

THE REPORT OF THE BRITISH TYVA CAVES EXPEDITIONS 2001/2002

Central Asia Exploration Group
(Members of British Cave Research Association)

Tyva lies in Southern Siberia and is a member state of the Russian Federation.

2001 Expedition between 5th and 25th August

2002 Expedition between 5th and 26th August

Aim

To carry out a reconnaissance of the limestone areas of Tyva in order to assess their speleological potential.



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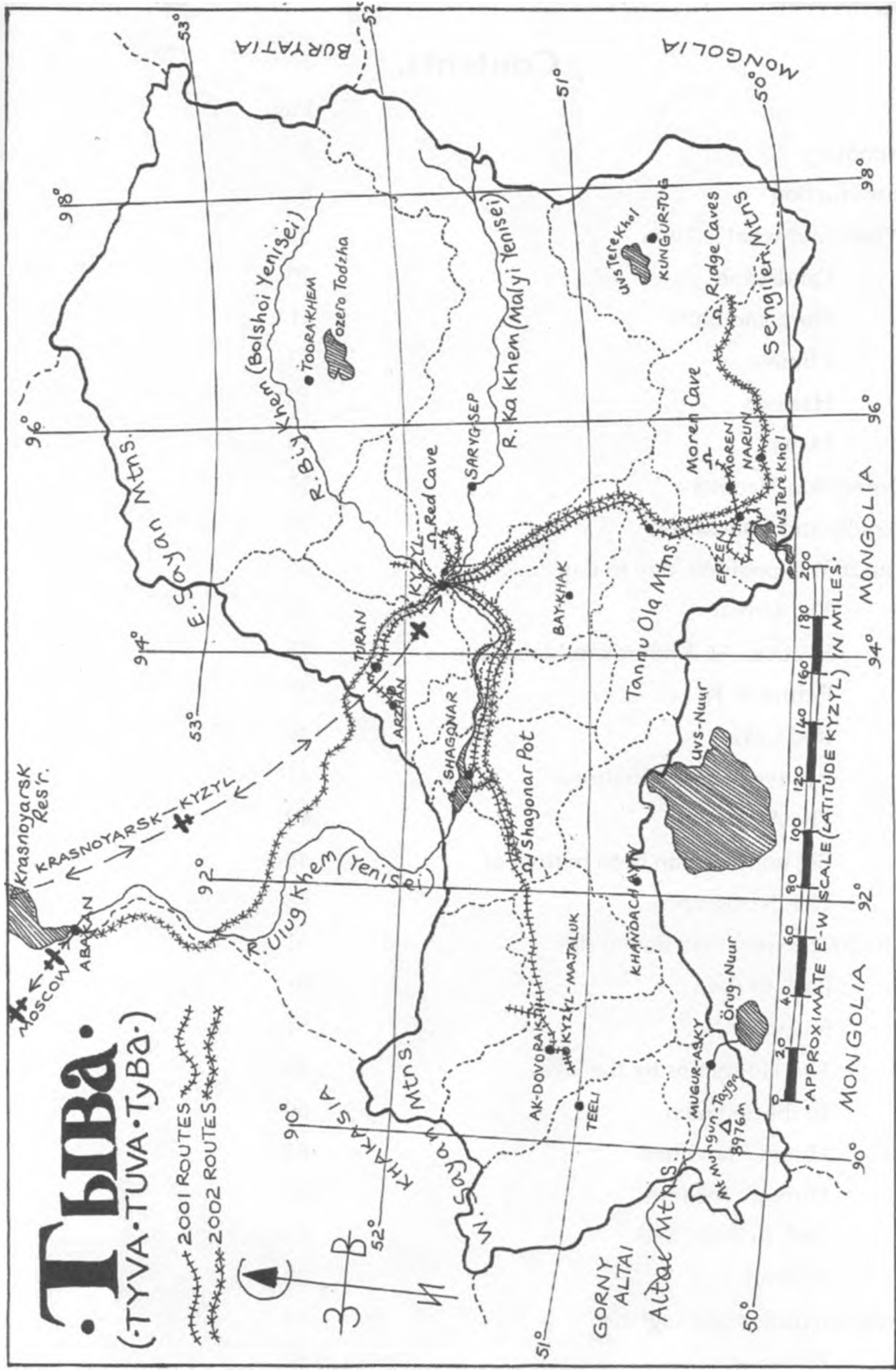
**THE REPORT OF THE
BRITISH TYVA CAVES EXPEDITIONS 2001/2002**

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Тыва

(·TYVA·TUVA·TyBa·)

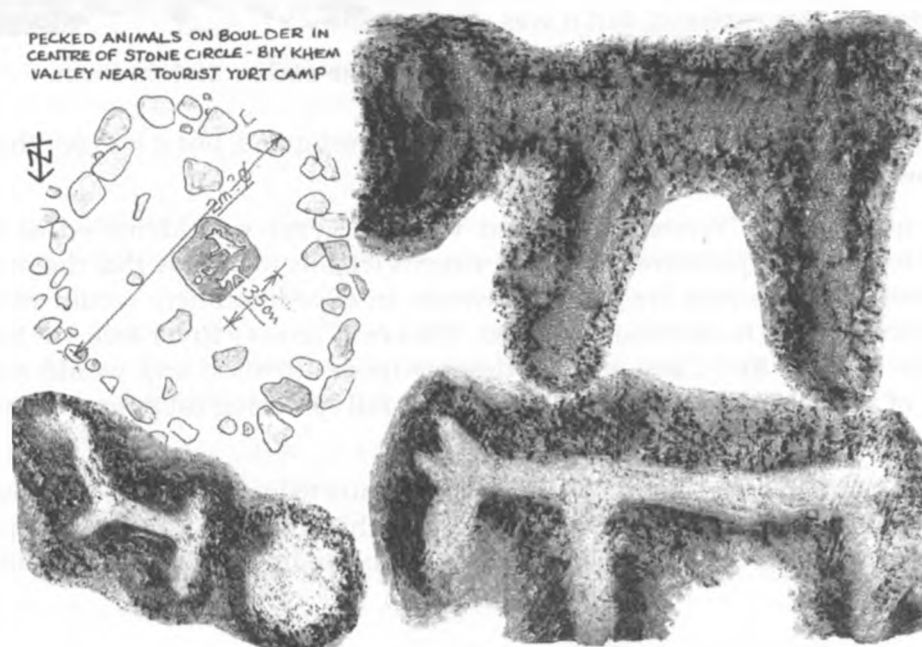
***** 2001 ROUTES *****
 ***** 2002 ROUTES *****



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Summary.

The expeditions identified several areas of interest, the largest area being in the Sengilen Mountains in South Tyva. Here, a vast area of limestone bears numerous caves. Two valleys were traversed and a mountain ascended. A number of large remnant fossil cave systems were surveyed and many entrances noted. Most caves were at a high level. Local informants describe many other cave entrances, some of considerable size. There are many springs in the area.

The second largest area identified was the Red Cave area east of Kyzyl, the capital of Tyva. Here a number of caves were entered and Tyva's longest cave, known as Red Cave was surveyed to a length of 196 metres. Many large entrances were observed in a number of distant cliff faces.

In south central Tyva, in the western ranges of the Sengilen Mountains, Moren Cave, White Mother Mountain was entered and surveyed. There was the possibility of more caves in this area.

To the west of Kyzyl, Shagonar pothole (previously referred to as Hole so deep man not been to bottom of) was descended and surveyed to a depth of 54 metres where an ice plug prevented further exploration. This is the deepest pothole so far discovered in Tyva. The immediate area was explored, but it was concluded that further discoveries were unlikely.

Minor limestone escarpments in the region were investigated, but it was felt that these areas show little promise of cave development.

An area north of the Yenisey River and west of Kyzyl was identified as having potential for future exploration. Local informants lead us to believe that the prospects for discoveries in this area are good. However, an expedition here would encounter many difficulties due to its remote location. The north Yenisey River area, the Sengilen Mountains and the Red Cave area all deserve more attention and would need the attention of a number of expeditions before their full speleological potential would be realised.

The 2002 expedition took advantage of the return route to look at caving in Khakassia a member of the Russian Federation north of Kyzyl. This area has a considerable number of good caves, which have received attention from caving clubs in the neighbouring states.



The author Melvin Penn.

Introduction.

The 2001 and 2002 Tyva expeditions took the form of reconnaissance expeditions with the object of assessing the speleological potential of one of the remote and little known countries of central Asia.

Interest in Tyva began in 1993 when a British Soviet expedition entered Tyva for the first time. The writer was a member of that expedition, which was led by Dr Jim Birchall. In 1988 Jim Birchall had the opportunity to organise a reconnaissance expedition to the Tien Shan in the Xinjiang Province of North West China following the visit to Lancashire Polytechnic of Professor He from Beijing College of Business. This expedition, of which I was a team member, whet the appetite of a small group of cavers from the North West of England who then began, under the leadership of Jim Birchall, a sequence of reconnaissance expeditions to central Asia. 1989 saw us in Uzbekistan and in the following years various areas of Siberia were given our attention. Jim Birchall also visited areas of Kurgistan and the Pamirs.



Dr Jim Birchall.

As the Soviet Union collapsed and the strictures of Communism gave way globally, the possibility emerged of gaining access to Mongolia, a country in which caves were not thought to exist, (see, *Underground Atlas* by Tony Waltham). The temptation to prove matters otherwise proved irresistible, so in 1993, with the assistance of our Russian friends, an attempt was made to enter Mongolia from Siberia. It was then that we discovered that between Siberia and Mongolia lay a country called Tyva. A visit to a retired Russian geologist who had worked in Tyva aroused our interest in Tyva itself as she described seeing caves used by shamans.

As there were regular, affordable flights from our base in Krasnoyarsk in Siberia, to Kyzyl, the capital of Tyva, a journey to Tyva appeared to our naive British selves, as "no problem." Unfortunately, the aftermath of the break-up of the Soviet Union was still having unpleasant repercussions in Tyva. Some Tyvinians took advantage of this unstable period to break with their former masters and declare independence and a few were not averse to making their point by shooting Russians and driving Russian settlers from the country. Needless to say our Russian friends were somewhat reluctant to accompany us on this venture.

After some considerable efforts in persuasion two Russians agreed to accompany us to act as our protectors and insisted on carrying discreet side arms, more for their safety than ours, we assumed.

As originally stated, our intention was to gain entrance to Mongolia. However, Kyzyl, the capital of Tyva was as far as we got.

We were well looked after, if not incarcerated, by our friends in a hotel, which doubled as a brothel, a facility of which I promise we did not avail ourselves. However the hotel was where we were bound to stay as our protectors explained, there had been a big flood- true; the ferry jetty had been washed away- true; therefore we could not cross the river to take the road to Mongolia. It was not until the 2001 expedition that we discovered that we did not need to cross the river to get to Mongolia; the road to Mongolia left from our side of the city!

It was all connivance on the part of our protectors to ensure we were not put at risk, or more correctly, they were not put at risk by any venture into the Tyvan interior. To be fair, the dangers were real and our idea of pretending to be American tourists, (everyone loves Americans), was not really practicable. As far as we were aware at that time, very few Americans or British had ever visited Tyva.

Our journey was, however, not wasted. A visit was made to the local museum and from there a meeting was arranged with a Russian geologist from the local Lyceum. A geologist gave a lecture, in Russian, on the local geology; this was loosely translated by our protectors and not well understood by us. However, the geologist was persuaded to show us a geological map, which revealed large areas with the indisputable brickwork symbol of limestone. "Were there caves?" I asked. "Yes, there is Red Cave." "Were there sinkholes?" "Yes, in a valley on the other side of the mountain and legend has it the caves go all the way through the mountain."

We left Tyva unexplored, but it remained an enigma that had to be resolved.

In 1994 I entered Mongolia as a member of a group of four, this time under the leadership of Allan Richardson. Caves and potholes were found and surveyed and in subsequent years another Mongolian venture found more potholes.

As countries around the centre of Asia revealed their subterranean secrets, Tyva remained a mystery. The gap in our knowledge had to be filled. So it was that in the new millennium, unfinished business became a thorn in my side and I had to find a way of getting back to Tyva. The Internet provided the solution.

In 2000 I began a systematic search to gather information on Tyva and to find a contact in Tyva itself. It was Tyvan stamps and the attention of Richard Feynman that helped me make the breakthrough. Richard, the famous physicist, composer and Nobel Laureate, now deceased recalled, in 1977, some oddball stamps issued in the 1930's, which he had tried to collect. "Whatever happened to Tannu Tyva?" he exclaimed. His interest aroused, he planned to visit Tyva on his retirement. Sadly he never made it, as he died before his ambition could be realised. His friend, Ralph Leighton, wrote a book about Feynman entitled *Tyva or Bust*, which became a bestseller and interest in Tyva developed. Ralph Leighton created a web site called Friends of Tyva and it was eventually through that web site and its contributors that I made contact with Rollanda and Nicolai. Rollanda and Nicolai, both retired academics from Tyva University are now concentrating on developing commercial careers. Nicolai had been a prominent mathematician and Rollanda a well-known and highly respected linguist specializing in English. The two had excellent contacts so the 2001 expedition began to take shape.

At this point my only knowledge of caves in Tyva was limited to the existence of Red Cave, and this was the only cave which Rollanda and Nicolai had heard of, it being situated a short distance from Kyzyl. My questions prompted Rollanda and Nicolai to make further enquiries and they established there was a cave called Moren Cave in the south. Local legend would have it that both were long and deep although they

had never been thoroughly explored or surveyed. Tyva does not have any caves. The areas of these two caves therefore became the principle focus of the first expedition. I also established that there was much limestone in Tyva, but very little information could I find relating to karst. A reconnaissance of the country as a whole with regard to speleological development was therefore needed.

Five of us carried out the first exploration of Tyva in 2001 and during this expedition both the aforementioned caves were entered and surveyed. On this expedition it soon became apparent that Tyva had many caves and considerable areas of cave bearing limestone that needed investigation. We were able to gather considerable information on the scale of the project and gained an understanding of the problems our hosts had in meeting our exploration requirements.

This was the first venture of this type that Rollanda and Nicolai had been involved in so they also learned from the experience. They provided

excellent facilities in terms of cooks, drivers, interpreters and guides, all eager to be of assistance. However, there were problems. To give an example, on expeditions, we are used to camping and we carry with us all the necessary equipment to do this as comfortably as possible. Our hosts preferred us to lodge indoors wherever possible and it soon became apparent that they lacked even the basic camping equipment. On one cold night when we insisted on camping we discovered our Tyvan friends had only a few blankets to snuggle up in as they slept in the mini bus. On discovering this we all loaned out warm coats to help them through the night. On the 2002 expedition the Tyvan contingent were much better prepared for camping in wild terrain.

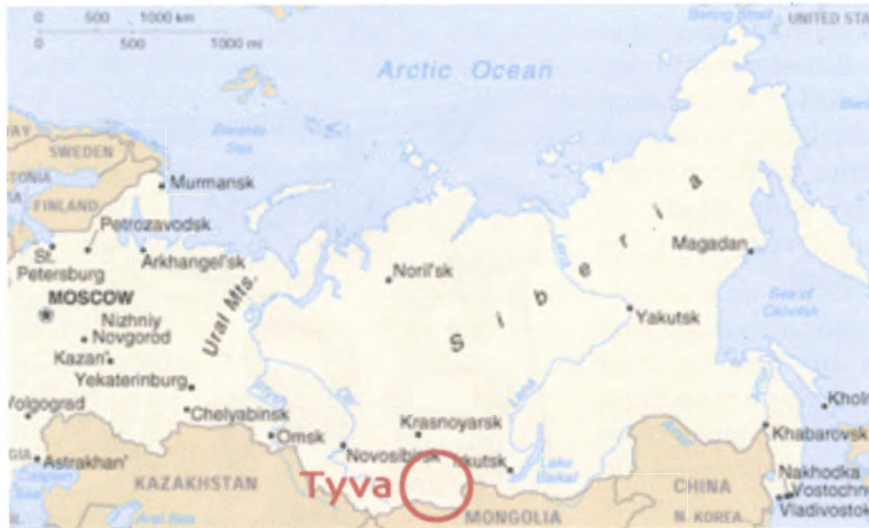
Probably the most valuable contact the Kongars made for us was with Valerie Popov, one of the principle geologists in Tyva. He joined us on the Red Cave area exploration and gave us leads to follow in other areas. Valerie also became an important member of the 2002 expedition and was able to identify many areas still unexplored.

Much of our objective to identify cave-bearing limestone was achieved by using local knowledge, as there was virtually no recorded information available.

From information gathered on the 2001 expedition the 2002 expedition became more focused and we were able to plan to visit specific areas.



Where and what is Tyva?



Tyva is an independent republic within the Russian Federation and is situated between Siberia and Mongolia. It is said to be the birthplace of Genghis Khan and that Genghis Khan's mother was a Tyvan.



Tyva has existed under several names. It was known under its Mongol name of Uriankhai until 1922 then as Tannu Tyva until annexation by the USSR in 1944. In 1961 it became Tuvinskaya ASSR or the Tuvinian Autonomous Region as the USSR would describe it. This was its second annexation, for following Chinese dominance Russia took advantage of the 1911 revolution in China and stirred up a separatist movement which in 1914 proclaimed Tuva a Russian protectorate.

In 1921, after the Bolshevik Revolution, Tuva became an independent republic. However, its Government did not please their Soviet neighbours, so in 1929 the Government was overthrown and a Moscow puppet was installed as the new Prime Minister.

In 1991 Tuva proclaimed itself a full republic within the Russian Federation, following the break up of the Soviet Union and in 1993 declared that the republic be called Tyva. Although the country is still widely known as Tuva I shall refer here to Tyva.

The population is 308,000, of whom 91,000 live in the capital. A large proportion live as cattle breeding nomads and many families still live in yurts, a traditional nomadic tent. Urbanisation is 48% of the population.



Looking over Moren Valley.

