomy to slide down the hillside.

Left: Hazel and Heather celebrate Comic Relief

Reaching base camp, the whole group was re-united for the first time in a couple of days, and morale had never been higher. Some individuals even trooped out of base camp to help the last few stragglers with their increasingly heavy packs over the last few wearisome steps. Somehow, my elation managed to defeat any physical feelings of pain or exhaustion. I felt fantastic. Dinner that night was again in two shifts but group spirit could not be so easily divided, many people attempting to sneak back in to the dining tent to re-join the banter and enjoy an impressive release of tension. For the record, we all slept pretty well that night and there was almost no mention of threesomes from any tent.

In the morning our faces peeled off. Everyone who had set out to climb the previous day had applied sun cream but most now realised that they had not re-applied it often enough. Some of us even had the foresight to apply moisturising creams before hitting the sack. But no one had anticipated the sheer depth of hideousness that would be exposed the following morning. We had all seen sunburn before, but we had not experienced red facial tattoos.

Thanks to a combination of sunglasses and facemask, I was blessed with bilateral scarlet bat wings for the rest of my time in Bolivia, while others had pillar-box noses and ears. Some even had a seeping yellow fluid dripping from their red skin - not a colour combination I wish to see again. Ever. Facial crustiness is also an undesirable thing. Kenny spent the first few hours of that post summit day, hidden in his tent, removing the superficial crusting from his face and Martin would literally punch anyone that made him laugh for days after, lest any violent facial movement lead to the loss of any vital components of his visage. Back in Sajama village we were able to compare faces and assess degrees of disgustingness but it wasn't long before the pain of sunburn melted away in the slumber of coach travel.

El Gringo & El Nombre de Football

Kenneth Baillie

At the end of the expedition Carlos, our guide, arranged for us to be interviewed by a Bolivian Television News Channel. The organisers of the expedition went to the studios in La Paz, and we sat around a table and gave a very relaxed and confident interview (it's easy to be relaxed when you are talking to several million people you'll never meet) to a famous reporter

known as *El Gringo*. After this interview the camera crew left the room, and *El Gringo* asked us a few general questions about humans at high altitude. "How long does it take to acclimatise?" he said.

"Acclimatisation continues for years, even generations" I replied. *El Gringo* looked a little surprised.

"These illnesses [HACE and HAPE], how high do you have to go before you suffer from them?"

"People have died at altitudes lower than we are right now." *El Gringo* now appeared shocked.

He asked a few more questions, and then he explained that the Bolivian national football team was due to play Argentina in La Paz the following week. There had been a great controversy about whether it was fair to play at the altitude of La Paz, and the matter was of great importance to the Bolivian population, who naturally wanted to have international football played in their capital city, and also to the people of Argentina, who wanted a level playing field for their match.

El Gringo had a brief conversation in Spanish, and then he made a request of me that I think I shall never hear again. He asked if I would participate that evening in a football programme that he presented, called *En El Nombre del Futbol*, which I later found out was viewed by 5 million of Bolivia's 7 million residents. *El Gringo* ordered one of his assistants to get him a Bolivian altitude scientist on the phone, and held a quick discussion with a scientist who agreed to participate in the show. Why wouldn't he - it's not often that you get the chance to be on *En El Nombre del Futbol*.

So the cast of the show was to be me (the malevolent foreigner who said that it was difficult for lowlanders to play football at high altitude), a translator, *El Gringo*, a Bolivian scientist who would present reasonable arguments for the match to go ahead and a token footballer. The rest of Apex's organisers were to be positioned in the front row of the audience, offering questions.

For two manic hours I ran around our hotel, showering, shaving, picking the crusty bits off my face, making myself look human for the Bolivian public. My excitement continued to build the more I thought about what was happening. What right did I have to be a panellist on a top football broadcast? I was surely of no interest to football fans in Britain, let alone in *South America*, the continent that produced Pele. I could never have dreamed of having an opportunity like this. I tried to phone home, but I got bored before I had managed to finish dialling the number, so I gave up and just walked around smiling for a while instead.

In those two hours, my appearing on a Bolivian football programme had gone from being an occurrence too ridiculous for fantasy, to being my number one life ambition. With Ward, Milledge and West's "High Altitude Medicine and Physiology" clutched under my arm for last-minute revision, I bounced into our jeep to go to the television centre. When I arrived, I was met by a bitter disappointment with a twist of a bizarre element of South American culture. *El Gringo* explained that the chief of the television station had banned me from appearing on the programme because, as he put it, "I would not be able to guarantee your safety, or the safety of my building, if you say those things". He was frightened that I would start a riot.

"In Bolivia we say we have three things," our driver had told me in his excitement about my planned appearance on *En El Nombre del Futbol*, "God, football and beer".

A lucky escape? Or my greatest ever missed opportunity. To my unending regret, it is close to a certainty that I will never again be asked for my opinion on any matter by a football television programme, in Bolivia or anywhere else. It is even less likely that I will ever be in a position to spark a riot. Perhaps it is best to live without ever having such an experience - after that, how could the rest of your existence be anything other than an anticlimax?

Journey Home

Martin Scnhopp

We were going home again. Split opinions. Some people had enough and just wanted to get home and others could have stayed in Bolivia for the rest of their lives. Most of us however, were quite sad to leave but also looking forward to getting back home. Personally, I couldn't wait to get rid of my very irregular, often diarrhoea-like stools, which had plagued me for the final two weeks of the expedition. But that is different story altogether.

The final night in Bolivia we had spent in the legendary Mongo's bar. A night to be remembered and filled with lots of gossip (and lots of photographic evidence). But we just had to celebrate, this being our last night together. With every round that was bought, smiles got bigger, stories louder and our red noses got even redder!? But as everything comes to an end this night and our expedition did too. Less than two hours of sleep had to be enough for us as our plane was leaving quite early in the morning. The lack of sleep and the after-effects of the few drinks from the night before made us feel fairly numb. No big emotional outbreaks! Finally in the plane, it did not take long for sleep to get a hold of us. A last look was thrown down onto La Paz where first rays of light fought away the darkness. Dawn was near!

It just felt so familiar back on British soil. We said good-bye to a few of the guys and drove off with our bus, direction north, destination Edinburgh. A quick break at a motorway Burger King (finally good old British food again) and soon we were in Edinburgh. The goodbyes were brief and off everybody went. The expedition was over. But when I walked home I thought to myself that this was actually just the start of our research, which was to occupy our lives for months to come. – Every beginning is another beginning's end –

'Needles, nebulizers and a nagging feeling that we didn
need to get quite so naked for Martin's ECGs
MGD

The Research

Introduction

Kenneth Baillie

High altitude sports such as skiing, snowboarding, trekking and climbing are becoming increasingly popular. Many people everywhere are familiar with the persistent nausea, breathlessness, throbbing headache, and disturbed sleep of acute mountain sickness (AMS), and many more will experience it in the future. Mysteriously, the condition appears to strike at random: every trekking group has an example of a highly trained athlete being outrun by a couch potato. A French paratrooper on a family trip was bedridden and had to be evacuated, whilst his mother was able to play volleyball and had no symptoms at all.

Many people have noticed that as they spent more time at altitude, they felt healthier, and were able to do more, and climb higher, without feeling breathless or sick.

It is human nature to wonder what is the cause of the unpleasant and debilitating symptoms of AMS. Why, also, are some people so much more susceptible than others? And how do our bodies adapt so quickly to the lack of air to breathe?

We cannot yet fully answer these questions. But the explanation of what we do know involves a fascinating tour of human physiology, from the drive to breathe to the delicate balance of acid in our blood. Our comprehension of human physiology has much left to gain from the study of humans at high altitude.