Landscape.

Tyva, at 170,500 hectares, is slightly bigger than England and Wales together. Tyva occupies the basin of the Upper Yenisey River and extends 1696 kilometres north to south and 3480 west to east. The relief consists of two basins, the Tuva and Todzha. These are drained by the two main tributaries of the Yenisey, the Bolshoy Yenisey and the Mali Yenisey, the Great and Little Yenisey. The river, at 3200 kilometres long, is one of the longest on the continent and it is the world's sixth largest in terms of discharge. It ends in the Arctic Ocean. The name Yenisey is derived from the Evenk name Ioanesi, meaning Great River. In another version we were told that in the Tyvan language Yeni means mother and si were the stones at the side of a river.

Nowhere on earth is as far from the sea and the capital Kyzyl has a monument proclaiming it to be the centre of Asia. The country lies between the Taiga zone of Eastern Siberia and the semi-desert of central Asia. As well as containing Taiga and semi-desert there are vast areas of steppe, also tundra plateaux with permafrost. Mountains, rise up to 3976 metres making Mongun-Taiga not only the highest in Tyva, but also the highest in all of eastern Siberia. The mountains occupy 50% of the country with the average summit rising 2700 metres above sea level. High mountain ranges include the eastern Sayan and Western Sayan to the north. This area consists of a series of narrow, sharp-topped ridges and flat top ridges between 2000 and 3000 metres high

with steep slopes and strongly eroded upper sections. High plateaus feature dense taiga, boulder fields and hollows with vast reed thickets. In the eastern alpine tundra the permafrost zone lies at ██████ metres.

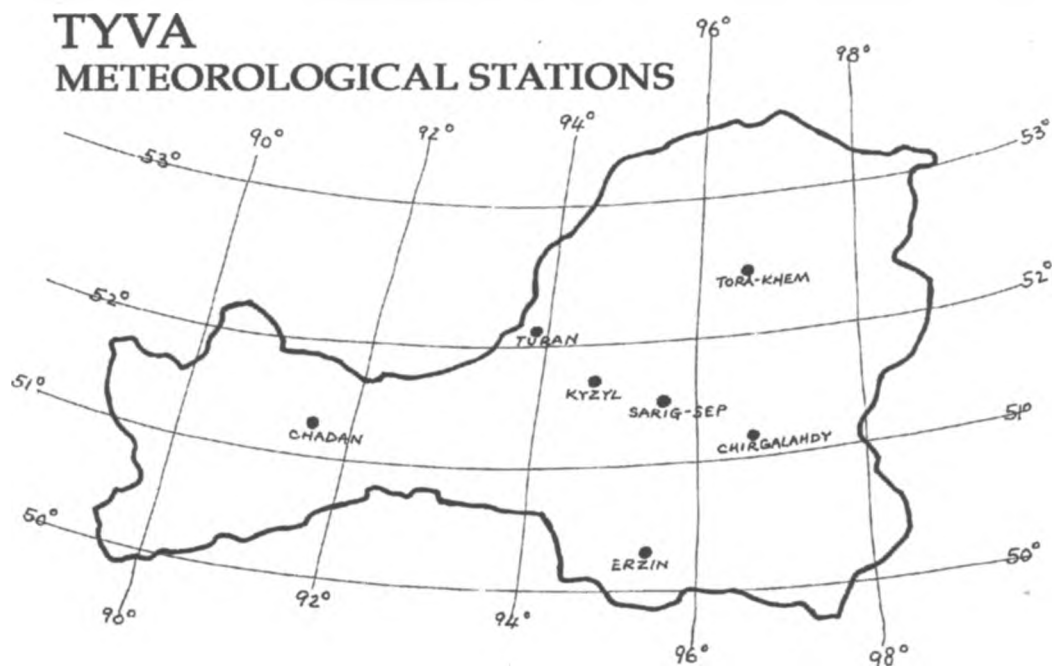
There are over 400 large and small lakes, many rivers and numerous thermal carbonaceous and salty springs. Lowlands constitute only 6 to 7 per cent of the total area. The steppes stretch out south from Kyzyl and are bordered in the extreme south of the Selenga River basin by semi-desert. Large sand dunes of the north Ghobi desert are found in the area south of Erzim not far from the pleasingly warm and clean fresh water lake Ozero Tere Khol. A recent UN survey credits Tyva with some of the cleanest rivers in the world.

Flora and Fauna

Most of the Yenisey basin is covered in taiga (marshy, primarily coniferous forest) indeed trees cover 50% of the territory. Siberian spruce, fir and cedar dominate in the south and larch farther north. Luxuriant meadows do exist in the more sheltered areas usually close to rivers.

There are 1500 species of plants 15 of which only grow in the republic. There are 72 species of animals, 240 of bird, 7 of reptile and 18 kinds of fish. About 60% of the territory is considered a hunting area and in fact the republic is considered a major supplier of fur, the so-called, "soft gold." Unfortunately illegal hunting is causing problems and it was suggested to us that bribing of officials was allowing unscrupulous fur dealers to take advantage of valuable animals. Hunters may provide the greater danger- both years we met armed huntsmen who had been hunting in the same forest we had been walking through.

It should be noted that bears and wolves are still found in Tyva. In the harsh winter of 1993 bears wandered into the main park of Kyzyl.



Precipitation (mm) Monthly/Yearly Averages

Extract from Vol. 29- Geology of the U.S.S.R.- 1966

PLACE	PERIOD	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	YEAR
TURAN	1948-57	10	7	6	8	26	48	65	61	30	8	18	14	303
CHADAN	1945-57	4	4	5	5	9	41	47	64	17	8	9	6	214
KYZYL	1943-57	9	5	4	4	10	33	52	48	22	6	10	11	221
SARIG-SEP	1948-57	9	7	9	10	24	50	68	58	29	15	15	12	214
ERZIN	1948-57	5	5	7	4	12	30	49	36	14	8	9	8	187
TORA-KHEM	1945-57	10	6	4	11	24	55	66	60	32	10	10	12	300
CHIRGALAHDY	1946-57	5	6	5	15	35	64	67	53	27	14	9	10	313

Temperature (°C) Monthly/Yearly Averages

Extract from Vol. 29- Geology of the U.S.S.R.- 1966

PLACE	PERIOD	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	YEAR
TURAN	1948-57	-32.80	-29.30	-18.50	-2.30	8.20	14.80	17.10	14.00	7.40	-1.30	-15.60	28.90	-5.60
CHADAN	1946-57	-32.30	-28.10	-6.00	1.60	11.10	16.80	18.50	15.60	8.70	-0.80	-14.80	-27.40	-3.90
KYZYL	1916-17 1944-57	-33.90	-30.10	-18.30	0.90	11.00	17.70	19.90	16.90	9.70	0.20	-14.50	-29.30	-4.20
SARIG-SEP	1948-57	34.30	-30.60	-19.70	-1.20	9.80	15.70	17.90	15.10	8.10	0.00	-15.20	-29.90	-5.40
ERZIN	1949-57	35.30	-32.10	-21.80	-3.30	9.40	16.30	18.00	15.70	9.00	-0.20	-14.50	-29.80	-5.70
TORA-KHEM	1945-57	-28.50	-24.90	-14.50	-2.00	5.90	12.80	14.90	12.10	4.70	-3.40	-15.70	-26.50	-5.40
CHIRGALAHDY	1946-57	-28.30	-24.10	-14.60	-3.30	4.80	11.50	12.90	10.60	3.80	-3.90	-15.60	-26.00	-6.00

Climate

The climate is continental in character with an average July temperature of +17°C. It can rise to +35°C or 39°C in August although during August 2002 we experienced temperatures of 40°C in the shade. During winter temperatures can fall to -35°C and heavy snowfalls occur. The snow usually melts at the end of April in the steppe and May and June in the mountains. In the west snow lies on some mountains all year round. In the highland zone snow melts in the beginning of July and cover starts again at the end of August or the beginning of September. Snowmelt fills the rivers in the first half of the summer. What is described as the rainy season occurs in late August when torrential down pours and thunderstorms are frequent. Precipitation in the basins between mountains is from 150mm to 300mm and in the mountains 400 to 600mm.

Recent observations indicate there has been a considerable increase in summer temperature over the last fifty years.

Month	Day temperature	Night temperature
June	24°C	16°C
July	28°C	20°C
August	23°C	17°C
September	18°C	12°C
October	14°C	5°C

Climatic Hazards.

Fire potential.

During our visit in 2002 there were extensive forest fires, the worst for decades. These fires were not only due to the occurrence of an extensive dry period coupled with high temperature, but to the practice of discarding glass bottles, which were very often broken, without regard to the environment or their potential to start fires.

Flood potential.

Sudden heavy downpours can occur. Fires not only destroy the vegetation, but also reduce the topsoil layer to ash. Heavy rain washes away this layer leaving a denuded landscape. These denuded areas are prone to quick run off that can cause watercourses to rise at an alarming rate. The upper basins of the Yenisey, which drain a huge area, are prone to this type of reaction and serious flooding has occurred on a number of occasions in recent years. My visit to Tuva in 1993 was following such a flood during which jetties were washed away and severe damage was done to major bridges. When we arrived floodwater in Kyzyl had to be drained by road tankers as there were no street drains.

Sand Storms.

Sudden sand storms can occur in the south in the region of the north Gobi and in the Shagonar area due to the creation of the man made lake, caused by the damming of the Yenisey. The latter is the result of local air temperature differentials occurring over the lake and land. We experienced such a storm in 2001.

Maps.

Obtaining good maps proved a difficulty from the outset. Prior to entering Tyva the only map we had available was a U.S.A.F. Operational Navigation Chart No ONC E-7 edition 5, based on satellite mapping with a scale of 1:1,000,000. In Tyva we acquired Russian maps of Tuva also 1:1,000,000 these were the best scale we could obtain. There were many discrepancies between the two maps and neither could be considered absolutely accurate. The Russian map is the more accurate in relation to the route of the roads whilst the U.S.A. map is better for showing the relief and showing contours, but neither could be relied upon. It will be realised that paths were not shown and neither were many of the tracks, which are considered roads in many places. The routes on roads/tracks are liable to change as they were affected by weather and erosion. The only metalled roads are to be found in the bigger towns with the exception of the main M54 north south highway and the main east west highway.



Kyzil and Kyzil Khives Mountains.

It was not until the last few days in Tuva that Valerie Popov managed to obtain good geological maps at 1:500,000 scale. However, it should be noted that Russian geological maps do not follow the same conventions.

Note: The maps shown here covering the areas of exploration, are computer enlarged segments of the above maps and the scale is not to be considered accurate. It will be noted that some of the spelling of local names differ. Most of the spellings here are my nearest approximation to the phonetic of the Tyvan language in English. The spelling of place names on the U.S.A.F maps do not directly correspond to the translation of names on the Russian map.

Moren and Naren villages to the west of the Sengilen Mountains.



Tyvan Expedition members.

2001 Expedition.

Melvin Penn Leader. Aged 55. 1988 North West China Caves to Tian Shan. 1989 First Anglo-Soviet Caving Expedition Uzbekistan. 1991 Anglo-Soviet Expedition to Baikal region Siberia. 1993 South Central Siberia Expedition. 1994 Mongolia Caves Expedition.

Nearly 40 years caving, climbing experience in over thirty countries.

Dr Jim Birchall. Aged 58. University Lecturer. 1988 North West China Caves to Tian Shan. 1989 First Anglo-Soviet Caving Expedition Uzbekistan. 1991 Anglo-Soviet Expedition to Baikal region Siberia. 1992 Kurgistan Expedition. 1993 South Central Siberia Expedition. 1994 Bashkoristan, Urals. 1995 Mongolia Western Hovd. 1996 South Mongolia Caves Expedition. 1999-2000 Israel, Jordan Excavations.

Malcolm Craik. Aged 48. Archaeologist. 1991 Norway. 1994 Mongolia Caves Expedition. 1996 South Mongolia Caves Expedition. 1997 Turkey Cave Expeditions. 1998 Ukraine Excavations. 1998 Spain, Portugal, France Caves. 1999 Israel, Jordan Excavations. 2000 Northern Spain Caves.

Peter Martin. Aged 54. Teacher. Over 20 years caving and climbing experience in many countries particularly France, Ireland and UK.

Linda Martin. Aged 51. Day Centre Officer. Four years caving experience France, Ireland and UK.

2002 Expedition.

Melvin Penn Leader. Aged 56. (See 2001 expedition).

Allan Richardson Deputy Leader. Aged 48. Teacher. 1989 U.S.A. Caves. 1991 Uzbekistan Caving Expedition. 1992 Kurgistan Caving Expedition. 1994 Mongolia Caves Expedition. 1996 South Mongolia Caves Expedition. Over 30 years caving experience in various countries particularly France and Ireland.

Valerie Alexanarvitch Popov. Aged 62. Senior Geologist, Geology and Exploration Expedition Republic of Tyva. Many years experience geological expeditions Russia, Siberia, Tyva.

Peter Martin. Aged 55. (See 2001 expedition).

Linda Martin. Aged 52. (See 2001 expedition).

William (Bill) Thompson. Aged 34. Managing Director of Refrigeration Company. 1988 Canoeing Expedition Finland/Sweden. 1995 Rivers Coruh and Barhal Canoeing Expedition Turkey. 2001 Rivers Otra and Sjoa Canoeing Expedition Norway. Over 20 years caving and climbing experience in Austria, Switzerland, Germany, France, Italy, Ireland and Spain.



Above Malcolm Craik looking over west Tyva.



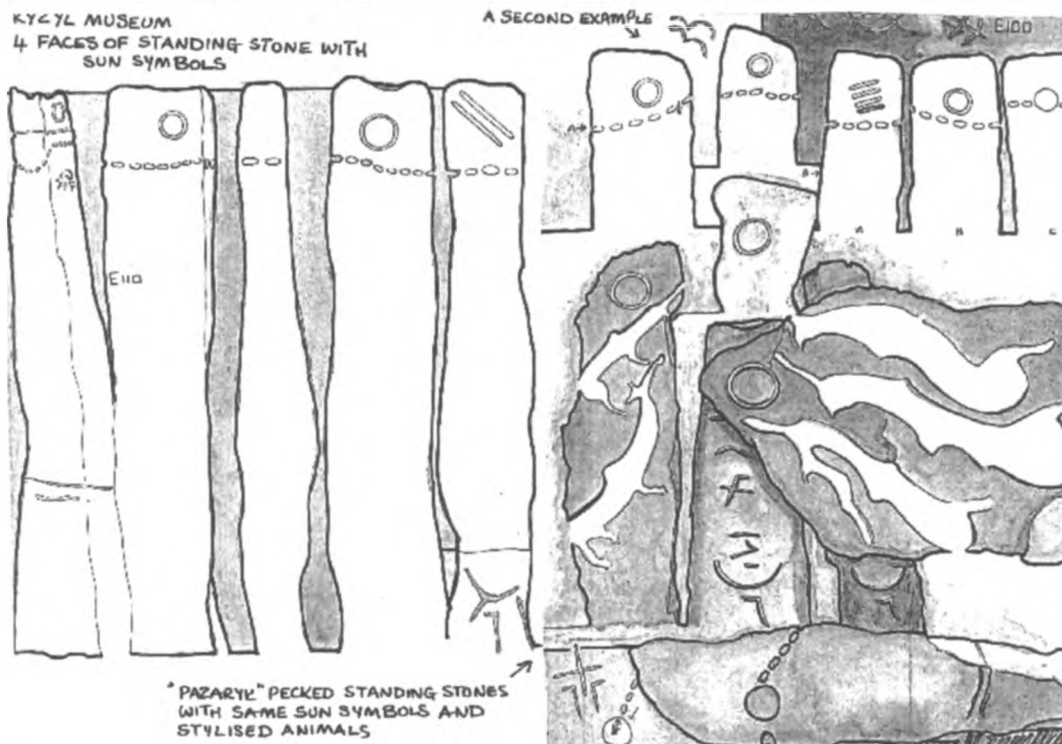
Above left Shaman. Right Rollanda Kongar.



Allan Richardson at the Centre of Assia Monument, Kyzil.

Sample of solution features found over approximately 500 metres, east to west, in limestone cliffs on the north side B'Loo River Sengilen Mountains, South East Tyva.

No.	HT (M) ABOVE RIVER	LENGTH (M)	HT (M) OF OPENING	DESCRIPTION
1	4	2	1.2	CROSS-JOINT
2	0	1.5	0.4	JOINT
3	4	1.5	1	JOINT IN FOLD
4	12		C.5	1m WIDE (NOT EXPLORED) 45 DEG JOINT
5	0	5	3	FISSURE MARBLED (Black)
6	0	2	1	50 Deg JOINT MARBLED ROCK
7	0	3	3.5	ENTRANCE POOL OVER 1m DEEP
8	0	4	2.5	FILLED JOINT MARBLING TO RIGHT SIDE.



Results and Conclusions.

The age of karst development is discussed. Detailed information on the caves surveyed is given. Areas worthy of further exploration are listed.

Discussion.

Most of the Limestone in Tyva is described as Proterozoic of the Vendian period and some as Cambrian although there does appear to be some discussion in academic circles as to which periods apply to some of the areas. There is also discussion in relation to the age of the caves but it is generally considered that the mature karst is of Pre Quaternary. Observations of caves in the Northwest Sengilen suggest that their origin is very ancient, but without detailed scientific analysis it is impossible to build an accurate picture. Evidence of over nine corrosion levels, three substantial collapsed calcite floors, corrosion of speleothems and breakdown would suggest that Moren Cave has existed through many and prolonged climatic changes. Moren Cave in particular is therefore worthy of detailed study in terms of its speleogenesis and would produce valuable information on the geological development of the area..

It is observed from the caves in the Sengilen Highlands that the mature caves are all at a high level in the region of 1900 metres. It is noted that there are active springs below the 1500 metres level and there are immature caves forming at valley floor level and just above. Valleys in the Sengilen evidence ancient glaciation and recent downcutting.