The benefits of this research could stretch beyond acute mountain sickness and other high altitude diseases. There are many sea-level medical conditions, such as asthma and chronic bronchitis, which are complicated by a lack of oxygen. By advancing our understanding of the normal response to a lack of oxygen, this research may stimulate the development of new treatments of use in these conditions.

[We hope to publish the findings of these experiments in full in high-quality international peer-reviewed journals. Details of these publications will appear on our website, www.apexbolivia2001.com, as soon as they are available.]

Molecular causes of mountain illnesses

Kenneth Baillie

We are very excited by our initial results which suggest that crucial defensive chemicals called antioxidants could be an important natural protection from mountain sickness. This could form the basis of future treatments for mountain sickness.

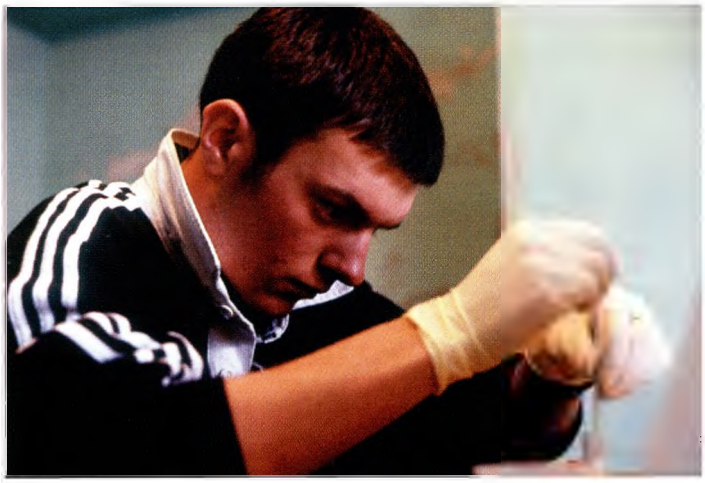
People die every year at high altitude because of fluid building up in the lungs and brain (pulmonary and cerebral oedema, respectively). Fluid on the brain causes it to swell and press against the rigid walls of the skull, and this causes the classic symptoms of brain swelling – headache, lethargy, nausea, vomiting, difficulty walking and eventually loss of consciousness. It is likely that the same process is responsible for the milder and more common condition, acute mountain sickness.

Cerebral Oedema

Studies of patients with cerebral oedema have found that the blood vessels themselves become leaky[1]. The problem is that although there are several ideas, no-one knows exactly what causes the blood vessels to start leaking. One suggestion involves dangerously reactive molecules called free radicals which are produced when the body's cells don't get enough oxygen. They react with important components of cells, such as proteins, fats and DNA, often causing irreversible damage. They can be thought of as tiny bullets ricocheting around inside cells. We think that free radicals could be a crucial step in the chain of events leading to mountain sickness. If free radicals are produced in excess at high altitude, they could damage the lining of blood vessels, allowing fluid to leak out into the brain[2].

Pulmonary Oedema

Pulmonary oedema may also be caused by blood vessels becoming leaky[3], and free radicals may again be important in causing this leakiness by damaging blood vessels. Free radicals also seem to be important in the way that the cells of the lungs detect oxygen. This is important because when they are short of oxygen, the blood vessels of the lungs constrict so that it is harder for blood to flow through them. This raises the pressure within the blood vessels, making it easier for fluid to leak out.



David Dorward puts in another hard day's pipetting

The body's natural defence against free radicals, chemicals called antioxidants, could be important in preventing the fatal forms of mountain sickness. Antioxidants defend the body by reacting with free radicals before they damage important cell structures. If free radicals are like little ricocheting bullets, the antioxidants could loosely be thought of as a bulletproof vest for cells.

Summary of Results

We are going to look for evidence of free radical damage in some of the blood samples that we took during the expedition. At the time of writing, we are eagerly awaiting the results of these analyses.

You would expect that, if antioxidants really are important in preventing altitude illnesses, those people with less antioxidants would be more susceptible to mountain sickness. With only 25 people, we can't prove that this is the case, but with the help of future studies, we might be able to prove that low antioxidant levels predispose to poor performance at altitude.

The boys hand over another batch of frozen samples to World Courier

We found that the levels of antioxidants in our subjects' blood were greatly increased after a week at high altitude. Furthermore, the rise in antioxidant potential occurred at the same time as everyone in the group was getting over the mild mountain sickness that most of us suffered at Chacaltaya. Our bodies may have been protecting themselves against higher levels of free radicals. If this is the case, then working out exactly how the antioxidant rise occurred will be a challenge for the next expedition. In the experiment described above, we have measured *total* antioxidant levels, but this is made up of a lot of different chemicals, such as vitamin C and vitamin E. Finding out which antioxidants are particularly increased at altitude may unlock the key to future therapies to prevent or treat mountain sickness.

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Blood Vessels in the Lung at High Altitude

Matt Bates

Background

All travellers to high altitude will be aware of the immediate effects of low oxygen concentrations on their breathing and lungs. A feeling of breathlessness and an increased rate of breathing are normal responses to this novel environment. However, some people experience a more serious condition. High Altitude Pulmonary Oedema (HAPE) is a dangerous condition experienced by visitors to high altitude and characterised by fluid leaking from the blood into the tissue of the lung itself. It can be fatal within hours and the fluid leakage is largely caused by the high pressure in the blood vessels of the lung.

When exposed to low oxygen concentrations, various arteries and veins within our lungs constrict and this increases the pressure within the blood vessels of the lungs (pulmonary hypertension). Victims of HAPE have extra-ordinarily high blood pressures in their lungs and we already know that treatments to reduce this pressure reduce the problem of HAPE.[1] However the precise mechanisms for this important and dangerous process of vessel constriction in lung blood vessels have not yet been established so that no specific treatments currently exist.

This research was designed to help us understand more about lung vessel constriction both at high altitude and in certain sea-level diseases (such as chronic bronchitis and emphysema, the debilitating diseases caused by smoking) that are complicated by low oxygen concentrations.

Endothelial cell damage

Endothelial cells are the specialised cells that line the inside of blood vessels throughout the body. In the lung, these cells release a variety of substances that control the amount of constriction of blood vessels and therefore control the pressure inside those vessels. Damage to these cells by low oxygen concentrations (see Kenny's research) is one mechanism by which excess substances can be released into the blood. My experiments therefore investigated three chemicals that control constriction and one chemical that indicates the amount of damage to endothelial cells:

- Urotensin-II (U-II) is a recently discovered hormone that is responsible for a complex combination of constricting and dilating actions in different human blood vessels. It has rarely been studied in human subjects and never before in low oxygen conditions, but acts particularly in conditions similar to those in HAPE.[2]
- Endothelin-1 (ET-1) is a powerful and important substance that constricts many human blood vessels. Levels of ET-1 have been demonstrated to increase under conditions of low oxygen concentration and it seems likely that ET-1 plays a role in HAPE. However the relationship of ET-1 release to endothelial damage at altitude has not been established.
- Nitric oxide (NO) is formed in endothelial cells and acts as a dilating substance in lung blood vessels. Inhibitors of this enzyme help constriction of blood vessels during low oxygen conditions, suggesting a role for decreased levels of NO in HAPE.[2]
- von Willebrand factor (vWf) is a molecule involved in the process of blood clotting but is however also an accepted marker of damage to endothelial cells. High blood levels indicate a severe degree of damage.[3]

The Experiment

We took six blood samples from all expedition members to investigate any changes in the levels of the above four factors that occurred during exposure to low oxygen concentrations at high altitude. Control samples were taken both before and after the expedition, with the remaining four samples being taken in the field, either in La Paz (3630m) or at the Chacaltaya laboratory (5200m).

We spun the samples at high speed using centrifuges to separate cells from fluid in the blood. The collected fluid (plasma) was then frozen using dry ice and transported back to the UK for analysis. Unfortunately, at present we only have two sets of results completed (U-II and ET-1) but laboratory work continues apace and initial result are very exciting!