Active speleothems were observed even in the high level fossil caves in the advance stages of breakdown. Samples of speleothem were collected and attempts are being made to find a laboratory to undertake analysis.

Karst in the Kyzyl Khives Mountains (Red Cave area) appears to be younger in origin than that in the Sengilen Mountains. Although there is evidence of ancient systems in the advance stage of breakdown, caves such as Red Cave show very little evidence of breakdown. Red Cave has a large amount of cave fill in the form of red clay and like all the caves noted in the area is no longer active. There are no signs of re-adoption since the cave was filled. The landscape of the Red Cave area is in the form of cuesta with dense taiga on the northern gently sloping sides. It was not possible in the time available to investigate the northern sides, but from information received in 1993 it suggested that dolines and possibly potholes or swallet holes might exist. There are low level active springs on the south side and although most cave development appears in the lower faces of the south facing escarpments, caves are found at all levels almost down to the active springs.

There were no fossils that could be identified by the human eye and no flint or chert was found.

No tests to date have yet been carried out on speleothems to establish dating information.

Caves.



White Mother Mountain and Moren.

Sengilen Mountains pass and camp.

Moren Cave.

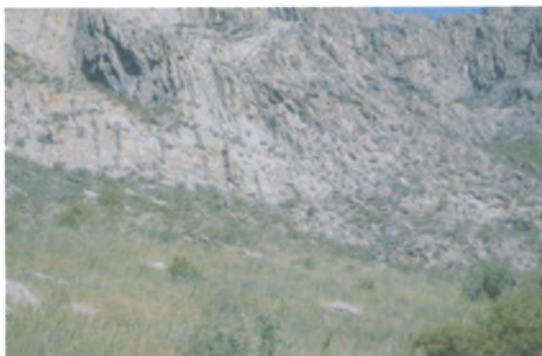
Map ref. 25 km ENE of Erzin.

Altitude 1850 metres.

Situated on the South East face of Ak-Khayrakan Mountain. (White Mother Mountain).

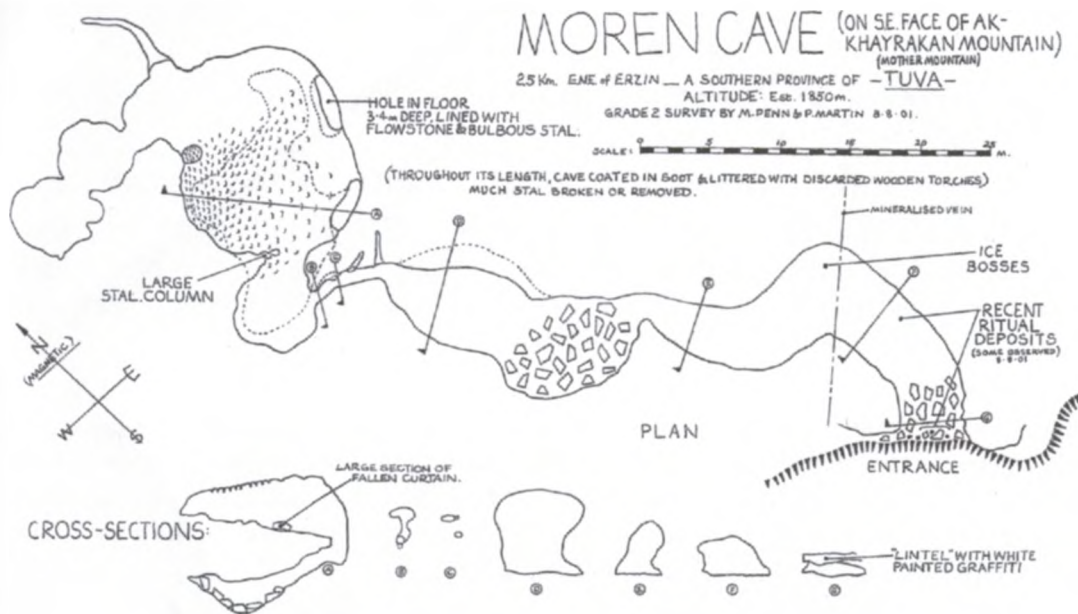
Location and approach.

A small meadow at the end of a track originating from the north east of Moren village provides an ideal point from which the path to Moren Cave can be found. The path is found on the east side of the valley just 100 metres south of a medicinal spring. Head upwards for a short while until the saddle of a ridge is reached. From the east side of the ridge a shear cliff can be seen just east of the summit on the left hand side of a rising valley. The cave is at the base of this cliff. An obvious path descends through a wooded area into a valley parallel to the valley with the spring. Follow a track heading north up the valley. The track becomes a path and then eventually peters out. At this point a scramble up scree on the left leads to the base of a cliff and the cave.



Route to Moren Cave upper right of photo. Linda Martin in Moren Cave entrance

In the south of Tuva, along the Moren and Naren rivers, limestone, probably Precambrian, displaying localised massive bedding, is found within a region of chaotic bedding displaying much disturbance.



An old resurgent fossil cave is developed along a joint with both phreatic and vadose development. From the entrance at the base of a 50 metre high cliff and at the top of a boulder slope a large passage opens up after descending over fallen rocks. A large chamber is then entered after clambering over large boulders resulting from roof collapse. Here, small ice stalagmites are to be found on a fine sediment floor. From here a short vadose meandering passage rises into a larger chamber where a damaged calcite column can be found on the left. This chamber is almost circular and from the far end a platform rises and within a short distance the cave ends with an impenetrable tube and low bedding, once the inlets of the cave.

This final chamber displays at least nine distinct corrosion/corrasion levels. The floor is comprised of at least three collapsed calcite floors 3 to 4 cm thick, which have formed over a conglomerate at least 3 to 4 metres deep.



Calcite column and corrasion levels.



Peter Martin in trench below false calcite floors.

A trench 2 metres deep is situated in the north east of the chamber and a descent can be made for 2.5 metres between a very unstable fill in the south east of the chamber. It appears that the initial drainage of the cave was through the main entrance, but subsequently secondary drainage developed through the floor of the final chamber, the main entrance then acting as an overflow to the main drainage.

Speleothems, of which there is significant development, display signs of corrosion indicating sustained periods of ancient aggressive flooding.

The entrance chamber and passage is in an advanced stage of breakdown with large areas of roof collapse.

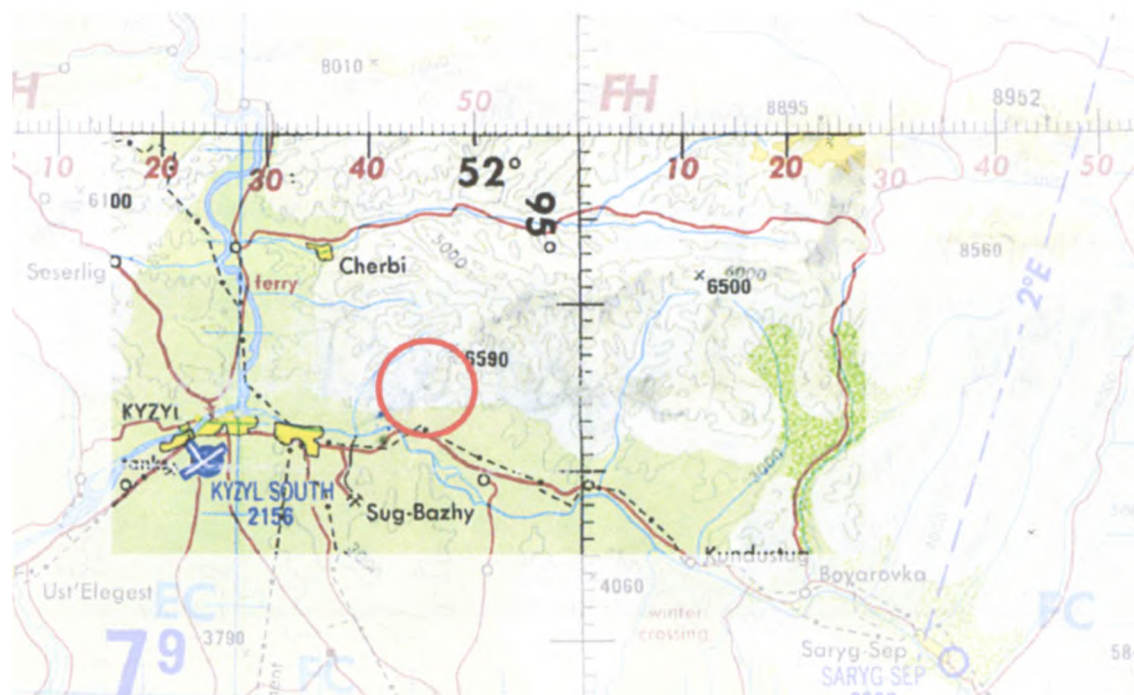
Two mineralised cross-joints near the entrance are alleged to have borne silver.

The cave displays signs of recent occupation with the walls and roof black with soot. Soot is both evident on fallen blocks and newly exposed roof from which blocks have fallen. Pitch torches were found littered throughout the cave and speleothems had been smashed from the walls and removed from the cave.

The cave had been used for animal shelter, as testified by an eighty year old Tyvan woman who was once a shepherdess in the area. This woman, assisted by her great niece, climbed up the mountain and visited the cave whilst our survey was in progress. She performed a shamanic ceremony at the entrance, which is marked by an oovoo, a gift decorated cairn of religious significance in relation to the spirit of the mountain. Several ritual deposits were found in the cave.

Local legend describes the cave as being 15 km long and passing through the mountain and having another entrance. The cave was surveyed to 150 metres long and possibly did have another entrance in prehistoric times.

Red Cave.



Central Tyva showing Red Cave area (U.S.A.F. map).

Situated in Mt. Apedek, SW of Kyzil Khives Mountains.

MR 51° 44' 83" N 94° 44' 33" E.

Altitude 2800 metres.

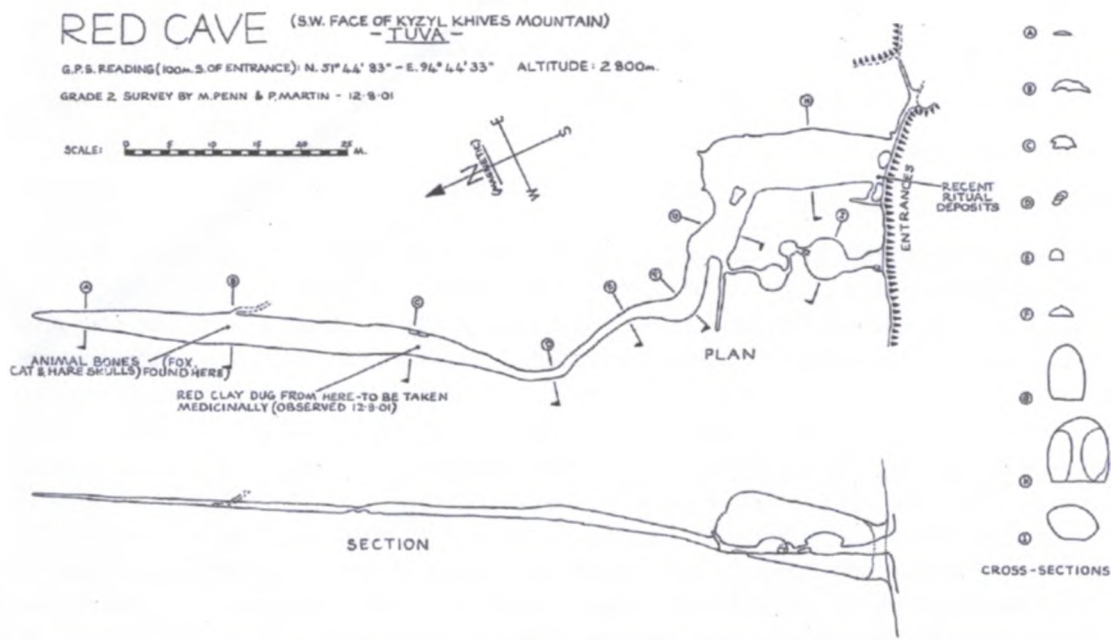
Location and approach.

Vehicles can approach from the south up the only and obvious track, which lead to the mountain from the Kyzyl-to-Saryg-Sep road shortly after crossing the bridge over the Mali Yenisey (Small Yenisey) River. The track leads as far as a smallholding and shepherd's hut at the head of a limestone valley. The path to the cave leads northwards up an obvious steep ridge on the west side of the valley. Follow the ridge as it rises up to the west of the mountain summit. Eventually a steep sided valley is entered on the west side of the ridge and a large circular cave can be seen on the right. This cave ends after only a few metres. Continue past the cave following sheep tracks on the east side of the valley, around a buttress and a cliff. A number of entrances can be seen on the right. At the base of the cliff, directly below the largest entrance, a steep gully on the right is climbable up to a ledge from which entrance to Red Cave can be gained. The distance from the main track to the cave is approximately 2 km.



Red Cave, the largest hole to the right in the rock face.

The cave is formed in a large area of limestone with significant karst development between the Tapsa and Kaa-Khem rivers to the east of Kyzyl. A fossil resurgence cave formed along a major bedding plane and a minor joint in narrow bedding, the cave is predominately phreatic in origin with vadose modification.



Concretions in Red Cave.



Flood clay deposits in Red Cave.

The cave entrance, which is situated 10 metres up a cliff face, appears to have been created as a resurgence from the confluence of two drainage systems.

There is little speleothem development and there is very little evidence of cave breakdown.

The northern drainage system contains a series of circular chambers drained by short vadose connecting trenches.

This system ends in the same cliff face as the entrance indicating the ancient upper system disappeared as the cliff face was progressively subjected to frost damage.

The walls of the dome chambers display an ancient flood horizon where clay deposits mark a line below the upper cleaner walls. Curiously it was found that the line of the deposit dips by a few degrees; Could the region have dipped since the last flood? Valerie confirmed that the area was subject to movement and earth tremors are still frequent in the area.

Of further interest in the cave are some fine examples of concretions that are well displayed in the cave entrance chamber.

Lower down from the cave an igneous sill is visible along the lower face of a cliff. As there is no evidence of deformation or crystallisation of the limestone above the sill it is suggested that the limestone is of the later origin. Valerie found pebbles of glacial origin.

The longest passage has a dense red clay fill (possibly ochre/haematite) over 1 metre deep at one point. Local people are removing the clay from a site in the main passage, for medicinal purposes, as it is believed to relieve stomach problems. During our survey two men from Kyzyl entered the cave and dug out a carrier bag full of the red sediment. The Tyvan authorities do not have the means of carrying out an analysis of the clay, so we took samples and are presently endeavouring to have them analysed.

Skeletal remains of several mammals were found; these were identified as fox, lynx or large wildcat and hare. Recent ritual deposits were found in the entrance. A small number of unidentified bats were seen roosting in the entrance passages.

A small piece of ancient pottery was found in the vicinity of the cave entrance.

Local legend tells of a bird, which flew down a hole and disappeared in a valley some distance away and emerged from Red Cave.

Hole through the Mountain Cave.

East of Kyzyl Mazik visible from the road west of Shagonar.

Location and approach.



Approach to Cave.



West Entrance.

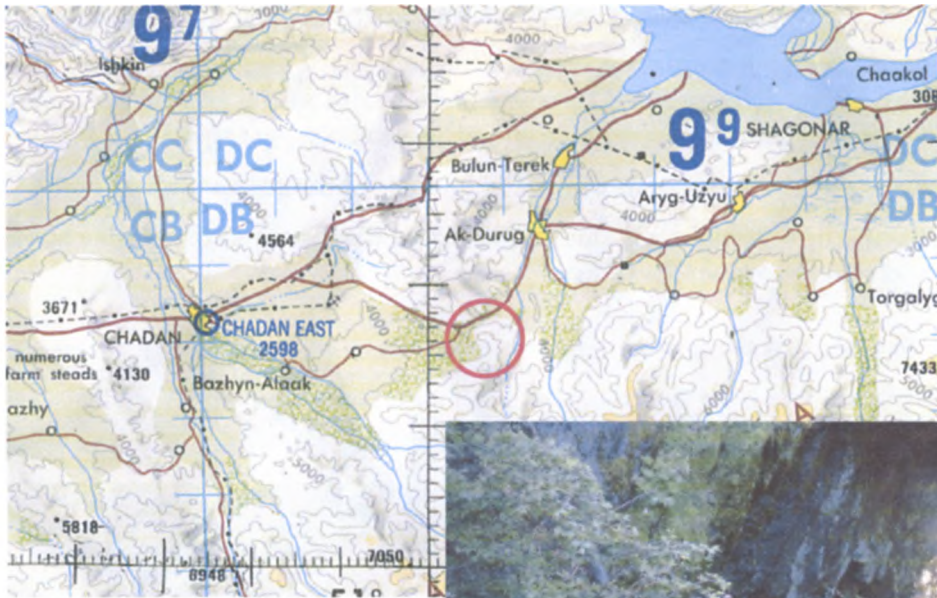
The cave is easily visible from the main road. Vehicles can park on a broad grassy area to the west at the base of the mountain. A path rises on the east side and heads towards the summit. On crossing the head of a second valley access to the cave is easily gained.

A large walking size passage 13 metres long, 6.5 metres wide at the west entrance, 5m wide at the east and up to 7 metres high, passes through a high-level limestone escarpment. A remnant of a large ancient mainly phreatic system developed along a joint of West/ East orientation. A secondary inlet passage, 10 metres in length, 5 metres high and 30cm wide, extends southwest towards a less accessible eyehole entrance.

A Tyvan tourist attraction, the passage is said to be large enough to accommodate 25 horses and to allow a horse to be ridden through. This was not tested out, but it does appear to be a reasonable description.

A local legend says long ago there were cannibals on the mountain that took a small boy and his mother prisoner. After some time the cannibals offered the boy some meat in a dish. He was just about to take a bite when he realised the meat was his mother's heart. He did not eat, but suddenly the heart became alive and flew through the air hitting the mountain. On impact the heart exploded and put a hole through the mountain.