Blood-taking in Chacaltaya

What I have found (so far!)

Plasma levels of U-II rose over the course of the expedition. This is the first human study to demonstrate that this exciting new substance is increased during low oxygen conditions and intriguingly levels remained high initially after return to sea level. One possible mechanism of HAPE involves patchy constriction and dilatation of blood vessels in the lung leading to extra blood being diverted to some small vulnerable vessels and fluid leakage through pressure increases in these areas. The mixed dilating and constricting actions of U-II fit with this theory. Further studies into the role of U-II in pulmonary hypertension are definitely needed.

This study also confirmed that levels of ET-1 are increased by high altitude exposure. This supports previous work by other authors however this research provides new evidence concerning the extremely rapid time-course of ET-1 elevation.

During our time at Chacaltaya laboratory three expedition members were evacuated with symptoms of moderate to severe Acute Mountain Sickness (AMS). Although numbers were too small to draw definite conclusions, it was interesting to note that these three volunteers provided blood samples with extremely high levels of ET-1, and particularly U-II, prior to their departure from the laboratory. U-II and ET-1 may have caused constriction of their lung blood vessels at high altitude and may have contributed to these people experiencing some mild fluid leakage into the tissue of their lungs. This would decrease the amount of oxygen that could be taken into the blood of these people, causing their more alarming features of AMS.

Further results will be described as and when all the relevant assays are completed but this research has already uncovered some novel findings and highlighted the need for future work into the biological mechanisms of action of U-II.

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High Altitude Cough

Roger Thompson

"All was not well with my body…My worst problem, though was my chest: the dry hack I'd picked up some weeks earlier in Lobuje (4800m) had gotten so bad that I'd torn some thoracic cartilage during an especially robust bout of coughing at Camp Three. The coughing had continued unabated and each hack felt like a stiff kick in the ribs."

Jon Krakauer at Everest Base Camp. Into Thin Air. MacMillan 1997

Lots of climbers and travellers complain of cough at high altitude. It interferes with sleeping and climbing and rib fractures have been reported after severe bouts of coughing. Dr Nick Mason kindly suggested this experiment that would follow on from work that he and Dr Peter Barry had done on the British Mount Everest Medical Expedition in 1994. The experiment investigated potential causes of high altitude cough and in particular the theory that the cough could be caused by changes in the brain that occur when the body is short of oxygen.

Previous research

On the 1994 Mount Everest expedition, research into cough showed that it became more frequent at altitude and that people became more sensitive to a stimulus (citric acid) that induces cough.[1]

In 1997, an experiment known as Operation COMEX was carried out in Marseille. This was a simulated ascent of Everest undertaken by nine "altinauts" in a chamber where the pressure could be reduced to reproduce conditions at altitude. More evidence was published showing that cough was more common at altitude.[2] Additionally this study provided key evidence against some of the suggested reasons for high altitude cough.

Why should cough increase at high altitude?

Numerous reasons may spring to mind. For example, infection or breathing the cold dry air on the mountains. Pulmonary oedema (the accumulation of fluid in the lungs) and bronchoconstriction (the narrowing of the airways that commonly occurs in asthma) could also contribute to an increase in cough.

The nebulizers

Evidence from the previous research counts against these hypotheses.[3] Firstly, the environment in the hypobaric chamber during Operation COMEX was controlled. Temperature and humidity were kept between 18-24C and 30-60% respectively. This fascinating evidence refutes that hypothesis that cough is only caused by the cold dry air of the high altitude. Secondly, the research subjects in operation COMEX showed no signs of respiratory tract infection. Thirdly, both studies on cough found no correlation between cough and bronchoconstriction or signs of pulmonary oedema. Finally, a cause for the decrease in citric acid cough threshold could be a change in the deposition of the particles of citric acid in the lungs at altitude. Again the previous studies do not support this theory because generally the change in cough threshold was not immediate, but rather occurred after several days.

What could be the cause? This experiment investigated whether the increase in cough could be caused by changes in the brain that occur at high altitude.

Cough and Carbon Dioxide

When the body acclimatises to high altitude it is thought that the brain responds differently to various stimuli. There are receptors in the brain that make you breathe more when they sense carbon dioxide. These are thought to become more sensitive at altitude, where there is less carbon dioxide in the air.

Mason and Barry have postulated that the change in the threshold concentration for citric acid induced cough could be related to this change in the brain's response to carbon dioxide. As well as controlling breathing, the brain also has a role in cough. For example, when you cough, you have to change the pattern of your breathing. Also, some of the best drugs for suppressing cough are those that suppress breathing. There has been some published evidence that links breathing in response to carbon dioxide to cough. A study found that those subjects who were less likely to cough had a relatively weak response to carbon dioxide.[4]

Therefore changes in the brain that alter breathing, like the increase in sensitivity to carbon dioxide, may also make you more likely to cough at altitude.

How I did the experiment

There were three branches of the experiment.

1. Testing the citric acid cough threshold of the subjects

The volunteers were asked to inhale different concentrations of citric acid from a hand-held nebulizer that produced a fine mist of citrate. The concentration at which they coughed, providing that they coughed at the next higher concentration, is the citric acid cough threshold.

Left: Catrin taking the citrate cough challenge

2. Testing the response of the male subjects to carbon dioxide

This involved breathing the air in a 6-litre bag (inside the box in the picture on the left). As the volunteer kept breathing in and out of the bag, the concentration of carbon dioxide that they inhaled rose steadily. This made them breathe more and showed how sensitive they were to carbon dioxide. The sensitivity increases with acclimatisation.

Below: Testing Sam's response to carbon dioxide at Chacaltaya

3. Measuring nocturnal cough frequency

The volunteers were each given a voice-activated tape-recorder and used this each night on the expedition to record the number of times that they coughed during the night. At time of press these results are still awaited.

What I found

My research confirmed work carried out in the past at high altitude, that the sensitivity to the increase in stimuli that make you cough is significantly increased at 5000m above sea-level. This confirms what climbers and travellers to high altitude have complained about for years.... they cough more when they go high.

On this expedition sensitivity of the cough receptors occurred more quickly than found in previous studies. This suggests that the cough may not be associated with acclimatisation. Indeed, this study didn't find any correlation between acclimatisation (as measured by the increase in sensitivity to inhaled carbon dioxide in the male subjects) and cough.

Other possible causes could be:

1. An increase in the amount of fluid in the lungs (pulmonary oedema that isn't producing major clinical symptoms)

2. The lack of oxygen at high altitude causing damage to the lining of the lungs (inflammation) and increasing cough receptor sensitivity

3. A change in the deposition of the citric acid particles that enter the lungs during the test, making it more likely that the person will cough

4. Breathing cold, dry air could also cause cough

Direct implications of this study are that most people will be more sensitive to things that make them cough if they go to high altitude. The research also points towards other causes for this cough and away from it being a consequence of acclimatization and should stimulate future research into these possible causes.

The cough team. From left to right: Dr Sam Patel, James Read, Roger Thompson, Yolanda Bennett and Johnnie Balfour

Reference List

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3. Barry PW. http://daedalus74.mc.duke.edu/ismm/news.htm#cough

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Exercise Performance

Alistair Simpson

It is has been suggested that athletes can improve their exercise performance at sea level by training at altitude. The theory behind this is based on the physiological adaptations which the body undergoes when exposed to high altitude. These changes occur in response to the lower amount of oxygen in the atmosphere and are principally concentration of the blood and an increase in arterial oxygen saturation, as well as other more minor changes, which could theoretically improve exercise performance. However, there are some detrimental changes which occur at altitude which could potentially offset any beneficial effects. Notably, these include a decrease in absolute training intensity, reduced creation of red blood cells by the bone marrow, increased destruction of red cells and other negative effects. Evidence for the practical outcome of these changes so far is not clear, and as much of the research to date has dealt with athletes, very little is known about the effect on untrained individuals.

Above left: Climbing on Sajama
Below: Alistair at Isla del Sol

The Project

To try and clarify this issue, particularly with regard to untrained people, this project was designed to establish what effects a three week stay at altitude has on the exercise performance of a non-athlete once back at sea level, by measuring exercise performance before and after exposure to altitude. To eliminate the effect of the three weeks of exercise on the results, a control group will simultaneously indulge in a similar exercise program, but at low altitude in Scotland.

The Step Test

The subjects' exercise performance was measured using a 'step test'. This test involves the subject stepping up and down a 25cm step at a set rate (25 steps/min^{-1}) for a set time (3 min). Immediately before and 15 seconds after stepping, the subject's heart rate was measured. The differences in the two heart rates so obtained were used to calculate a measure of the exercise performance of the subject. This is a simple, cheap and portable method of assessing a person's exercise performance, and previous research has shown it to be reliable.

What I Found

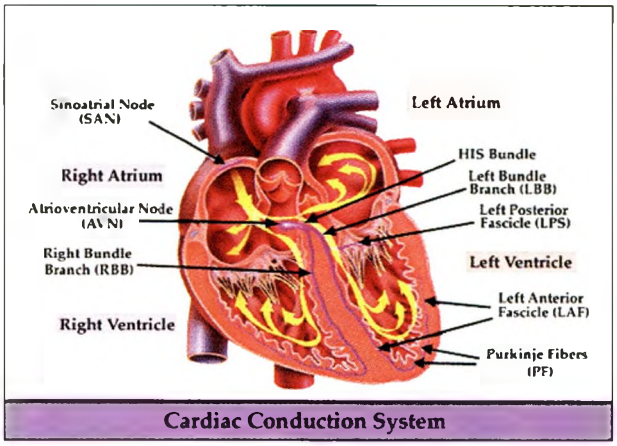
The results of the experiment showed that exposure to altitude decreased the exercise performance of the subjects tested. This is in contrast to popular belief, but is not entirely unexpected. Possible reasons for this decrease include the reduced energy intake at altitude with an associated increase in energy expenditure, as well as the various physiological changes which could serve to offset any benefit of altitude exposure.

The ECG at altitude - QT Interval

Martin Schnopp

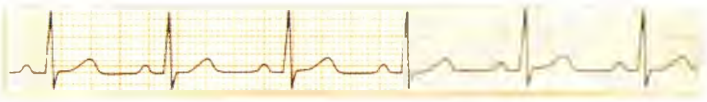
Background:
What is the ECG?

ECG stands for **E**lectro**C**ardio**G**ram and displays the electrical activity of the heart. It is measured by attaching electrodes in certain positions on the body. The electrical impulse that starts a heart's contraction is created in the heart itself (where the yellow arrow starts on the diagram opposite). It travels through the heart, as shown by the arrows in this diagram, through special conduction pathways. This leads to the whole heart muscle contracting synchronously within a very short period of time.

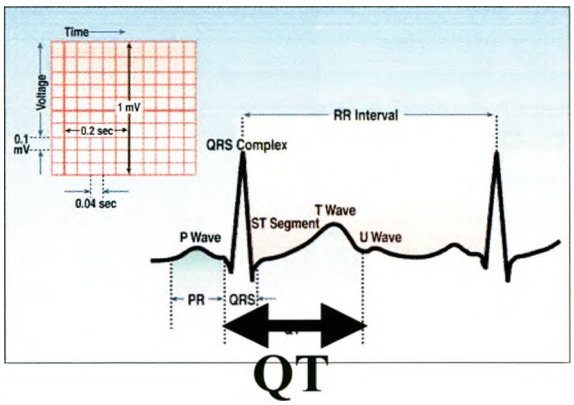


Cardiac Conduction System

What does Martin mean with QT interval?



The graphical display of the electrical impulse that is generated, 'the ECG', is well known through various media and can be seen on the left. Every big spike sets off a heart's contraction, which pumps blood out of the heart into all parts of the body. Hence, a working conduction in the heart is vital. The part of the ECG that I looked at is the so-called 'QT interval' (see diagram below). It reflects the timeframe in which the heart muscle is contracted. When the QT interval lengthens, the heart is more likely to fall into dangerous heart-rhythm problems. This happens, for example, with various medications. One of the aims of this project was to find out whether altitude does lengthen the QT interval. This could prove to be very beneficial in future, as individuals at risk could be identified and rhythm disturbances maybe prevented before going to altitude.



How I did it

We took 24-hour ECG recordings from every volunteer on the expedition at different altitudes and looked whether ascension prolongs this QT interval. All this required was very careful placement of 3-4 sticky electrodes and a walkman-like tape-recorder

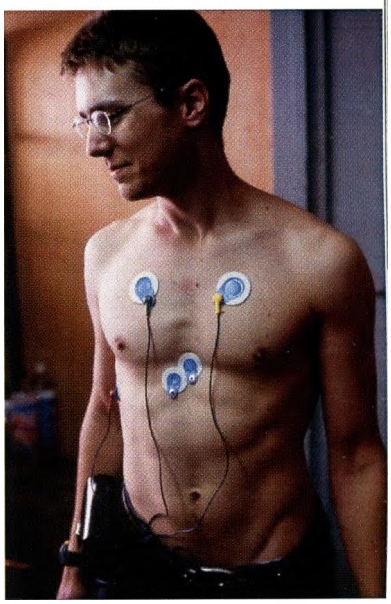
Right: Martin and Kenny getting to know each other better...

(see centre of picture right, bottom left). It was attached to a belt so it could be comfortably worn for 24 hours. This way we got a range of physical activity from sleep right through to severe exercise when climbing Sajama.

On return to Edinburgh the 112 tapes were analysed using high-speed specialist equipment and computers. This way every tape only took 20 minutes to analyse rather than listening to the whole 24 hours.

What I found

I am excited to say that we could prove that the QT interval prolongs at altitude. The higher we went the longer the QT intervals became (without exceptions)!! This means that the heart changes in the way it works at altitude and probably has an increased risk of having heart-rhythm problems. We also found that there is an important sex difference in the QT interval, showing that girls in general had longer QT intervals. These results are extraordinary as they shed light on an area that had so far been neglected in altitude research. Future follow-up studies will be necessary to determine the exact risk and what could be done to reduce it.



John Somner bears his chest in the name of science

Serum markers and mediators of Acute Mountain Sickness and cerebral oedema

Roland Partridge

"The majority of newcomers are quite well on first arrival. Towards the evening the patient begins to feel rather slack and disinclined for exertion. He goes to bed but has a restless and troubled night and wakes up with a severe headache. The patient may feel slightly giddy on rising from bed and any attempt at exertion increases the headache." **– Ravenhill 1913. (1)**

As everyone on the expedition can testify, this is a fine description of the experience of ascending to high altitude rapidly. The details of AMS symptoms and the need to understand them has been described earlier. My research aims to investigate the processes of AMS and go some way to explaining the difference in response to altitude between individuals.

The leading theory as to the cause of AMS is that there is a movement of fluid out of the blood and into the brain tissues, causing 'cerebral oedema' as defined previously. This causes a slight increase in pressure within the head and compresses the brain, which causes the usual AMS symptoms of headache, nausea, vomiting etc. (2).

Blood is kept separated from the brain itself by a membrane known as the blood-brain barrier. This allows some movement of fluid across it, but prevents any significant leaks. Certain chemicals found in the blood can increase and decrease the amount of 'leak' across this membrane. When cells are starved of oxygen (as in the hypoxic conditions of altitude) they become damaged and release these chemicals, causing inflammation, and an increase in the permeability of the blood-brain barrier (3). The following movement of fluid into the brain tissue results in a rise in pressure inside the head and thus causes AMS.