Shagonar Pothole. (Big hole no man been bottom of.)



Peter Martin descending.

Mt. Sarig Kholchuc.

West Tyva (Situating south of Ak-Durug – Abasa Road. Highway A 162.

51° 16' 18.8" N 92° 05' 83.1" E.

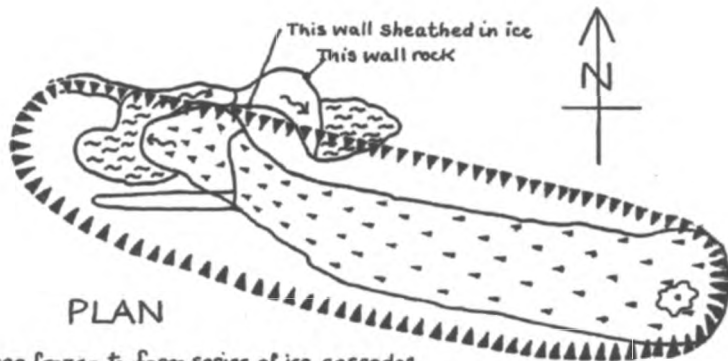
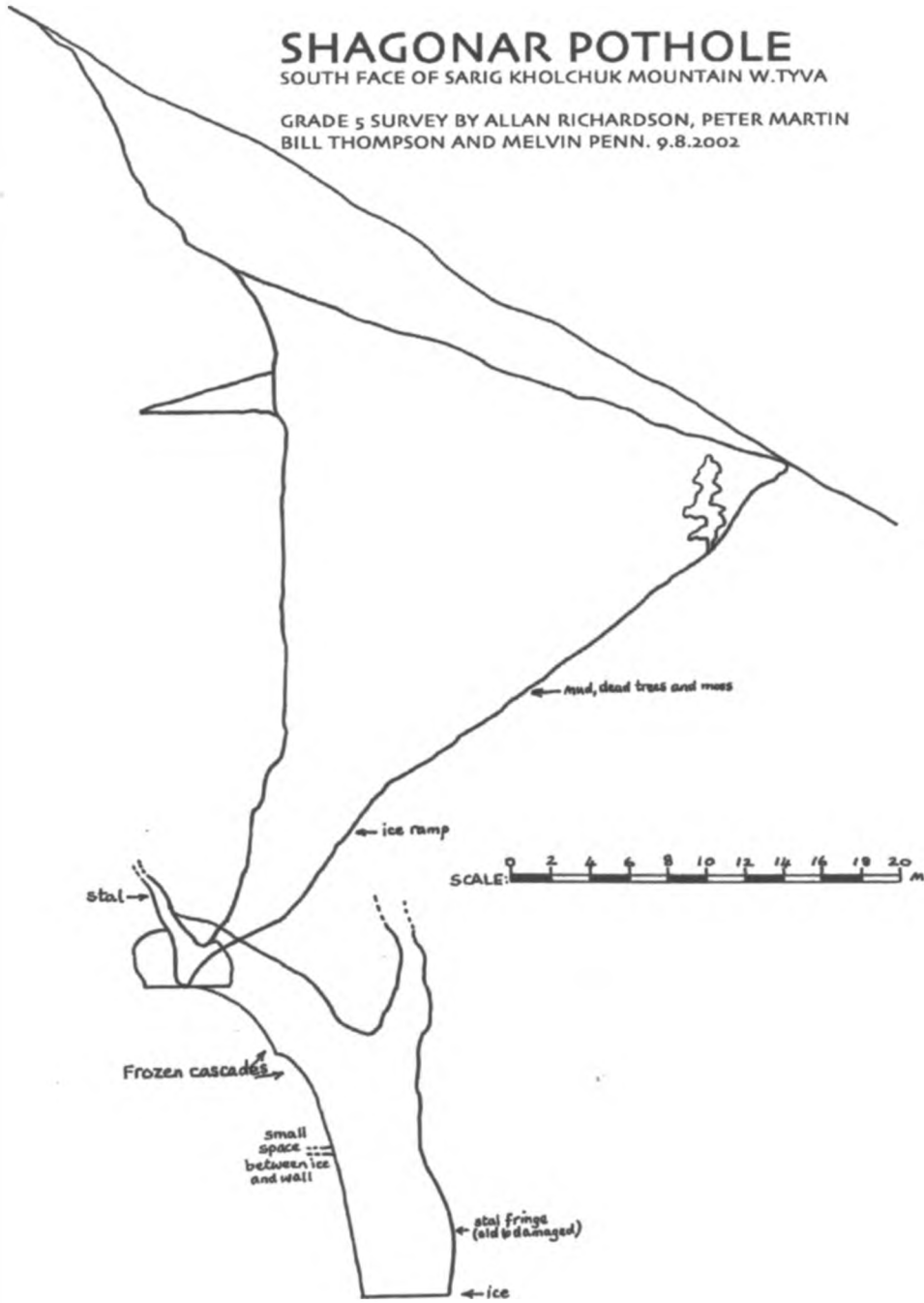
Altitude 994 metres.

Situated in an area of 300 to 400 metres thick limestone of Vendian or Lower Cambrian era. The pothole lies high above the right bank of the Khozhei stream, which is the left tributary of the Chaa-Khol River. The stream appears near the boundaries of limestone

SHAGONAR POTHOLE

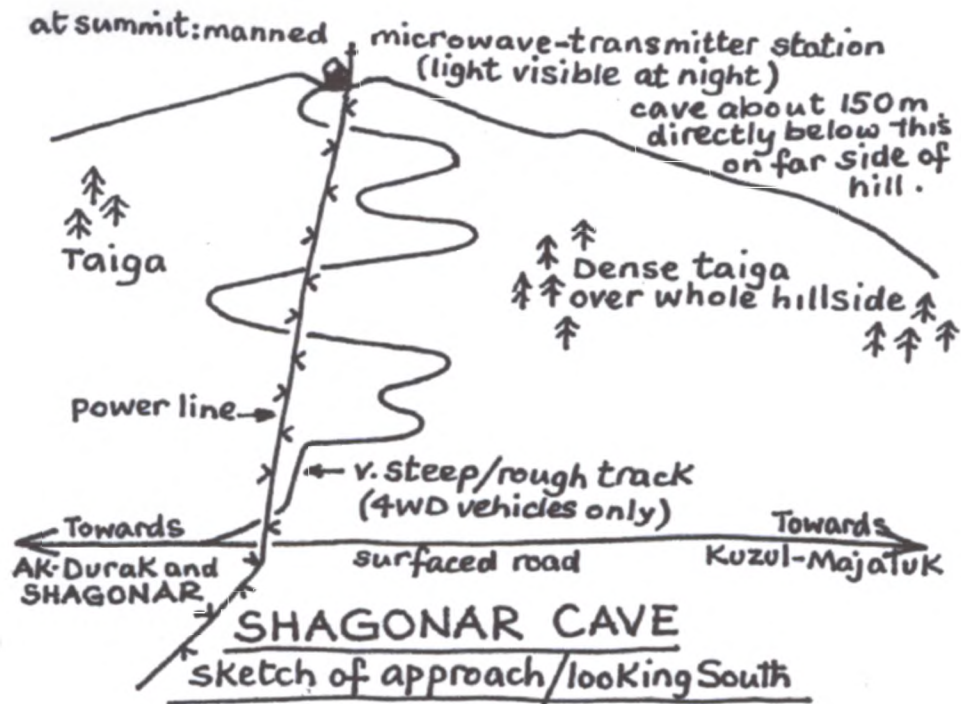
SOUTH FACE OF SARIG KHOLCHUK MOUNTAIN W.TYVA

GRADE 5 SURVEY BY ALLAN RICHARDSON, PETER MARTIN
BILL THOMPSON AND MELVIN PENN. 9.8.2002



PLAN

All water frozen to form series of ice cascades
the two pools had frozen surfaces 1-5cm thick - Surveyed in August, the hottest month of
the year, with outside temperature around 30°C.



and Devonian sandstones as a powerful source that might have karst origin. On the left platform of the stream in rocky outcrops sinter formations were noted - deposits of calcite (apagonite), fragments of stalactites and clayey formations.



Pothole is in distant mountain.



View into sinkhole of pothole.

Access to a microwave relay station is gained from a steep track that zigzags up the north side of the mountain from highway A162 between Chadaan and Ak-Durugf. The summit lies directly behind the relay station. On the southeast slope a sinkhole is found within the fringe of a Siberian pine and larch forest 150 metres from the summit of the mountain. As the area opens up a steeply descending scree slope leads to the sinkhole. Entrance is gained from the lower eastern side of the sinkhole 12 by 36 metres and 15 to 22 metres deep. A 75-degree angle, debris-strewn ramp descends to the edge of the pothole located at the base of a vertical cliff face. The cliff rises to a height of 36 metres and contains an obvious man size cave entrance with a passage 8 metres long Allan Richardson and Peter Martin on ice tongue.

An ice tongue protrudes from the ramp and over the lip of the pothole. Immediately facing the pothole lip a chamber is up to 1 metre deep in ice covered water. From this

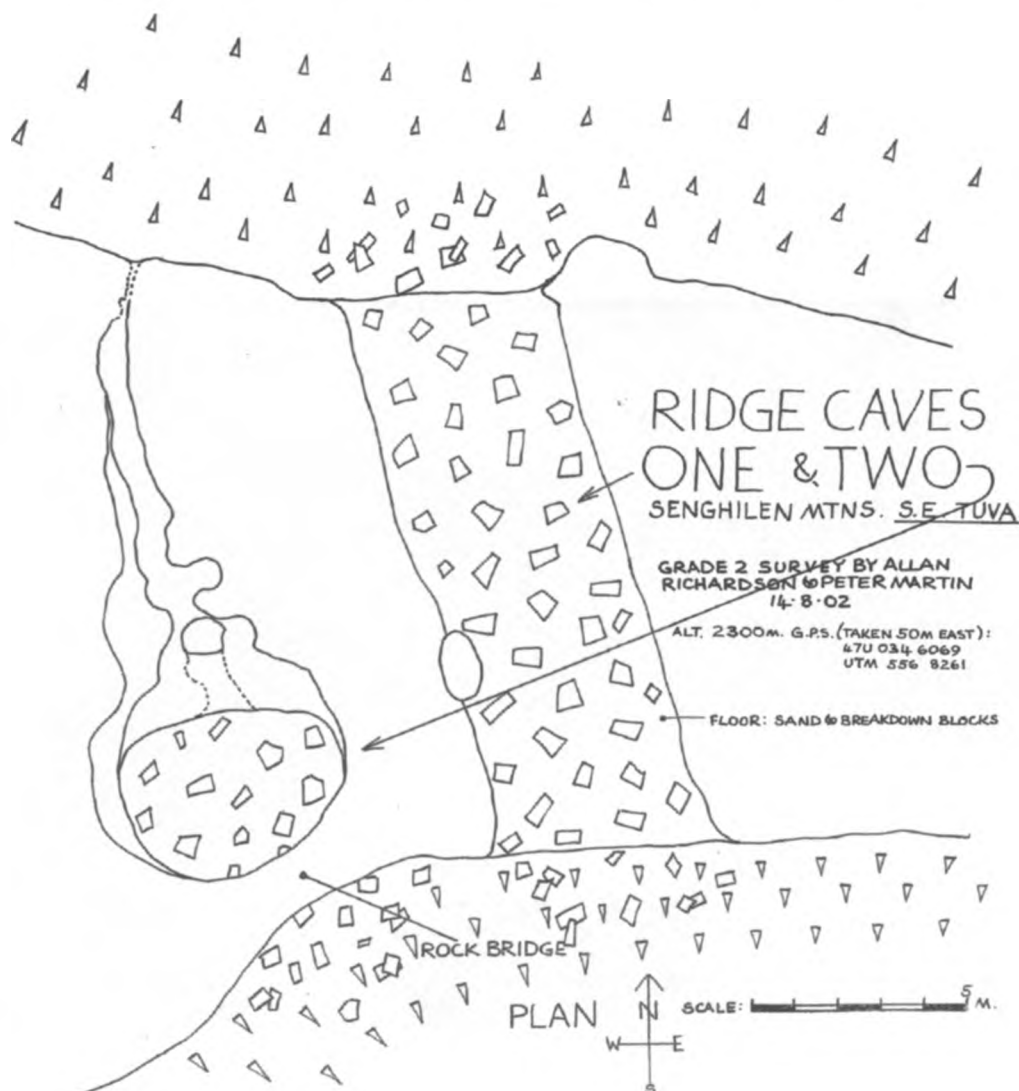
chamber an overflow descends down the pothole itself. Ice stalactites hang around the head of the pitch. The way on is to be found directly beneath the ice tongue where an ice cascade descends for 19 metres until an ice plug is encountered preventing further exploration.

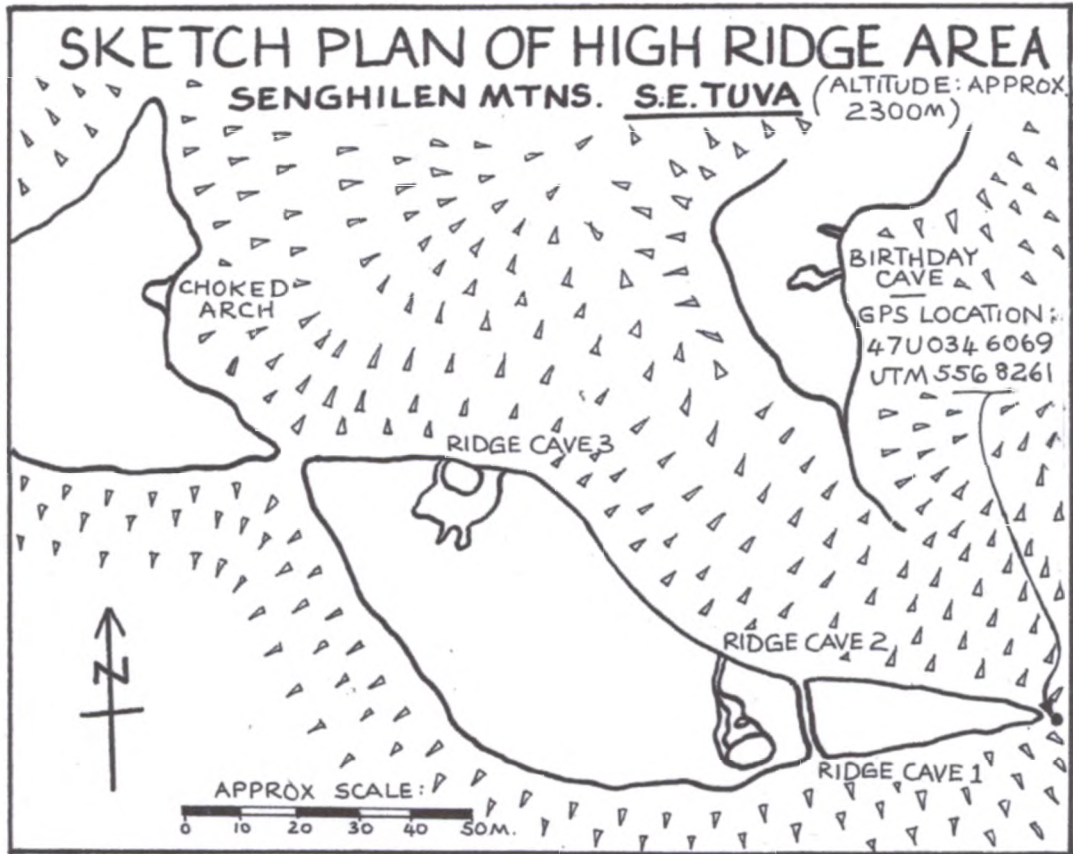
Ridge Caves.

Mount Marchurdi. Sengilen Mountains.

47U 034 6069 UTM 556 8261. Altitude 2300 metres.

The larger caves of several caves found at the base of the cliff faces of a ridge running west east, near the summit of, and on the northern slopes of Mount Marchurdi. Access is gained by climbing up from the B' Loo River. The caves are fossil resurgent caves in the final stages of breakdown. Whilst Ridge Cave 1 passes through the ridge, Ridge Cave 2 is a honeycomb of holes, formed in an aven above a collapsed chamber, the only remnant of which is a rock bridge. Ridge Cave 3 is basically a large chamber beneath several avens. Broken speleothem curtains and flowstone are evident in the



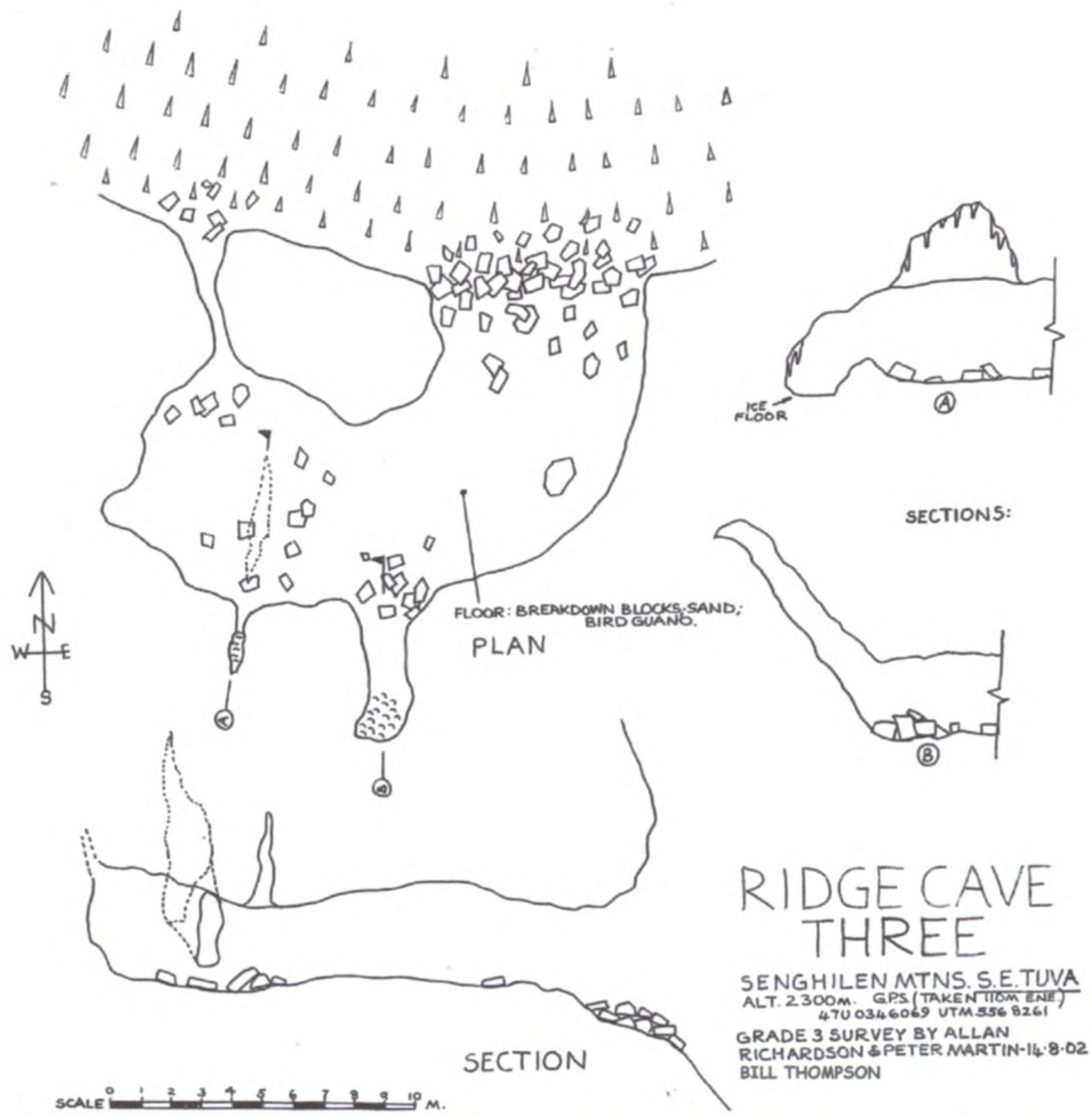


Birthday Cave

7 Metre long, trending 220°. Entrance 1 metre wide 0.75 metre high. Low passage leads after 3.5 metre to a 45° inclined aven 4 metre wide and 5 metre high.



Bill Thompson at Ridge Cave 3.

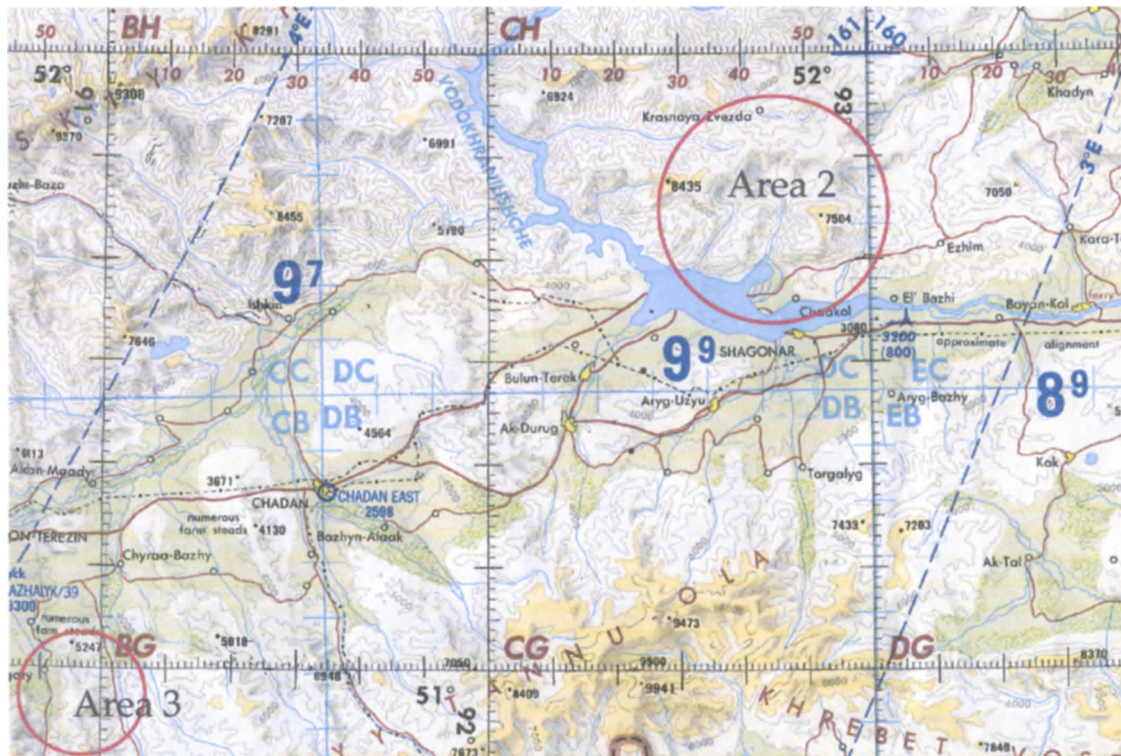


Chagan in Ridge Cave 1

roof and some of the speleothem are still active. One descending side passage (A) has considerable flowstone down one wall and closes with an ice floor. The aven at (B) can be climbed and has, in the roof, stalagmites suspended along a joint. This chamber has evidence of occupation by nesting birds, bats and possibly Ibex or lesser animal.

In the immediate area several other lesser caves are to be found some at lower levels. On the west end of the ridge are a number of narrow, gradually descending caves up to 10 metres long developed along joints closed by cave fill.

Prospective areas of exploration



Area 1. North Central Tyva.

East of 94° 45' and North of 51° 40' to West of 95° 20' and South of 51° 10'.

Between Tapsa and Mali Yenisey (Kaa-Khem) rivers, northeast of Kyzyl, the Kyzyl Khives Mountains, (Red Cave area).

Area 2. Northwest Tyva.

East of 92° 30' and North of 51° 35' to West of 93° 0' and South of 51° 50'.

On Eilig-Khem, Kuilug-Khem streams, the right bank tributaries of the Ulug-Khem River down to Shagonar. This is completely unexplored and looks promising.

Area 3. West Tyva.

East of 90° 30' and North of 51° 0' to West of 91° 0' and South of 51° 20'.

In area of Utug-Khaya Mountain, next to the village of Shekpeer, to the east of village of Kyzyl-Mazhalyk.



Area 4. South Tyva.

East of 95° 10' and North of 50° 02' to West of 96° 50' and South of 50° 50'.

In the mountains fringing the Moren and Naren rivers.

Area 5a. Southeast Tyva.

East of 96° 30' and North of 50° 0' to West of 97° 0' and South of 50° 40'.

The Central Sengilen Mountains, the B' Loo River and associated valleys.

Area 5b. Southeast Tyva.

East of 95° 20' and North of 50° 0' to West of 97° 0' and South of 50° 30'.

East of Kungurtug and Ozero Tere-Khol. The valleys of the Saryg-Chazy and Sur-Tash rivers. There are reputed to be karst sources of considerable discharge as well as karst caves in the Chunai River area.

Area 5c. Southeast Tyva.

East of 97° 40' and North of 50° 10' to East of 98° 0' and South of 50° 35'.

In the area of Emi River in the East Sengilen Highland there are karst sinkholes and valleys.

Both the Kyzyl Khives Mountains (Red Cave area) and the Sengilen Mountain area have large areas of karst, including substantial cave development; they would take many weeks to explore. Area 2 has not been explored and information is based on the geology and local information. However the area does appear to have good potential. The caves of Area 3 have not been explored but the potential for significant discovery is not very good.

There are many stories of shamans using caves and of Buddhist monks, both living in caves and hiding in caves their sacred scriptures "Tankers" (devotional pictures) and artefacts. Some of the museums have on display some of these items found in caves. We were told that a recent expedition from Poland had tried unsuccessfully to find a

cave, in the Sengilen Mountains, in which it was rumoured a famous Polish General, from the white army, had hid his treasures.

Area 6. Southwest Irkutsk Oblast.

Three villages; Alygdzher, Upper Gutara and Nerka. This area has yet to be identified. The regional representative from the area told us that there were many unexplored caves in the area. The process of identifying the area is on going.

It should be noted that all the above areas are in the permafrost zone. The recent rising of local temperature suggests that the exploration of caves previously impaired by ice may become increasingly possible.



EEREN MUSEUM

RITUAL SPOONS WITH 9 HOLLOW
IN BOWL - USED TO SCATTER FOOD
OR DRINK TO THE "9 HEAVENS" IN
DIFFERENT DIRECTIONS

The 2001 Expedition, Day to Day.

The arrival.

6th August Monday.

Our team was met at Kyzyl Airport by Nicolai and his daughter, Victoria and driver Valodya. Two vehicles were ready to convey us on the short journey into the city and to the second floor apartment, which was to be our base for the next three weeks. At the apartment we were greeted by the residents, Chechek, and her young daughter Delana who had vacated the flat for the duration of our visit. Chechek and Delana visited us each day we were resident in Kyzyl to cook our meals. Later, we met Rollanda and together with Nicolai discussed the itinerary. We were warned not to go out during darkness and to watch out for pickpockets when we travelled around the city.

Nicolai arrived to ask for our passports and a copy of the official invitation, which had to be presented to the authorities and a local tax paid. We took a walk and photographed the Center of Asia Monument on the banks of the Yenisey River and then took interest in a small yurt and a shaman's shrine. We photographed these and were immediately accosted by a woman who appeared from a nearby building and demanded payment for taking the photographs. With some amusement we ignored her and walked on. She shouted after us, "you will have bad luck if you don't pay."

Nicolai, Rolanda and Valodya drove us out to visit the monuments which overlook the city. A new one had appeared since I last visited Kyzyl. A giant, bronze Tyvan, arms outstretched, looked over the city from the summit of a nearby hill. The road to the monument was in the process of being laid. We had arrived in Tuva in the month the country celebrated its 80th anniversary and everything was being spruced up for the occasion. Rollanda guided us to a fresh water spring and insisted we walk around the spring, clockwise, three times and make a wish. We were being introduced to Tyvan traditions.

South to Ak-Khayrakan Mountain (White Mother Mountain.)

7th August Tuesday.

We changed dollars at the only bank available and Malcolm tested out one of the two cash machines installed in the city. He was delighted when it worked. A Tyvan in the queue noticed we were changing money and suggested to some of my companions that he may offer a better rate. The deal was done outside while I completed my transaction at the counter. Time was then spent collecting food, fizzy drinks, Russian beer and water, thereby causing a late start for our long journey south down the M54. We were pleasantly surprised to find our transport was to be a small but comfortable bus to be driven by a Tyvan named Vova. Our interpreter would be Egor, a student on vacation from his studies in economics at Moscow University. Chisui, the deputy director of the Ubsu-Nur Biosphere Reserve, was to be our guide. Chechek and Delana would accompany us to take care of the cooking. A Ukrainian mature student was also to travel with us for a reason none of us could work out.

It was mid afternoon when we halted by a tree shrine at the head of a pass. These shrines are known as oovoos in Mongolia; I do not yet know the Tyvan words. They were decorated with gifts, mainly strips of blue or white fabric in the Buddhist tradition. A carved horse head totem stood next to the oovoo and close by policemen worked away on the axle of their police car which they had jacked up onto bricks.

Several more kilometres went by and we stopped to visit a standing-stone bearing carvings dating from the ancient Scythian civilisation. We passed through two police check points as we neared the Mongolian border and then turned off east and left the metalled road to head towards the small log cabin town of Moren. The route did not take us into town but passed to the north and into the foothills of the Sengilen Mountain range. Soon our objective, Ak-Khayrakan Mountain came into view.

The white limestone massif stood out in the evening light and we understood the meaning of its name, White Mother Mountain. The track was narrow, winding and steep in places and at one point we were all asked to alight so that the brave driver could take a run at a particularly steep section. He was successful and we re-boarded to discover that the beer bottles we thought we had securely stowed had rolled down the bus and gathered in the stairwell. It was a good job the bottles were plastic!

It was near dusk when we reached our destination, a small pasture at the head of a gently rising valley. We were surprised to see a small collection of old tents, supported by rough cut poles and home made pegs, pitched close to a precious spring. This, like all other springs in Tyva, was medicinal and a place the natives came to for cures. Gifts adorned crudely constructed wooden guttering, which spouted cool water; we had to treat the site with respect. As we pitched our tents we attracted the attention of the children from the camp who had never seen tents like ours before. Once our camp was ready, we began to take in our surroundings and Peter, triumphantly, found the first cave, which was just about big enough for him to crawl through and pop out in a small cliff face three metres further on.

8th August Wednesday.

Led by Chaisu and accompanied by four adolescent Tyvan adventurers who claimed to be familiar with the mountain, we set off for Moren Cave. The route took us across two ridges and down into a far valley from where the true ascent began. As we entered this valley we overtook another small party also heading for Moren Cave. An 80 year old Tyvan woman was making her final pilgrimage to the cave which was a significant place to her in her youth. She was accompanied by her young grandniece who was struggling with carrier bags of food, offerings and various items of shamanic significance. Our youthful friends became employed in helping to carry the bags.

Somehow Chaisu got confused over the route and began a climb up the rocky valley side. Soon the path was lost and a steady walk became a scramble as steep drops and scree-ridden gullies were negotiated. When the route began to appear impossible a shout from below declared that a less arduous and probably the correct route had been found. By the time we got down onto the better route our young guides had got ahead, and were ascending scree and steep rock outcrops leading up to a shadow where they thought the cave to be. Memories seem to have played tricks and the group divided to find the true entrance of the cave. As Chaisu took over assisting the old woman a cry of success emitted from a high ledge at the base of a sheer cliff. The cave was found.

The last few metres to the cave required careful footwork and the use of hands to balance, but once on the ledge there was ample room to move about. Pete and I changed into our caving gear whilst the bemused Tyvan boys watched on. They claimed the cave was 15 kilometres long, went straight through the mountain and had two entrances. Being convinced the cave was somewhat shorter we invited the boys to accompany us on our survey. The terminal chamber was reached within a short while and the legend was disproved. The boys who were initially eager to assist soon got cold and had to be taken out before we could complete our survey.

At the entrance Linda was invited to help the old woman perform her shamanistic ritual so she held tributes while chants and charms were recited. The old woman was once a herder in the area and claimed she sheltered in the cave with her goats and sheep. She was showing the young girl the places of her youth and passing on the family history before she herself passed on.

The survey finished, we returned to camp, but not before the old woman pointed south to a grey mountain in the far distance and close to the Mongolian border. She claimed that within the mountain were more and bigger caves. An objective for a future trip perhaps?

The return to Kyzyl.

9th August Thursday.

After breaking camp we headed for Moren and then back west to cross the M54 and drive onto to steppe proper. Chaisu took us to the fringes of the North Gobi desert where we climbed up the biggest sand hill in the country. From here we travelled to Tere-Khol Lake for a days relaxation and clean up. The waters of the lake were clear, clean, warm and, to a six-footer like myself, barely shoulder deep. We had an excellent swim although we did not venture too far as the southern part of the lake lies over the border in Mongolia. That evening we dined on boiled mutton from a freshly slaughtered sheep killed the Mongolian way, the white death. In the white death a sheep is placed on its back and the chest slit open above the heart with a clean cut just long enough to thrust in ones fist. The aorta is squeezed to bring about a quick death. No blood must touch the floor for the ground is sacred mother earth. The meal was washed down with beer and vodka as masses of white moths gathered about our torch lights. We slept in the National Park's hospitality yurts.

10th August Friday.

Friday, the day Tyvinians call Wedding Day. Our route back to Kyzyl took us via many kurgans, Russian for burial mounds. South of a rocky hill, Yamaalyg, there were said to have been many battles and nearly four hundred kurgans could be seen. On the other side of the hill there was only one kurgan, said to be that of a black shaman, a place of evil. Near to the rock outcrops were fine beds of rock roses said by the Tyvinians to be a snakes penis. On the face of yet another rocky hill there was an astounding rarity. Prehistoric art in excellent condition was there to be seen out in the open, painted onto two rock faces. Chaisu was concerned as to how the art may be preserved. Mineral deposits leached from the rocks above were gradually obliterating the art, however human interference was a greater concern. We were of little help despite Malcolm being a professional archaeologist. It would have needed a constant armed guard to ensure their safety out there. Complete isolation could be a preservative, but with the park authorities anxious to promote tourism the risk of damage was growing. There did not appear to be a solution that would not spoil the uniqueness of the art's situation.

11th August Saturday.

We toured the busy market and visited the Kyzyl museum, which houses a fine collection of petroglyphs. Pete was allowed to take rubbings from the carvings. This was a relaxing day.



Left:
Mt. Ak-Khayrakan,
White Mother
Mountain.