Below: Roland working in the Chacaltaya Laboratory

Two chemicals closely involved in this process are proteins known as Interleukin-6 (IL-6) and Interleukin-10 (IL-10). IL-6 stimulates the increase in permeability of the blood brain barrier (makes it more leaky) whereas IL-10 acts in the reverse, decreasing the permeability (making it less leaky). The balance of these two substances has been shown to control the degree of cerebral oedema in people at sea level (4). I attempted to test the idea that the ratio of IL-6:IL-10 will relate to the amount of cerebral oedema in expedition members as measured by the symptoms of AMS.

My research measures the levels of IL-6 and IL-10 at sea level, during our time at altitude and then on return to sea level. Blood samples were collected from the subjects and the serum (the fluid part of the blood where proteins are found) was separated off. This was done by spinning the samples in a centrifuge, which pushes blood cells to the bottom of the tube, while the serum rises to the top. The samples were then frozen on dry-ice and shipped back to the UK.

I'm also looking at a protein called s100b which is released into the blood when brain tissue is starved of oxygen (5). It may then be possible to use this as a marker of the amount of brain hypoxia at altitude, and relate this to the degree of AMS symptoms suffered.

At time of press I have just returned from my medical elective and have not yet completed the analysis of the samples. The first few batches have been tested and the results look

exciting, but it is too early to comment definitively. Our web-site (www.apexbolivia2001.com) will carry my findings as soon as they are complete.

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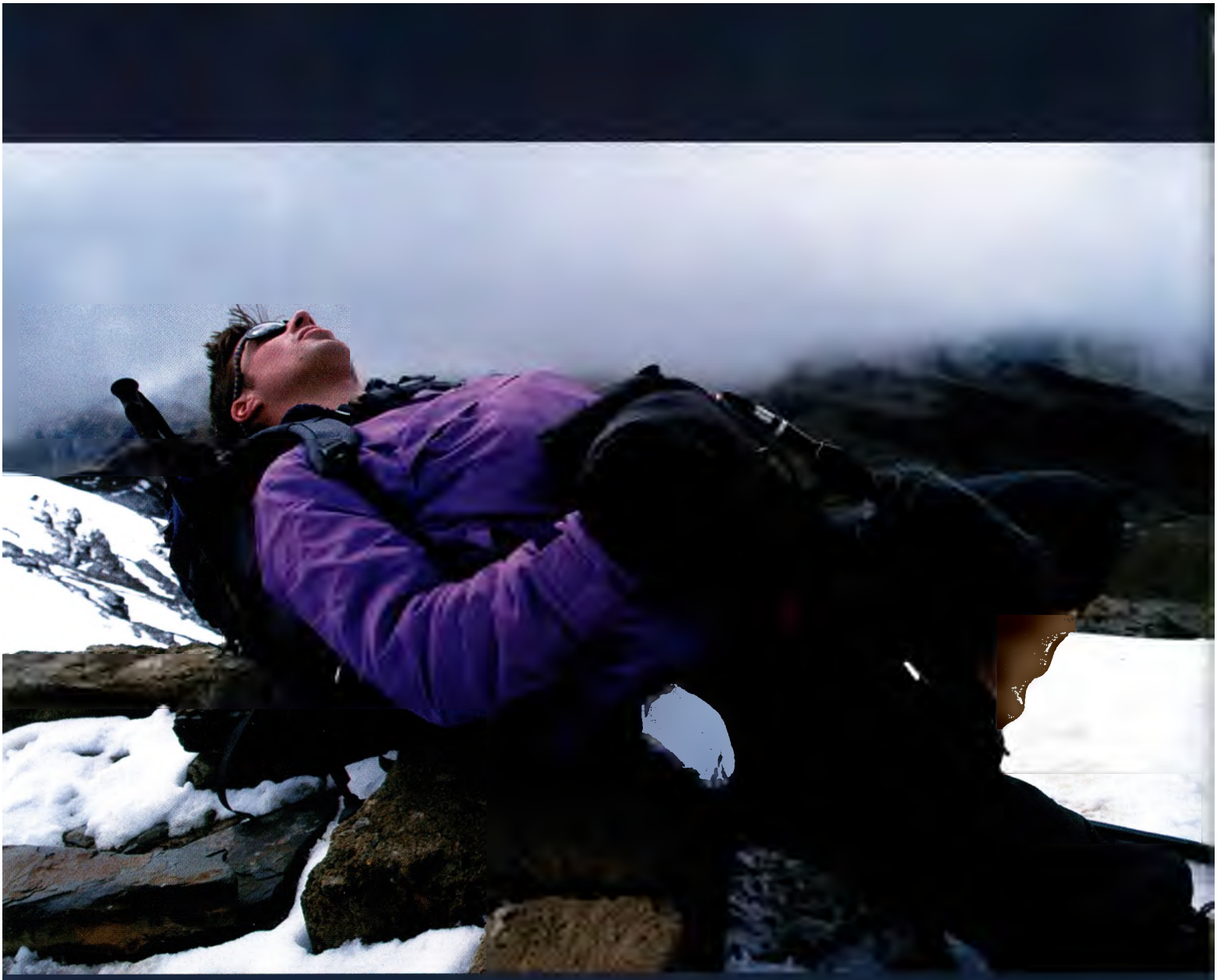


‘An expedition marches on its wallet…’
JKB

‘There are two requirements for a successful
expedition; money and things.’
MGDB

Accounts

Accounts

Roger Thompson

The accounts presented in this report by the tables overleaf, are those of the expedition, Apex: Bolivia 2001. It is important to state that these are not the accounts of the charity, Apex. I have divided the tables into three columns because, for example, some of the grant-making trusts wished their money to be spent on the research alone. Each trust will, if they require, receive a precise breakdown of what their contribution to the expedition was used to fund. Our estimated total expenditure was slightly less than the expedition's income. We have therefore returned this surplus money to a number of the trusts who funded the expedition. For this reason, in the tables overleaf, our income is exactly equal to our projected expenditure.

We are awaiting confirmation from the Inland Revenue that we will receive a VAT rebate for purchases made in the UK. We have deducted VAT from our expenditure in anticipation of this rebate.

Other Contributions

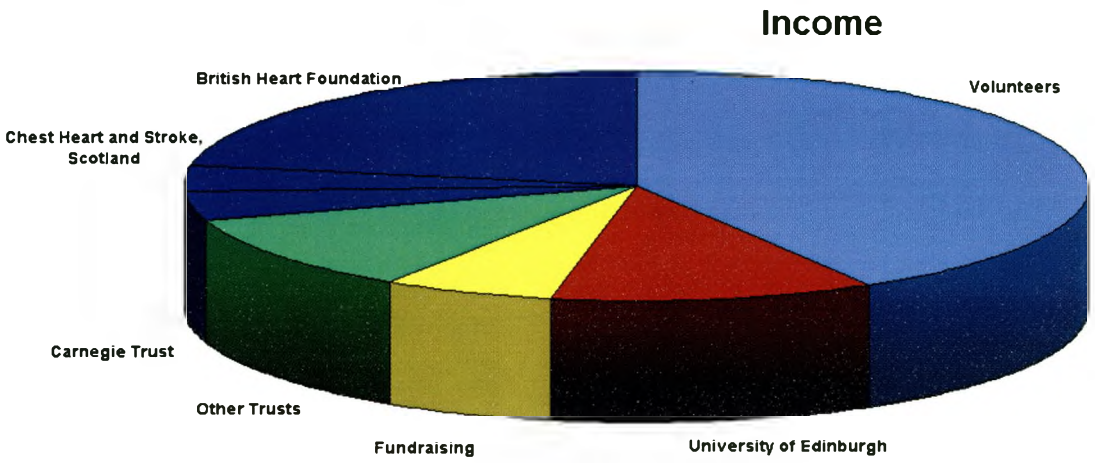
The Mount Everest Foundation supported the expedition with a loan of £1000. This was given on the understanding that it would be refunded if it was not needed. Due to the success of our fundraising we were pleased to be able to return this money.