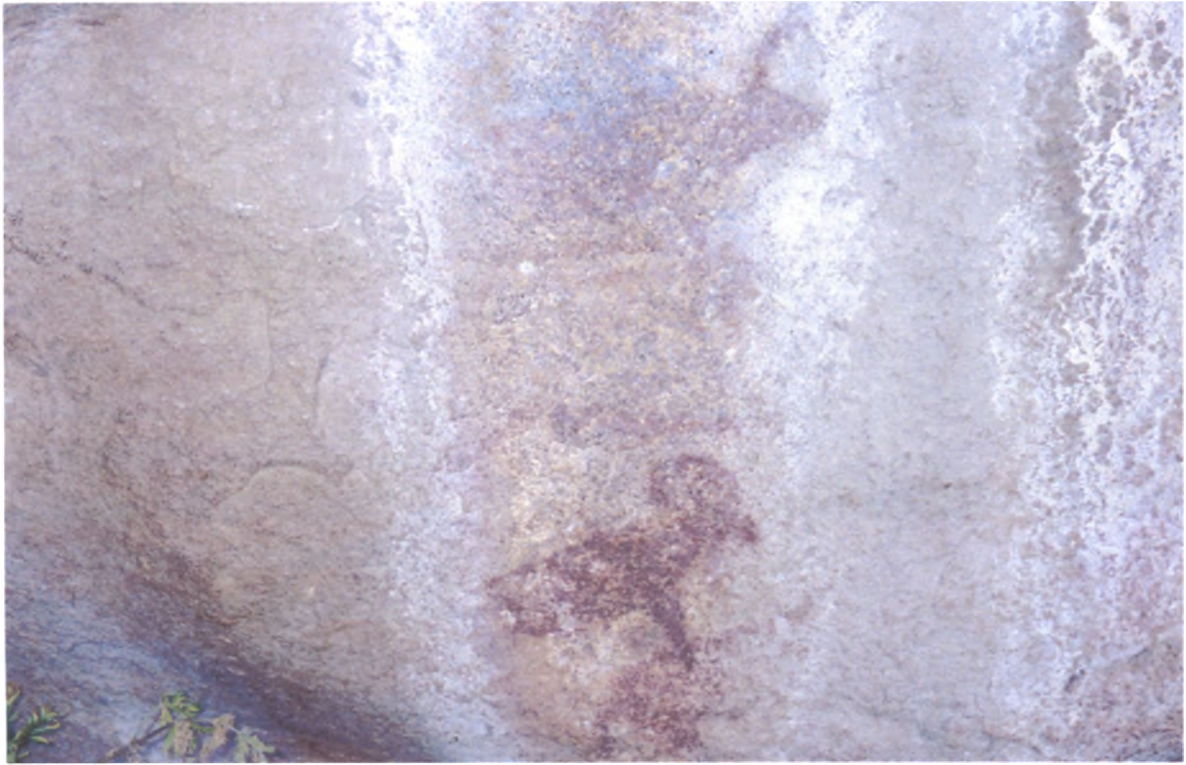
Right: Tyvan Steppe.



Left: Scythian standing
stone with pecked design.

Below: Ibex pecked out on a
basalt stone.





Above: Prehistoric art, at least three days walk from the nearest cave.

Right: Preparing a meal.



Left: North Ghobi Desert, our bus in the middle distance.

Red Cave. Kyzyl Khives Mountains.

12th August Sunday.

Early Sunday morning we were introduced to Valerie Popov one of Tyva's principle geologists; he was to accompany us to Red Cave.

We were surprised to find how close the Red Cave area was to Kyzyl. It took less than an hour to get to the end of a track in a narrow valley bounded by steep hills. The head of the valley terminated at the juncture of two limestone gorges which cut down through the limestone; there were abundant signs of early karst development.

Valerie is a Russian Tuvaphile who speaks not a word of English. He is tall, strong, grey haired and swarthy and although getting on in years bears the toughness of an old pioneer. From his strong leather belt hung a bone handled sheath knife and a compass pouch, he carried a large geological hammer and looked every bit a pioneer. He led the way up Hapiduck Mountain and indicated a cliff face way in the distance as being the site of the cave. The path, no more than a sheep track, wound its way over two ridges before a steep sided valley was entered. It then took the top of the eastern side before it crossed the contours and entered a steep ravine.

The climb was hard work and slow progress was made towards the site Valerie indicated. His objective however proved to be illusive since the place was not the one he thought it was. Nevertheless, a large perfectly round cave entrance was found and entered, only to close after a few metres. Red Cave lay hidden further on. Eventually, after negotiating a narrow path following the base of a westerly facing cliff and after passing several small caves, Red Cave appeared, some 10 metres up a cliff face. Access was gained by climbing a widened joint where two faces met in an obtuse corner. Despite the presence of stinging plants similar to nettles, but more vicious, the climb was easy, however I led it with a rope, taking no chances in such a remote spot. Pete, Lin and Valerie followed and then Pete and I began the exploration and survey.

The cave had an impressive entrance split in two by a rock pillar. An old stall boss stood in the centre of the entrance chamber and two passages rose up from the back of the chamber. We took the right hand passage first and entered a clay filled passage after passing over a few boulders. The passage went on at first hands and knees and then flat out crawl to a restriction that only Pete could squeeze past, it terminated in a low filled bedding. We surveyed back towards the entrance and met Valerie at a wide section where the floor had been lowered exposing vadose development.

As the survey continued two candle-bearing Tyvinians entered and much to our surprise dug out clay, filled a bag and then left. Valerie explained the clay was used to treat stomach complaints. The clay is mixed with water and drunk. Valerie was concerned that the clay, probably of ochre content, had never been analysed and could possibly do more harm than good.

The left hand passage proved very interesting as we found a series of dome shaped chambers connected first by a narrow vadose passage and then by low crawling tubes. Eventually the left hand series ended up opening out onto the cliff face higher up. Following the survey we photographed and descended from the cave.

Lin said she had seen the Tyvan clay collectors climb up to the cave but had not seen them descend, they had apparently found another way down. The only other way down was through a very short passage which followed the joint we had climbed and then went through the escarpment and out onto a precarious ledge. Below was a very steep and precipitous descent, which I considered to be an extremely dangerous and

unlikely route. The mystery was not resolved.

As we left the cave to return to our transport we observed many more entrances both in the Red Cave cliff area and in distant escarpments. Peter found several small skulls in the cave, which he identified as various rodents. Back at the minibus we noticed many cannabis plants growing around an old log cabin in which a poor Tyvan family lived. There was very little other vegetation but perhaps the few sheep in the locality were happy grazing on what they had. Nicolai gave the family some of our food and we left for Kyzyl.

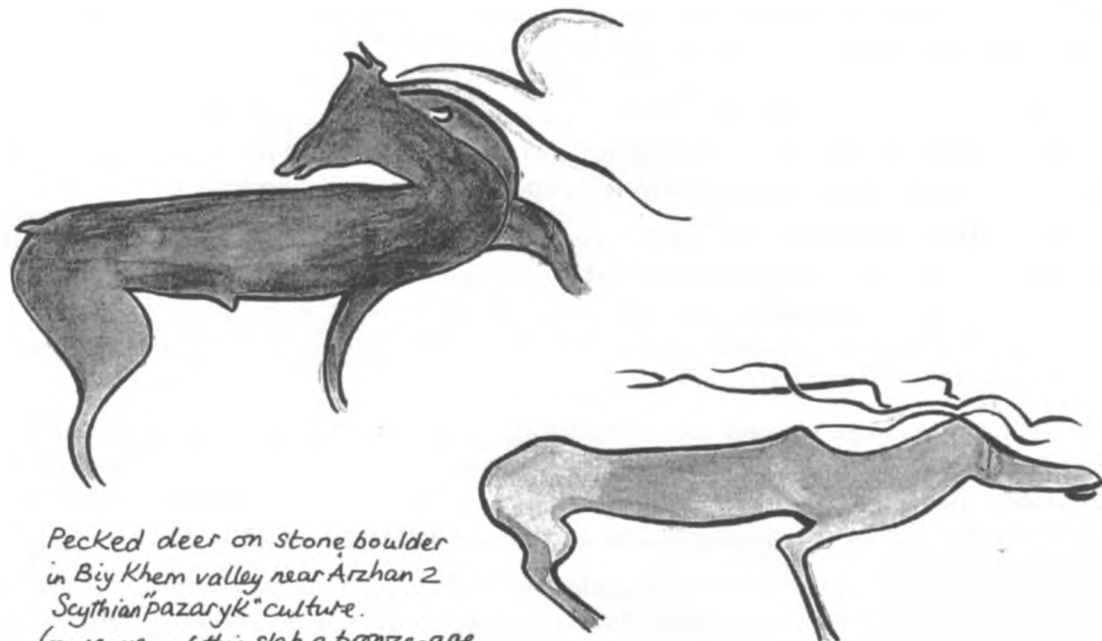
The Anniversary celebrations.

13th August Monday.

The week of the anniversary festivals began. We visited the cultural market where local crafts were on display. Impressed by the old believers cakes stall we tried a sample. The sponge was a little dry and was covered in coloured marsh mallow. Almost immediately we finished eating the cake we were descended upon by a Tyvan television crew, who interviewed us and suggested we try another cake each. This left our mouths so dry it was difficult speak. By the market we met Anna, a Russian speaking East German who was studying management at Leeds University. In the afternoon we attended the opening ceremony of the celebrations and were drenched as the heavens opened to greet the speech of the Tyvan President. In the evening Nicolai produced Vodka, which he offered us, believing it would prevent us getting ill after our soaking.

14th August Tuesday.

We were taken to the races, part of the Naadan, the annual sports festival and this year part of the anniversary celebrations. We were received as guests and were given seats



*Pecked deer on stone boulder
in Big Khem valley near Arzhan 2
Scythian "pazaryk" culture.
(on reverse of this slab a bronze-age
carving of wagon)*

in the official box where we met Tyvan and Mongolian politicians. The main race was over 40 km and was only open to experienced older riders as the horses were allowed to gallop. Indeed the leading rider was disqualified as he allowed his horse to gallop over the last half furlong. The horses were allowed to be galloped in the 20 km race. The races seem to go on forever so we were relieved to be invited to the yurt of one of the regional representatives to experience Tyvan hospitality. As well as learning much about Tyvan customs we gathered information about caves in their region and collected the addresses of contacts. We spent the early evening in a Korean restaurant celebrating Lin's birthday before attending a firework display at the central square. We appeared on television that evening.

15th August Wednesday.

The celebrations went on and we were taken to watch the Khuresh, Tuvan wrestling, in a stadium set within the city park. Wrestlers appeared from Mongolia, Buryatskaya, Russia and Tyva dressed in traditional wrestling attire, which included boots and a cut down blouse that enable the judges to determine if a female was sneaking into the competition. It was a knockout competition that seemed to involve hundreds of contestants. Six or seven contests took place at once and only finished when one wrestler could force his opponent to the ground. He then performed the eagle dance to the acclaim of the crowd. We left before the final, suffering from celebration fatigue.

16th August Thursday.

We met Irgit Sambu, a notable and elderly, almost infirm, archaeologist who directed our driver to take us to see ancient petroglyphs pecked on rock faces overlooking Kyzyl. The Scythian deer were spectacular and the design of a large bear almost futuristic in its concept. From here we were taken to meet Professor Constantin Chugunov of St Petersburg University who had recently discovered an unrobbed kurgan, named Arzhaan 2, containing eight and a half kilos of gold artefacts. An article describing the finds appeared in the Times only the week before we left for Tuva. We met Chugunov at his end of season camp situated on the banks of the Yenisey and enjoyed lunch with his Russian team. Chugunov proudly showed us the photographs taken at the dig before showing us a dig close to their camp. This kurgan had been identified within a cabbage field but when dug was found to have been disturbed. Malcolm had specialised on the Scythian civilisation and had studied under one of the leading Russian archaeologists from St Petersburg so this was a special occasion for him; Chugunov and he had mutual acquaintances.

The Arzhaan.

17th August Friday.

We left for Turan to visit the site of recently excavated kurgan, Arzhaan 2. We had a new interpreter, Ulana Mongush, a postgraduate linguistic student studying in Abakan. Ondar Valerie Dyrty-oolovich from the School of Arts in Kyzyl drove and his cousin Vadim Ondar acted as cook. Our guide was Mannai-ool Mongush Murgut-oolovich, a PhD from Kyzyl and the head archaeologist in Tyva.

At Turan we met the Director of the Museum in Turan Tatyana Vereschagina and were invited to camp on ground on the edge of the town. The ground was unsuitable and we persuaded the crew that a move to Arzhaan 2 would be better. Arzhaan 2 was some way out of Turan and lay on the steppes close to a road. It was huge and only

two thirds dug. A deep pit from which the artefacts of the Pazaryk culture, 5th century B.C. were extracted lay near the centre. It was originally lined with timber to make a room in which the Scythian noble man was laid down with his prized possessions. A horse had been buried in a nearby pit. The Tyvinians call this valley in which Arzhaan 2 is situated the Valley of the Kings, for here many large kurgans exist. A trip down the valley took us past kurgans yet to be excavated, until we reached the site of the original Arzhaan kurgan, named after the local village. Arzhaan actually means spring, a source of water. Further on Mannai-ool led us to the largest Kurgan of all, so large, Valerie drove up to its summit. Overlooking the Valley of the Kings Mannai-ool offered Malcolm the opportunity to bring a team from England to excavate their largest Kurgan. Malcolm was thrilled to bits and spent some time taking GPS readings around the kurgan, establishing it to be 150 meters in diameter. We returned to Arzhaan 2 via an abandoned village whose former residents worked on an adjoining collective farm now derelict. A decaying children's playground lay silent and surreal, testimony to another era now past. 35,000 sheep and 300 cattle once grazed the Arzhaan plain before the farm collapsed in 1991 and was plundered by the workers.

Not far away from our camp lay a double lake where people took the mud for their health. Pete, Linda and myself attempted to walk there, but the swampy nature of the ground defeated us.

A chilly night drew in without a single light to be seen from any human habitation except our own. We loaned our clothing to our support team; they were not prepared for spending the night in the open and had only blankets to keep themselves warm in the minibus.

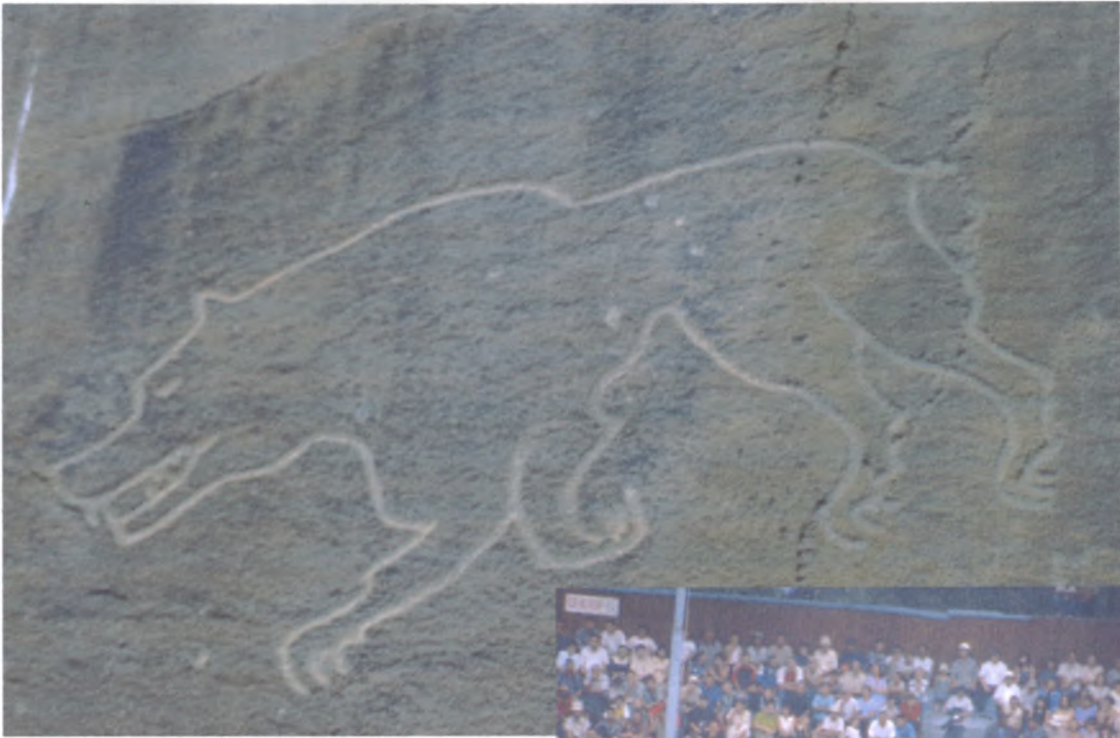
18th August Saturday.

It was porridge and a pear for breakfast and I started the day with a mild case of dysentery. Before we left the Kurgan a Tyvan, who had worked as a tractor driver on the excavations, brought his friends to show them the dig. He left some cigarettes and other items as gifts to the spirits in thanks for the employment the excavation had given him. Valerie thought there was a cave in a hill overlooking the Arzhaan plain so we travelled to the hill to investigate. The rock was igneous and the cave turned out to be a large open collapse shelter with three entrances. The professor said a Tyvan shepherd had told him he had seen fallen stone figures on the hillside nearby so we spent the next hour searching but found nothing of interest.

19th August Sunday.

Back in Kyzyl we managed to do a little shopping. Tuva is not yet set up for tourists and souvenirs were only available from two shops. Postcards were almost unknown so when we did find some we ended up buying out the entire stock of the country. Stamps are not handed over at the post office. The post office assistant personally places each stamp on each card before sending them on their way. There were no post boxes.

In the late afternoon we were taken to the yurt hotel, a good idea on the fringe of Kyzyl. Here wooden yurts with fitted washbasins are situated in a compound close to the Yenisey. Some Austrians, students of Tyvan throat music, were in residence and together we enjoyed an evening's entertainment presented by Ay-Kherel, Tyva's leading throat-singing group.



Pecked bear.

Tyvan wrestlers and the eagle dance.





Tyvan hospitality in a yurt.



View from Red Cave.



The climb up to RedCave.



Children with team at our camp near Ak-Durug.

Big hole no man been bottom of.

20th August Monday.

In the morning we had time to explore the hillside above the yurt hotel and found a petroglyph not far from the hotel's perimeter fence. On returning to Kyzyl we prepared to travel west to see more petroglyphs and to investigate some of the leads we had now accumulated. Valerie Dyrty-oolovich was to be driver again, but this time he was also to act as guide. Vadim Ondar was to cook again and Elena Samba was to be our interpreter.

After a 300km drive along the A60 we arrived at an unofficial campsite set beside a medicinal spring, east of Ak-Durug. A good-sized camp was assembled here and bathing in the waters of the spring was well organised. The ladies had a wooden screened area, the men benches, arranged further up the tiny valley of the spring. A complex of hollowed out wooden guttering transported the water down the valley to the screened enclosure, which was about 2 metres square. Here woman sat on benches and took turns to stand under the spouting water. A large, white, squat, Buda, embellished with the usual gifts sat overlooking the whole affair.

Valerie made contact with children who had been brought from deprived backgrounds in a nearby town for a holiday in the country. We were asked to go and talk with them. I took the opportunity to record the children singing national songs. They took the opportunity to ask such questions as, "Do all English men have beards?" "Were there bears and wolves in England?" and "How does such a tall man fit into such a small tent?" It was an excellent evening and we learned a lot about another side of Tyva.

21st August Tuesday.

We were not too enthusiastic about the prospects of finding anything of interest in this area. Locally there were only small outcrops of limestone showing evidence of much disturbance. The children from the camp wanted to accompany us on our exploration so six or seven of the older children were given permission and they enthusiastically volunteered to carry our equipment. Jim and Malcolm elected to explore around the camp area with Valerie and Vadim. An old man told us that he knew of some caves and a hole below a microwave station on the mountain on the other side of the A60 main road. He offered to guide us there. The hole sounded like one that Popov had told us he had heard about.

Our attention was first given to a hole in a broken limestone face close to a steam. The hole was the wrong shape for a proper cave and the rock dangerously loose, nevertheless we spent valuable time abseiling down into it to find nothing. Further up stream we passed lime burners who looked in a very poor state. Their little wooden hut reeked of poverty; they used empty food tins for drinking mugs. Not optimistic we crossed the road then a meadow and soon we were into the taiga and following a track which had been cut into the hillside for access to the microwave station. It was a lengthy climb and before long the old man gave up and disappeared, but his dog and our young porters stayed with us. On the way up we met a minibus coming down and we learned from the driver that there was indeed a big hole near the station. We were told to ask for Dennis who had tried to explore the hole. Feeling heartened by this we pressed on, eager to reach the station and meet Dennis.

Dennis, a young Russian, was amused at hearing of our venture, but agreed to guide us to the hole. We dropped down the other side of the summit ridge, and made our way through the undergrowth. There was no path and the ground was very steep. I

asked Elena to speak to the children who were now as determined as us to press on; I did not want any accidents. I wanted her to ensure the children would follow in line and take care. A strong youth of about fourteen years old had attached himself to Peter and proudly wore his caving helmet, another of about thirteen wore mine and yet another, even younger, wore Lin's. The rest of the party carried our ropes and tackle bags, with the girls sharing the load as much as the boys. This adventure was the best thing that had happened to them and they did not wish to miss a moment.

Carefully we made our way through the taiga until the edge of a steeply angled rock slab and scree was reached. A short distance away the edge of a scar appeared. We managed the children down the slope and gathered them together in a group of trees at the lower end of a great shake hole. There before us was a huge chasm, its depth in blackness. We could hardly believe our eyes; we had never expected anything like this in Tyva. Pete and I got changed into overalls and retrieved our helmets from our porters. From the trees a black, slippery ramp, strewn with tree debris descended at 75 degrees. We secured a rope to the trees and used a length as a fence to keep the children back. We gave strict instructions that the children, who were completely enthralled by what was going on, were to stay where they were put, they could only watch.

Pete and I descended the ramp. A length of aerial cable had been laid down the drop giving evidence of Dennis's attempt to find out how deep the hole was. The rotten remains of a makeshift ladder constructed from hemp rope and roughcut branches hung by the pothole lip. The Russians thought the depth to be over a hundred metres as they had lowered objects and thrown down stones to find out. The bottom of the ramp ended in an ice tongue, indeed the lower part of the ramp, where the angle levels a little was all wet ice. A couple of metres back at the base of the steep section, dangerously slippery, black, peaty mud covered the ice. From the ice tongue we peered into a chamber split into two halves. In one was an ice-covered pool, the other would provide a possible stance to observe the drop. It was apparent the investigation would take some time and it was already late afternoon.

On returning to the top of the ramp we suggested that the children should return with Elaine and Linda. This suggestion did not please the children so in compensation we organised ourselves to take each child in turn onto the top of the ramp so they could look down into the pothole. Our rope fully employed in their safety we led each child to gaze in wonderment at what was before them. By the time everyone had visited the edge the group was buzzing. The older boys would have stayed with us until the end, but in recognition of their status they accepted the task of ensuring their companions returned home safely. Manfully they minded the little band as it wound its reluctant way back off the mountain.

Now on our own Pete and I began the task of recording what we had found. Pete made a descent into the entrance chamber and noted that the drop went directly under one side of the ice tongue and then twisted out of sight. We drop stones and counted; we could hear them bounce for some time. We lowered the full length of our rope and attached the aerial cable. To this we attached a litre plastic bottle, which we also lowered, carefully noticing the tension on the rope and listening to the sound of the bottle hitting the sides of the shaft. It eventually dropped in silence as the rope ran out to its full length; it had descended over 30 metres.

It was getting late by the time we finished our survey of the upper parts of the hole. Full exploration and survey would have to wait for proper equipment and another year.

As we left the summit Dennis indicated for us to join him for a cup of chai. We would have loved to, but it was getting late and we had to get back. Jim and Malcolm were not very pleased as we eventually returned to camp in the dark; they had obviously got concerned. It was late when we broke camp and left for a new destination.

That night we stayed in the flat of a cousin of Valerie in Ak-Dovurak. The area was not very pleasant, Ak-Dovurak means "White dust". The main employment of the area was the Asbestos mines and quarries, but there was little work now as most of the production ceased production when the Russians left. The hillsides above the town were scarred with heaps of residue from the workings and we worried about the winds carrying asbestos dust over the town. There is a high incidence of industry related illnesses here yet the people seemed unaware of the cancer risk.

There were no light in the building so we found our way up several flights of stairs by the use of our head lamps. There was also no hot water in the town as the system had broken down. Like many former Soviet towns the flats were heated by piped hot water from a central power station and this had temporarily ceased functioning.

The Petroglyphs.

22nd August Wednesday.

Biche-ool Salchakovich Mainy, the curator of Kyzyl Mazhalik museum joined us to lead us to an interesting archaeological site in his area. He had only left hospital the day before after an operation, but he was so keen to meet us he had abandoned his convalescence for the day.

South of Kyzyl Mazhalik we visited an ancient solitary statue set out in the open. The statue appeared to be of an important military man and is worshipped by local people who think the statue is the image of Ghengis Khan. There were signs on the ground that indicated a tomb probably resided below. Another area revealed the site of a box shaped cyst around which were stationed three headless carved statues. We travelled a short distance further and after passing a few log cabins parked near some rock outcrops. Valarei took an axe from the minibus and cut and trimmed a branch from a willow tree. I asked him what the stick was for? "There are snakes where we are going," came the reply. Despite the threat of snakes a group of bare footed children followed us for a short walk to an allmost black rock face which at first sight seemed nothing of significance. Closer examination revealed Buddhist writings, a large fantastic pecked eagle, bulls, human horned masks, various other animals and a strange script that no one has yet identified.

In the afternoon we headed north to a hill, Aldii Dilaankara. On this hill there were numerous examples of petroglyphs from different eras all pecked or scratched on pieces of basalt. Over a hundred had been logged and we found many more scattered over a wide area. Much time was spent photographing and sketching. Scenes depicted men running with the hunt, men riding, there were numerous deer with stylish antlers, wolves and bears. On one hill a rock showed what was thought to be a mythical monster of Tyvan legend the Amirga-Moos, an animal that swallows the moon and dwells in heaven.

We left the hills and visited the museum where Birche-ool, the curator presented me with a book on kurgan and petroglyph sites. I passed the book onto Malcolm as it covered subjects within his discipline.

It was late afternoon when we left to drive back east and we hoped to have time to check out a large hole through a mountain. It is said a horseman could ride through the mountain and the passage could fit 25 horses.

There was not much daylight left as we approached the site of the *Hole through the Mountain* so we drove as close as we could to the upward path. Pete and I took different routes so as to scan as great an area as possible for other entrances. I traversed to the east to approach the cave directly from below. Pete traversed a rising escarpment to the west before making his way the cave. I pushed on at a pace feeling quite fit and reached the entrance first where I immediately began measuring. Much to my surprise Vadin had followed me up and was keen to help. It was evident the cave was a popular spot; it was not far from the summit, easily accessible and big enough to attract attention from passers by on the road below. Furthermore, the stories of how many horsemen could fit in were true. Pete arrived before I had finished so we completed a rough survey together as the sun was setting. No other caves were found and the area did not appear to be very promising.

We made a rapid descent passing a group of Tyvan tourists on the way. The exploration and survey had taken us 56 minutes and it was getting dark when we reached the vehicle. However before we could leave the tourists demanded a photo of us all together, so we obliged.

It was dark when we pitched camp near a river close to Chadan, at a site originally created for the Russian Pioneer Youth organisation and apparently used earlier in the year for a throat singing festival. We spent a pleasant evening sat around a campfire exchanging stories. We learned that *kodak* is Tyvan for penis, so we have to watch what we say when asking for a film. Todge means lake and the Tyvan for a yurt is ook, or hook without the h. The Tyvan language is a Turkic language and there is much debate as to how it occurs in Tyva as there is no similar language in the vicinity. Some academics consider the Turkic language to have originated in Tuva, others say it originated in Turkey, but how did it get from one place to the other?

23rd August Thursday.

We took the opportunity to have a good wash in the river before travelling on to visit the Neeren Museum and the ruins of an ancient Buddhist temple, which was destroyed in the purge of 1936. In the afternoon we visited a new temple, in fact a converted house, and entered to experience a service performed by the resident monk, a buddist of the yellow hat school. Our next stop was a poignant visit to the east end of the lake, a reservoir created by the damming of the Yenisey as it entered Krasnoyarskaya. The local people still mourn the loss of the valley, an act from which they gained no benefit but lost many ancient archaeological sites, the power produced from the dam benefits Krasnoyarsk.

At a small filling station we began to fill one of the tanks with petrol when a leak was discovered. Fortunately, as the vehicle had two tanks the petrol was decanted into a plastic container and the petrol poured into the second tank. On the way back we stopped at Mt. Halirakan, "Holy Mountain" a large block of limestone with no sign of karst development. It had, however, a small monument telling that it had been blessed by the Dali Lama XIV. A short distance further on at the end of the limestone block we had some refreshment at a pontoon café floated on an oxbow of the Yenisey River. Years ago the area was the scene of a Red Army battle, now it was a good place to enjoy some cool beer. It was late when we arrived back in Kyzyl.

24th August Friday.

After a late night, 1 am bed, I was up writing by 7.30. This was our last full day and we had many loose ends to tie up. At the request of Lin we were taken to see disabled children at the National Centre and we met the Minister for Social Services, the staff and the children. Lin discussed with the Minister and staff the various disabilities presented and talked about the methods of treatment used in England. Once again the TV crew arrived and we found ourselves interviewed yet again. The rest of the day was spent shopping and sorting out belongings and equipment ready for the flight home. Chechek produces an excellent banquet and many of those who helped us on our excursions turned up to say goodbye. With many speeches and toasts we pledged to do our best to return and finish the work we began.

25th August Saturday.

After an emotional final farewell we left for Krasnoyarsk, Moscow and home.



"PAZARYK" PETROGLYPHS FOUND ON
HILLSIDE NEAR KYZYL MAZHLYK IN
W. TUVA.



The 2002 Expedition, Day to Day.

Back to Tyva

6th August Tuesday.

Our drive from Abakan took us 600km over the Sayan Mountains, along the M54 main North/South highway. On the way we took several photo stops and at a road side shop had some refreshment. Outside a stall was selling produce from the Taiga. There were pine nuts, birch syrup, various tree barks for herbal medicine, honey and buckets of Chanterelles at 50 Roubles a bucket. Going over the pass we saw a memorial covered with wreaths where last year a helicopter crashed whilst carrying important politicians, killing all on board including the governor of Krasnoyarskaya. That was not very reassuring as we planned to fly by helicopter in a week's time. On the descent from the mountains we paused to photograph an impressive rugged ridge in the distance which, owing to its shape, was known as the Sleeping Beauty. There were many signs of the passage of extensive forest fires, which have seriously affected the livelihoods of the forest people who rely on forest produce to make a living.

On arrival in Kyzyl and a warm welcome from Chechek we found that the sleeping arrangements in the flat had been altered from last year. The Martins' would have the narrow room to themselves and the rest of us the large bedroom. After an excellent meal we discussed the arrangements for the forthcoming expedition. The first part, to the pothole we found last year, would be no problem, but there was much concern about the proposed helicopter trip into the Sengilen Mountains. The Kongars were worried about the forest fires affecting flights and in particular delaying our return. Should we get stranded, Bill who was returning home early, could miss his return flight; however our opinion was to take the risk.

Shagonar Pot.

7th August Wednesday.

We rose early as the plan was to leave by 1100 hours but events conspired to delay us and we eventually left at 1300. Valerie Popov joined us, it was great to see him again. Popov means *family of priests* and is one of the most common names in Russia. His father and grandfather were priests and they lived on the border with Ukraine. His father died in the second world war when Valerie was only three years old and he remembers hiding under the table as German aircraft attacked. Valerie Dyrty-oolovich is one driver, who drove for us last year, and Boris Hapylak, a new man to us, is the second. Aidyn Mongush, a law student, aged 24 and studying in Moscow, would act as interpreter. *Aidyn* means moonlight and *mong* means strong, whilst *gush* means power. *Mongush* is the most common name in Tyva and originates from the tribes of the Khemchik River region in Western Tyva. Chechek and her daughter Delana would cook and Nicolai would join us to make sure things ran smoothly.

Our two vehicles drove west along the same road as last year and stopped by the pontoon café we visited last year. It was no longer a café, now it was abandoned and partly sunk, a sad end to someone's private enterprise.

It was early evening when we arrived in the vicinity of the microwave station and we had difficulty finding the right track to the camp by the medicinal spring. On the way we stopped to seek out a rising spring that Popov knew about. We found the stream with water bubbling up through the streambed and discussed the possibility of it

originating from the limestone mountain Sarig Kholchuc. We concluded that the water was more likely a subsurface flow from local limestone outcrops. My party wanted to drive straight up the mountain track to the microwave station but I suggested that our vehicles, still loaded, would find it too difficult and that we had better set up camp and have a snack first.

The campsite was quite crowded. There were many more people around than last year however we managed to find a good space with a campfire already built. There were even some handy posts to hang a washing line on!

After pitching camp, Boris was nominated as the driver for the ascent of the mountain but after a brave attempt his minibus engine boiled over two thirds of the way up. We began to walk and met Sergei, one of the Russian engineers from the microwave station who was out hunting. He had shot a black squirrel. When we arrived at the station Sergei, who, it transpires, was an ex caver from Krasnoyarsk, had got there before us. On site, four engineers at the start of a two-week shift accompanied us to look at the hole. We later sat with them in their hut to chat, share a cup of chai and eat cinnamon buns.

Back at the camp various singers, who were all volunteers from Shagonar, had been organised to entertain at the camp and had attracted a gathering of local youngsters to listen and watch. The concert was followed by disco music broadcast from one of the cars and with this constant loud music I found sleeping very difficult.

8th August Thursday.

I awoke feeling unwell and off my food. I was soon making frequent trips to the toilet - the dreaded trots had struck! We got away by 1000 hours but again the vehicle did not make it up the hill with us all on board. Nicolai had taken the better vehicle so he could make arrangements for the helicopter flight, send emails for us and, more importantly, buy some more beer.

At the pothole, which the Russians have named Shagonar Pot after the nearest town, we fixed bolts in the rock and Pete and Bill began the descent. Whilst they were underground the Russians turned up with their rifles, saying there were two bears around the station last night. The hunters now claimed to be after deer, but it seemed they were prepared to shoot anything that moved in the taiga. Half an hour later Pete and Bill came out of the pothole, frozen stiff, and after some lunch Pete descended again, this time with Allan. By 1700 hours the pothole had been bottomed out at fifty four metres, Tyva's deepest pothole. The crampons we brought proved very useful, particularly in the ascent. A frozen waterfall with fluted columns finished at a frozen lake at the bottom. The possibility of forcing a way through the ice proved impractical as it was too thick. The true depth may never be known; the limestone is 300 to 400 metres thick. After a mug of chai with the Russians we returned to camp.

In the early evening Bill and Allan went for a walk over a nearby rock exposure and up several limestone valleys, finding no caves and very little evidence of surface solution. At the camp the evening's entertainment started again; jugglers, musicians and actors performed short plays: even acrobatic children did their bit balancing along a thin bar. A policeman turned up to make sure there were no problems.

As the evening settled down a group of students gathered around our fire and with the accompaniment of a guitar sang their favourite songs for us, even a Beatles number in which we were obliged to join in. We, too, did our bit and gave a fair rendition of Ilkley Moor amongst other songs. I recorded the whole proceedings for posterity.

9th August Friday.

Yet again the van overheated and we picked bilberries as we walked to the summit. There were hundreds of large, white moths, probably Gypsy Moths, around the station, attracted by the lighter colours of the station walls. They are a serious pest in the forest, for as they die they leave eggs behind which produce a grub that damages the trees. This time we had chai with the Russians before we went to the pothole.

Pete and Allan surveyed inside and began de-rigging as Bill and me measured the surface features and entered a passage in the cliff face above the pot. The passage, though man size at first, soon closed down. The job done we returned to camp. Bill and Allan took a walk around the area and found a small cave about four metres long, blocked by rubble. The cave contained animal bones and droppings, possibly fox. Nicolai returned with Valerie and told us he had managed to book the helicopter, although he was not happy as return flights could not be guaranteed owing to the Naadan* and the possibility that local dignitaries may be using the flights. We still said we were willing to take the risk.