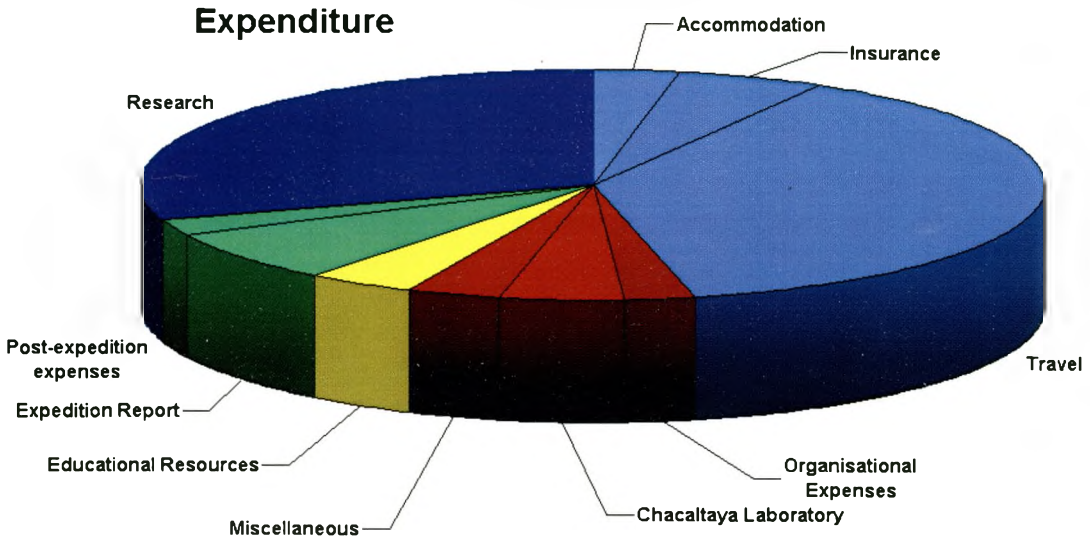
The accounts presented overleaf do not include research funding that was not paid to the charity, Apex.

- Following Kenny's superb application, The British Heart Foundation gave a £10,525 grant to the University of Edinburgh, Division of Molecular and Clinical Medicine in order to fund Kenny's research.
- Chest Heart and Stroke Scotland also gave £1000 to the University of Edinburgh, Division of Molecular and Clinical Medicine to contribute to the cost of both Kenny's and Matt's research.

The contribution to research by Apex (in the table **EXPENDITURE**) funds the remainder of the research costs.

The distribution of the income and expenditure, including the additional research income that is described above, is shown graphically by the pie charts below. The colour scheme of the charts gives a very rough guide as to what each source of income funded. As stated above,





Contributions made directly to the organisers

The Mark Scott foundation, Glasgow, made a generous donation to cover Kenny's costs in organising and participating in the expedition. The Myre Sim Fund of the Royal College of Physicians, Edinburgh, gave a bursary to each of the organisers.

The Climb

Excluded from the expedition accounts is the climb of Sajama. In addition to the £750 per volunteer contribution to the expedition, the volunteers paid £60 per person for a training weekend in Aviemore. Also, the volunteers who participated in the climb paid £185 each to The Adventure Climbing and Trekking Company of South America.

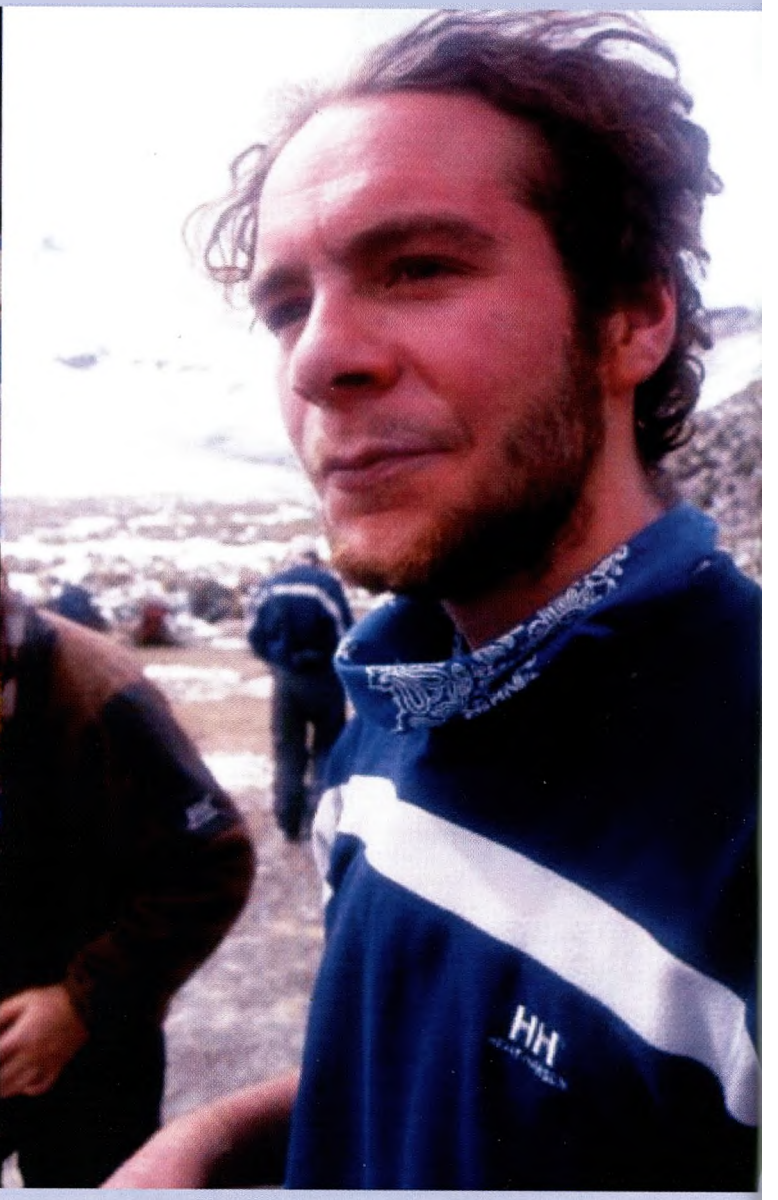
INCOME (net refunds)

	Expedition	Research & Report	Post-expedition	TOTALS
Volunteers and Organisers	£ 19,500.00			£19,500.00
University of Edinburgh Development Trust	£ 2,500.00			£ 2,500.00
University of Edinburgh Moray Endowment Fund	£ 2,000.00			£ 2,000.00
University of Edinburgh Student Travel Fund	£ 926.31			£ 926.31
Young Scot Post Office Action Fund	£ 500.00			£ 500.00
Chase	£ 50.00			£ 50.00
Rotary clubs	£ 300.00			£ 300.00
The Explorer's Club	£ 430.00	£ 417.00		£ 847.00
Samuel Scott of Yews Trust	£ 483.12	£ 16.88		£ 500.00
Lorna's Lottery (Lothian NHS Trust)		£ 500.00		£ 500.00
Gilchrist Educational Trust		£ 508.12		£ 508.12
Chest Heart and Stroke, Scotland		£ 600.00		£ 600.00
Carnegie Trust for the Universities of Scotland		£ 2,000.00		£ 2,000.00
The Guild Fund		£ 300.00		£ 300.00
Fundraising		£ 1,708.00	£ 1,200.00	£ 2,908.00
Other trusts			£ 1,550.00	£ 1,550.00
	£ 26,689.43	**£ 6,050.00**	**£ 2,750.00**	**£35,489.43**

EXPENDITURE

	Expedition	Research & Report	Post-expedition	TOTALS
Pre-expedition administration	£ 1,210.93			£ 1,210.93
Chacaltaya Laboratory	£ 2,033.61			£ 2,033.61
Insurance	£ 2,430.69			£ 2,430.69
Coach to London	£ 1,600.00			£ 1,600.00
Flights	£ 14,201.25			£14,201.25
Internal travel	£ 1,229.82			£ 1,229.82
Equipment transport	£ 855.40			£ 855.40
Accommodation in La Paz	£ 1,461.68			£ 1,461.68
Phone	£ 198.54			£ 198.54
Goodwill gifts	£ 292.16			£ 292.16
Cash advance charges and interest	£ 125.57			£ 125.57
Sundries and logistics	£ 615.75			£ 615.75
Photography	£ 310.65			£ 310.65
Website	£ 123.38			£ 123.38
Research costs (estimated)		£ 2,600.00		£ 2,600.00
Expedition report		£ 3,450.00		£ 3,450.00
Post-expedition administration (estimated)			£ 1,000.00	£ 1,000.00
Educational resources			£ 1,750.00	£ 1,750.00
	£ 26,689.43	**£ 6,050.00**	**£ 2,750.00**	**£35,489.43**

INCOME minus EXPENDITURE (0.00) - - (0.00)



'I can only thank the many organisations and individuals that have supported the expedition for their tremendous help. I believe that the expedition has fulfilled all the expectations of our sponsors and donors'
AART

Acknowledgements & Articles

Acknowledgments

We are grateful to have had the opportunity to work in collaboration with:

University of Chile

Academia Nacional de Ciencias de Bolivia

Instituto de Investigaciones Fisicas, Universidad Mayor de San Andres, La Paz, Bolivia

Instituto Boliviano de Biologia de Altura, La Paz, Bolivia.

Club Andino Boliviano

Medex

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British Heart Foundation

Myre Sim Fund of the Royal College of Physicians, Edinburgh

University of Edinburgh Development and Alumni Services Small Project Grant

University of Edinburgh Moray Endowment Fund

Carnegie Trust for the Universities of Scotland

Chest Heart and Stroke, Scotland

Mount Everest Foundation

University of Edinburgh Student Travel Fund

Mark Scott Foundation

The Russell Trust

Gilchrist Educational Trust

The Explorers Club, New York

Young Scot Post Office Action Fund

Royal Medical Society, Edinburgh

Sir Samuel Scott of Yews Trust

Lorna's Lottery, Lothian University Hospitals NHS Trust

The Guild Fund

Old Etonians Trust

Rotary Club of Inverness

Soroptimists of Inverness

Rotary Club of Perth

Rotary Club of Coulsdon

Rotary Club of Reigate district

Chase

Special thanks must go to the following companies, whose much appreciated and seemingly endless support was essential to the success of the expedition:

Tiso, The Great Outdoor Specialist

Helly Hansen

World Courier

Scarpa, The Mountain Boot Co. Ltd

The generous donations of goods, services and equipment from the following corporate sponsors made our research possible and made the expedition smoother, warmer and safer for everyone. Thanks to:

Kendro Laboratory Services
Sarstedt
Camlab
Cognitive Drug Research
Medical Expeditions Ltd
Reynolds Medical Ltd
Datex-Ohmeda Ltd
Amplicon Liveline Ltd
IMBEX Rent a car
Frontier Medical Products
Mountain Hardwear
Lyon Equipment
Karrimor, The Great British Mountain Company
Ajungilak ASA
The Gorge Outdoors
The Brasher Boot Company
Running Shop Online
HB Climbing
Mountain Technology
Grivel, Mont Blanc
Wynnster Outdoor Leisure
Rab Carrington
Idass
Troll
Targus
Scalesexpress.com
Weight-til
Dine-in
AW Bent
The Really Useful Group
Regatta Ltd
Dairy Crest Ltd
Isostar
Compeed

Many local companies helped us to raise money for the expedition:

The Copy and Print Shop
Armstrong's
Avalanche Records
Bar Oz
Blonde Restaurant
Bookstop café
Bottoms Up
Brown The Stationers
The Cameo Cinema
Cellar Bar
Chandlers Records
The Cook's Bookshop
The Crags
Cuttea Sark
Dixons Group plc
The Feather Co.
Freeze
Iguana
Iso Health Shop
It's A Wrap! Coffee & Wrap Bar
Kings Arms
Mackenzie & Co Chemists
Medusa
Miller's Sandwich Shop
Mr Wood's Fossils
Moss Chemists
Negociants
Nimo's Emporium
Odeon
Outdoor Trading Company
Phileas Fog's Emporium
Robert Cresser Brushmaker
Sandy Bells Pub
Scruffy Murphy's
Sey's Deli
Transreal Fiction
USER2 Computers
Wind Things
White Fun and Fancy Gifts
Workout World
XL Hardware

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Dr David Newby, Department of Clinical Cardiology, Royal Infirmary of Edinburgh.

Dr Ian Nimmo, Department of Biomedical Sciences, University of Edinburgh.

Dr Peter Andrews, Department of Anaesthetics, Western General Hospital, Edinburgh.

Due credit must also go to:

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Ing. Pedro Miranda, Director, Instituto de Investigaciones Fisicas, Universidad Mayor de San Andres, La Paz, Bolivia

Prof. Claus Behn, University of Chile, Santiago

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Prof. Danny McQueen, Department of Biomedical Sciences, University of Edinburgh

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Sir Chris Bonington CBE, Expedition Patron Apex

HRH The Duke of Edinburgh

Reinhold Messner

Sir Stewart Sutherland

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The volunteers

We owe a great deal of thanks to the volunteers on the expedition, who worked hard before, during and after the expedition to make it a success. They are, in ascending numerical order:

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James Read	Catrin Meurig	Ian MacCormick	David Dorward
Johnnie Balfour	Jenny Fleetwood	Peter Hall	Jonathan Heggie
Sam Patel	John Somner	Sarah Grant	Heather Smith
Yolanda Bennett	Ruth Mottram	Sonia MacCallum	Trevor Crofts

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Julie Wilson, Helly Hansen

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Mark Stead, Datex-Ohmeda Ltd

Richard Morrin, Datex-Ohmeda Ltd

Jim Hicks, Amplicon Liveline Ltd

Jonathon Hudson, Amplicon Liveline Ltd

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Miss Emma Wilkinson, Reynolds Medical

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Mrs PJ Oliver, Myre Sim Fund, Royal College of Physicians, Edinburgh

Adrian Plumb, Tiso, The Great Outdoor Specialist, Edinburgh, UK

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Dr Annabel Nickol, Medical Expeditions

Dr Bill Adams, Statistician, Faculty of Medicine, University of Edinburgh.

Dr Graham Russell, University of Edinburgh Expeditions Committee.

Mr Richard Thomas

Mr Michael Lamb

Mrs Margaret Raw

Jason, Journey Latin America

Miss Clare Watson

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Publicity Record

May 2000	Cover Story in *Hype*, Edinburgh Student Magazine.
	Apex Website uploaded at www.altitude.med.ed.ac.uk.
August 2000	Interview with *The Sunday Times.*
November 2000	Link to Apex Website uploaded on www.bbc.co.uk, one of Britain's most popular websites.
March 2001	Live radio interview, BBC Radio Scotland.
	Press Release before expedition taken up by many newspapers; article and photos published by *The Evening News.*
	Apex Website uploaded to www.apex-altitude.com.
April 2001	*The Sun* newspaper reports on leaked story about the expedition.
	Interviewed by Channel 5, Bolivian National Television; live appearance arranged on *En El Nombre del Futbol...*
	Post-expedition press releases taken up by most national newspapers, including a full page spread in the *Sunday Express,* and by local newspapers across Scotland.
	Live radio interview, BBC Radio Scotland.
	Live radio interview in welsh, BBC Radio Wales.
June 2001	Live interview on BBC *Breakfast News.*
	Half-hour long prime-time *Tomorrow's World* episode broadcast on BBC 1 about Apex: Bolivia 2001.
July 2001	*BMA News* cover story.
	"Cutting Edge"; commissioned article in *Times Higher Education Supplement.*
January 2002	Half-hour long programme about Apex: Bolivia 2001 broadcast on BBC Radio 4.

A peak practice

Mystery of mountain sickness solved

By Toby McDonald

STUDENT doctors have made a medical breakthrough at almost 21,000ft while climbing one of the world's highest peaks.

The researchers from Edinburgh University believe they have discovered a significant factor in the cause of mountain sickness.

The research was carried out by a party of 23 students – six observers, and 17 "guinea pigs" – during an expedition to South America.

Tests were carried out on the volunteers during an ascent on the Bolivian peak, Sajama.

And the investigation found that important defensive chemicals in the blood called antioxidants may be increased at high altitude.

During the visit, five of the group were evacuated from the laboratory by jeep because they were suffering from acute mountain sickness, whose symptoms include severe headaches and nausea.

It is also believed to be related to several potentially fatal conditions.

Yesterday expedition leader Kenneth Baillie said: "We are very excited by our initial results. Antioxidants are the body's natural defence against damagingly reactive chemicals called free radicals.

"This could be important in protecting the body from mountain sickness, and indeed the volunteers who were evacuated with severe mountain ... identified a hormone which may be important in causing dangerous changes in lung blood vessels when the body lacks oxygen."

This could be im... only in the treatment ... tain sickness, but ... level illnesses like ... bronchitis.

"Other results su... potentially danger... mality of electrical ... the heart occurred ... jects, which could e... reports of sudden d... tude."

'Electrical activity in the heart could explain sudden deaths'

Mount... ness is ... which ... random ... now the... no identi... mon med...

The re... carried ... the Ape... expeditio... tion to th... 23 fourth ... ical stud... were ac... by three ... doctors working ... tude ... ducti... climb...

Tw... condi... altitu... fluid ... monary ... in the lungs.

As well as conducting research into potentially fatal physiological conditions which strike at high altitudes, the medical team also sought to clarify why certain conditions – such as asthma and chronic bronchitis ... are caused or ...

MOUNTAIN HIGH: The research team from Edinburgh University climbed the Bolivian peak of Sajama, above, under close medical observation. Their personal experience has helped to explain why many people have died suddenly from altitude sickness

Photo by Alastair Sampson

Kenneth Baillie

Six Edinburgh University medical stud... were literally on top of the world when ... researched why altitude affects human...

"Breathtaking expedition. Inspired s... Brilliantly ..." That is how S... Black, the Nobel prizewinning pharm... gist, described ... Bolivia 2001, a ... research expedition to the Andes of ... Its six organisers, medical students ... University of Edinburgh, and its 20 ... mental subjects were the subject of ... *row's World* special episode, "Mount... madness".

People die every year at high altit... because of fluid leaking out of blood... into the lungs and brain (high-altitu... pulmonary oedema, Hape, and high... cerebral oedema, Hace). These illne... kill within hours, but we do not full... understand what causes them. The ... reliable treatment for them is imme... descent. A separate and bizarre phe... non, high-altitude cough, can be sev... enough to break climbers' ribs, but ... as ... unexplained.

What is happening when our bod... in the mountains? Why can only a ... acclimatisation enable a person to c... mountain under his own steam, wh... they had been dropped on the summ... would have died within minutes? W... some people more susceptible to thi... than others? And what causes blood... to leak fluid into the lungs and brai...

'A bizarre phenomenon, high-altitude cough, can be severe enough to break climbers' ribs, but is also unexplained'

During a holiday to South Ameri... Chilean altitude physiologist Claus ... He showed me the Chacaltaya cosm... physics laboratory. At 5,200m, Chac... the highest laboratory of its kind in ... world. This was an opportunity not ... missed. From March 2000, we work... to make our expedition happen.

Eager to generate as much resear... possible from our labours, we studie... volunteers intensively, taking freque... samples and measurements of cogni... function, breathing and cough respo... the blood, we looked for dangerousl... tive molecules called free radicals th... released when cells lack oxygen. Fre... cals are like bullets ricocheting arou... causing damage at random. These ... can damage the lining of blood vess... allowing fluid to leak into the lungs ... brain. This may have tragic consequ... the climber who develops cerebral o...

The body has a natural defence a... free-radical damage in molecules ca... antioxidants. Antioxidants, including... mins A, C and E, react with the free... before it has a chance to do any dam... they could be thought of as a bullet... vest for cells. These antioxidants ma... crucial defence against altitude illne... of our most exciting results shows th... bulletproof vest became stronger wi... matisation to the altitude. We found ... antioxidants after five days at the ex... altitude of Chacaltaya. This could m... the body is protecting itself from fre... cals. If this is true, exactly how did ... in antioxidants come about? The im... tions of this question may extend bey... tude medicine. Antioxidants are impo... sea level, preventing heart attacks an...

We also moved one step closer to ... the mystery of high-altitude cough. T... cough is not due to the cold, dry air. ...ugh over th... ...e volunteers ...mprove. ...ish medical ...ved us clos... ...untain illne... ... about hum...

HIGH TIME: members of a group of medical students who took part in an ambitious televised expedition to Bolivia hope to return after they have completed their pre-registration year.

The six, in their fourth year at Edinburgh University, spent ten days above 5,000 metres, studying the effects of altitude on human physiology. They were more than a year organising the trip, which was televised for BBC1's ...

...enneth Baillie ...t again. Now ...t we would be ...mbitious.'

Sickness TV probe girl Soph taken ill

EXCLUSIVE by EMILY SMITH, TV News Editor

TELLY girl Sophie Raworth suffered acute altitude sickness – while filming a programme about the illness.

Sophie, 32, was 5,000ft above sea level in Bolivia when she collapsed with breathing problems, severe headaches and dizziness.

The BBC Breakfast News presenter was rushed to hospital in the South American country's capital La Paz where she spent several days recovering.

She was filming a Tomorrow's World special on the sickness in a mountain laboratory.

Show producer Camilla Lewis said: "Sophie was filming on the effects of

Sophie . . . hospital dash

altitude on the human body when she fell ill with acute mountain sickness. She made a full recovery and decided to carry on filming."

Skiing fanatic Sophie's investigation looked at why certain types of people survive and function better at altitude.

Acute Mountain Sickness causes headache, nausea or vomiting, sleep disturbance, dizziness, shortness of breath and severe fatigue.

About 70 per cent of visitors above 8,000ft suffer from at least mild headache. Seven per cent describe acute headaches.

Single Sophie – who weighs nine stone –

Medical students hoping to reach new heights in South America

Medical mountain adventure for Scottish students

Scientists study mountaineers' biggest dang...

...EELING PEAKY: The researchers, from left, Alistair Simpson, Kenneth Baillie, Matthew Bates, Roger Thompson and Martin ...

City experts hi... research height...

By DAVID BROOKS

SCIENTISTS from the Capital are helping tackle some of the biggest dangers faced by the world's best mountaineers by carrying out tests in Bolivia.

- Altitude testing to be done in Bolivia
- Team to be filmed by Tomorrow's World
- Climbers hopeful of breakthrough

Six researchers from ... high in South America's ... the effects of high altitude on the human body.

The fourth-year Edinburgh students – Mr Baillie, Roger ...

and I decided to go ...

apex: bolivia 2001. Expedition Report.