Valerie was unhappy because someone had shot up his vehicle while he was driving. A passenger window was smashed and there were several bullet holes in the driver's door. Allan, who was once an army officer, said the shots looked like they had been fired from a .22 semi-automatic rifle. A good job it was nothing bigger, but disturbing nevertheless. Valerie did not report it to the police as he said that nothing would be done.

*annual national festival involving horse racing, wrestling and archery.

The mountains by the lake.

10th August Saturday.

The previous night was littered with disturbances. There was too much noise and I could not sleep. Our Tyvan colleagues started chopping wood at six thirty and revving up vehicles at seven. Bill was also suffering in his tent next door. I decided we would change campsites for the coming night so we would get some rest.

Today we looked for a hole which Allan and Bill thought they saw the previous night, on the north side of the hills to the east of Shagonar pothole. We drove as far up the hill as we could, taking forest tracks near our target where possible. Boris was willing to drive anywhere and I had difficulty keeping him confined to the area we wanted to explore. The taiga was so dense that Allan took GPS readings so that we could find our way back. We found a dry valley below the ridge in which the hole was seen and we split into two groups, keeping in voice communication as we skirted the area and advanced up the ridge. With this method we had a better chance of locating the hole quickly. On attaining the rock outcrop we found the hole to be merely a slipped slab of rock.

The far edge of the ridge is the contact zone between the pre-Cambrian limestone and the Devonian sandstones. Back in the vehicle we drove to the other side of the mountain, along deeply rutted tracks. We walked up the hill directly below Shagonar pot and looked at the tectonic fault zone; there was little evidence of solution and no caves. Popov tried to find the resurgence but everything had dried up due to the high temperatures and lack of rain fall. We stopped for lunch and ate lots of wild bilberries and saw a truck carrying bilberry collectors heading up the valley. It was very hot.



Above: Bill Thompson abseiling into Shagonar Pothole.



Right: Valerie pointing out bullet holes in his vehicle.



The Shagonar Pothole Team, from left to right: Allan Richardson, Aidyn Mongush, Valerie Popov, Bill Thompson, Delana Semenovna, Boris Hapylak, Linda Martin, Melvin Penn, Chechek Semenovna, Valerie Dyrty-oolovich, Peter Martin, Nicolai Kongar.

Allan Richardson
on the ice fall in
Shagonar Pothole.



Upper passage in cliff face.



Buddha by medicinal spring.



White moths. probably Gypsy Moths, dying at the relay station.



Above,
distant unexplored
limestone.



Our camp by the Yenisey.

Later, at camp, a police captain visited us to see if we were happy. He informed us he had sent officers each day to check on us because we were the first foreign visitors to the area. He told us crime was declining but, like most places, youths were a problem, particularly when there was drink about and he inquired if we had had any problems with drinkers.

According to the Captain, the police get the highest salary in Tuva. He told us he is paid \$150 per month and asked about policemen in England. We also learned that the police could earn more money if they work in the capital and that they could retire after just ten year's service. His sister married a Swiss and he wanted to know how much it would cost to go to Switzerland. As he was leaving he spoke to us in English, telling us his name was Sasha.

Our work finished in the area we collected wood for the evening's fire and headed off for a quieter spot further northwest, on the edge of the reservoir of the Yenisey. As we passed a small town I was surprised to see heaps of town rubbish dumped on the surrounding fields. We drove through fields of marijuana and saw a local wearing a mosquito head net, making us wonder if we would be eaten alive! Our campsite was very pleasant and we joined a local group of teenagers for a wash and a swim, the leader of which turned out to be a physical education teacher who was the worse for wear for drink. He was fascinated by Alan's hairy body and wanted to pluck a couple of hairs to show his wife. Tyvinians have very little body hair. When he saw the fair-haired Bill, he thought he must be from Finland and offered him one of his daughters to sleep with so that she would have a fine son. Bill, now more red than fair, declined the offer as far as I know.

The mosquitoes were not so much of a problem but the white moths were. As dusk fell they got everywhere and we had to closely examine our clothing and tents to make sure we cleared away the eggs. We ate traditional boiled mutton and washed it down with beer and vodka. A very good relaxed evening.

11th August Sunday.

The temperature was forty degrees in the shade, nearly ten more in the sun. We walked up the banks of the reservoir looking for Buddhist excavated cells and it seems they all were now under water. From a headland we had a good view across the water, though it was a little hazy. Popov told us that the distant peaks were limestone and that he had heard that there were many caves. Looking through binoculars we could see the limestone and Allan also thought he could see caves along the banks of the reservoir to the west. The area would be very difficult to explore owing to its ruggedness and remoteness, there being no roads and a lack of water during the summer. Any expedition would have to carry everything in, possibly on horseback. This region would need to wait for another year. The road of Genghis Khan used to run along the riverside from Kyzyl to Abakan and is now mostly under water.

On breaking camp we headed back towards Kyzyl, but the vehicles had constant problems which the drivers blamed on the heat. We got separated and had to return to find the other vehicle, which had broken down due to a problem with the half shaft. Repairs were done and later we again became separated as our own vehicle broke down from heating. Boris fiddled with the petrol pump and poured water on it to cool it and by this method got the vehicle started again, only for it to fail an hour further on. Again Boris worked his magic and we lurched along until the other vehicle came back for us. It seemed that the real problem was that his brave attempts at scalling mountains and crashing through the taiga had stretched the fuel pipe, thereby letting

in air and starving the engine of fuel.

We transferred our gear into the other vehicle and left Boris to sort it out on his own. We met the others at the old sunken pontoon café and all squeezed into the one vehicle. Somewhat further on, at one of the regular roadside checkpoints, the police stopped us. We were overcrowded, but Valerie explained our situation and we were allowed to continue. The gremlins, however, were still with us; we eventually ran out of fuel but managed to get enough from a passing motorist to get us to a petrol station in Kyzyl.

On our return to Kyzyl we learned that Nicolai had a new proposal for our onward transport. He took me to meet Feoder, the owner of a small fleet of lorries. Feoder was brought up in the Sengilen Mountains and knew the area well. With him were a tough looking bunch of Tyvinians who spoke in a strong guttural manner, similar to the Mongolian language. He suggested that he take us into the Sengilen in one of his lorries, an idea I was not keen upon until I saw the lorry he was talking about. In his yard was a massive, six-wheeled, mountain-climbing vehicle called an Ursula. The Ursula had a cabin on the back which could easily accommodate our party, despite there being no seats. The Tyvinians laughed when I asked if they could make the rear cabin more comfortable. "Do you want to go? Are you interested? Then you must bear the discomfort!" stated Feoder. Valerie promised that he would acquire sixteen mattresses to fit out the cabin for a more comfortable journey. I was assured this vehicle was used regularly to transport goods and people to and from Kungurtug, in the heart of the Sengilen Mountains. I was impressed and proposed that we show the others the vehicle; this could solve all our problems.

The others were brought to see the vehicle and agreed to the change of plan. Chechek shook her head and said we were mad. We knew this, but this was beginning to sound like a good adventure. Popov agreed and pointed out that if we had gone by helicopter we would still have had to find transport to get us out of Kungurtug and into the



RUBBINGS OF PECKED STONE IBEX or DEER PART OF STONE SLAB WITH SEVERAL ANIMALS (NOT APPARENTLY IN COMPOSITION) IN GARDEN OF KYZYL MUSEUM - PAZARYK CULTURE

limestone mountains. Although an aerial reconnaissance would have been useful we would now be able to see more of the area close up. Knowing how much we would have had to pay for the helicopter, Nicolai cannily said we would sort the finances out in the morning, I would therefore not be about when he negotiated the deal.

To the Sengilen.

12th August Tuesday.

Nicolai arrived later than promised and then almost immediately left, only to return later to take me to sort out the final details of the trip: the others went shopping. The lorry trip turned out to be expensive, but cheaper than the helicopter. I knew some money was being made out of us but the opportunities to make money here are rare, so I did not blame Nicolai.

At 1700 hours we finally left on what we were told would be a three hour drive to Naren, the last village before the Sengilen Mountains. Most of our gear had been taken in the Ursula which had left earlier. For comfort, on this part of the journey, we travelled in a minibus with the driver's wife whom he had brought along for the ride. The plan was for them to leave us at Naren where we would meet the Ursula and be picked up at Erzin, on the M54, when we returned from our trip.

Valerie Popov travelled with us, bringing his rifle – for what purpose I wasn't sure. Valerie Ondar came along to act as fixer and Nicolai's deputy. Elana Samba, who worked with us last year, was interpreter and cook.

It was a difficult journey in view of the heat and there was a lot of smoke and dust from the forest fires, which seemed to be burning in every direction. About three quarters of the way the minibus broke down and refused to start up again. The offending part was the rotor arm and this was fixed with the spring from a Biro and a bit of copper wire. Soon after passing Erzin we left the metalled road and headed along a very bumpy dirt road to Naren. We eventually met up with the Ursula east of Naren, the whole journey having taken over five hours. Our route then meandered upstream, traversing the water several times on the way. During this time darkness fell and finally Valerie stopped us by what he thought was a good campsite. The ground, however, was very rocky and unsuitable for our tents, so we pushed on looking for a better spot. By 2230 we decided to stop for the night, 1350 metres above sea level and only 60 km from Mongolia, still 30km away from our intended night stop. Our evening meal was an adequate snack of bread and cheese. Feoder had a bigger team with him than I expected: his crew consisted of driver, Mongush, and mechanic, Bhaylak. A young Tyvan named Chagan appeared to be a trainee.

13th August Tuesday.

Feoder and crew were up at 0615 and played head-banging pop music just to appeal to our best side so early in the morning. Valerie assured me that they were working on the lorry, to check it out before the start of such a long journey on a rough road. I think they were counting the bits to make sure they were all there! The make of road driving safer the leaf springs were slackened by the application of a five foot long spanner.

We were offered tinned stew with barley for breakfast, but preferred fruit, cheese, bread and jam. Bill and Allan said they would eat whatever the Tyvinians ate but when it came down to it they elected to have a more English breakfast.

Despite the work, we still got off to an early start and I soon realised why the Ursula

was needed. The track was rough and heavily rutted in places: four-wheel drive vehicles would find it difficult; with six we crashed on regardless through rivers, over rocks and still burning forest. The rear cabin was heaped with mattresses so we sat around the sides facing inwards. Our carry mats were used as back rests so we could spread out. It was quite comfortable and we could see the scenery through the windows. For those with a little extra stamina it was possible to brace one's legs against the huge spare fuel tank straddling the cabin, and thus stand up through an open roof light to see the scenery without obstruction. Only Peter could maintain this stance for any length of time. Another option was to sit with the driver in the three-seat front cab, from which one could get an interesting view of the obstacles ahead. Not for the faint-hearted, but everyone was to have a go.

As the valley narrowed we saw plenty of limestone and some caves. We stopped a short distance from one green, grassy hillside to watch and photograph a forty-strong flock of black vultures waddling up hill to get to a vantage point from which they could launch themselves. They do not have the energy or strength to take off like any normal self-respecting bird.

While stopped we noticed a very large cave entrance on a distant limestone peak, south of the valley and noted its position using a clinometre, compass and GPS. Our route now took us within 30km of Mongolia, the closest we would approach.

Further on up the valley, after a bit of a climb, an unexpected level grassy area appeared with tents and vehicles scattered around. It was the site of another medicinal spring or, more accurately, collection of springs. Acrid water bubbles up or runs out at many places, probably all from the same source. There was a Buddhist shrine and at each spring a small sign specified which part of the body the water would treat. Elena sampled the one for the left eye for a problem she had. There were springs for the right eye, the liver, the heart and so on. The springs were sulphurous and tasted and smelt horrible.

Continuing up the valley we came to an open cast gold mine which had been worked since 1902. The miners worked on alluvium deposits, which they washed out by means of a large chute. A digger at the valley floor dropped the deposit onto a belt, which moved it through the washer leaving the heavier gold behind. We were not allowed to leave the bus but took many photographs.

As we climbed up the valley it got narrower and the Ursula had to negotiate some very tight bends and uneven ground, sometimes tilting quite alarmingly. We reached the highest point of the pass and the view was stupendous. Limestone mountain plateaux stretched out in almost every direction as far as the eye could see. In the far distance we could see more white peaks, tantalising in their suggestion of discoveries to come. Close by on the ground chunks of white marble testified to the fact that great forces had been at work.

We drove along a short track to the nearest summit to take photographs: our altitude was over two thousand five hundred metres. Valerie Popov told us that there were dolines (a depression) on the plateau. They were filled with clay and our natural reaction would have been to dig them out, a suggestion made by Allan. However, this would not have gone down very well with the authorities as the dolines may have contained gold deposits. We then realised that *Dolina* in Russian meant valley and there were in fact no dolines as such in the area.

During the ensuing descent I got a turn in the front cabin and found myself occasionally holding my breath as Mongush steered the vehicle down the steep hillside. I could see

why Mongush needed an assistant; there were numerous switches, knobs and gear levers to deal with. Chagan held the levers in place as they tended to shake out of position. Driving this vehicle really was definitely a two-man operation.

As the descent began in earnest the rounded plateaux covered with juniper bushes and hardy grasses gradually gave way to white ridges and escarments. Loam ruts became soft clay and then boulders and pebbles. Frost shattered limestone cliffs gradually rose up on either side. Lower down, the valley bottom opened up into a broad exposure of bright alluvium deposits, the flood plain of a pure mountain stream. The glistening stream became bolder by the metre, rushing down between bleached rock channels and gathering momentum until it spread out into a crystal clear river, where it ambled on until the next cascade. The Ursula pressed on despite the state of the track, which had now all but disappeared. Ignoring the meanders and taking a more direct line down the mountain, it crashed through the water sending up plumes of spray. By mid afternoon emerald green spruce began to gain in numbers along the valley sides and we took a break for lunch. What a splendid outlook: the camera, with all its technical innovation, was challenged to capture the beauty we were privileged to witness.

The Ursula crew lit a fire and made lunch. It was a long affair by our standards and consisted of soup, potatoes and the traditional Tyvan tea, boiled with milk and salted. Allan was beginning to feel ill with an upset tummy – nothing to do with the lunch? Popov kept finding rocks, quartz, graphite and coloured fluorite. Pete and Bill spotted caves high up the valley sides although I did not see any associated karst development.

The journey eventually resumed we came across the local filling station, once a thriving little community in Soviet times when trucks regularly took the route. Now all that is left are two half buried fuel tanks. A passing truck had broken down and was parked next to the tanks. Our crew spent some time trying to help. Although we had to move on, Feoder found time to give the stranded men some bread and tea.

It was early evening by the time we found a suitable campsite, just a metre or so above the river on a narrow strip of grass between the forest and the pebbles. Our meal was a barley type porridge made acceptable only by the addition of sugar. Allan, still feeling unwell, crashed out for an early night.

As our journey progressed more and more cave entrances were spotted high on the mountainsides. Now we began to take a closer look at our surroundings. A short distance down valley from our camp, on the southern bank, a dramatic mountain of thirty-three spires rise directly from the river's edge. This mountain, we were informed, is sacred and must not be touched; not a stone or leaf must be disturbed. It is the number of spires or peaks that is significant to the faith of these people. The mountain certainly had a character much different from the surrounding mountains. We respected our guide's wishes and left the sacred mountain alone.

Within the low cliff faces, created by the down-cutting stream, many immature caves were to be seen, so we decided that, in the limited time of the evening, we should record them. Meanwhile, our Tyvan friends began to fish using snatch rods. We could not see any sign of fish and thought their chances of success slim. By the time we returned to camp in the dimming light we were proved wrong. Enough fish - trout like with coarse skins and golden tails - had been caught to make a good supper. We should have known; the river is named B'Loo, which means river of many fish.

Mount Marchurdi.

14th August Wednesday.

It was Lin's birthday and a very cold morning greeted her as she emerged from her tent. Allan was feeling much better, but even so did not eat breakfast. We had travelled for over twelve hours the day before and were beginning to feel we would be spending most of the time in the Ursula, so we would not have time to explore any area in any detail. The original plan had been to traverse three valleys in a large circle and after considering our progress so far and the distances involved we felt a different approach was needed. After a short conference a new plan was devised. We now intended to travel just a short distance down the valley we were in, as far as the next side valley, to see if there were any reasonably accessible caves. If nothing promising was apparent we would reassess the situation and select one of the mountains to give our attention to for the rest of the day.

We set off, only to discover that Lin had left her boots behind so we had to go back for them. The Tyvinians said this was an omen and signified that Lin would one day return to these mountains. At the foot of the sacred mountain we came across an oovoo tree, a shrine at which the Tyvinians paused to offer a short prayer.

On reaching the side valley we found it to be raised above the main valley floor. It hid a remote homestead, including a flat-roofed log cabin which had numbered timbers for ease of assembly. (The original cabin kit?) Outside the cabin stood a 4x4 vehicle, a small generator and a solar panel, which was charging the battery of a ghetto blaster. Grazing sheep were of mixed breed, some native stock with black patches and others with fat tails, brought in from Russia to improve the flock. Tame and friendly Husky-like dogs roamed freely around. A horse, with a traditional wooden Tyvan saddle, wore a bridle decorated in Russian ten and twenty rouble coins dated 1922. The animal also wore a tuft of cloth tied to its mane to show it had been blessed. Lin got a chance to have a ride on the horse, led by a boy from the homestead. Elena then demonstrated her riding skills to an appreciative audience.

A man approached us from another cabin and asked if we had a doctor with us. He told us there was a teenager inside suffering from stomach problems and his 72 years old father was caring for him. The teenager turned out to be thirty, deaf and possibly suffering from some kind of liver complaint. All we could offer was our best wishes for his recovery, our sadness at his condition and the advice that drinking boiled water may help.

We could see a cave entrance not far behind the homestead, but were informed that it was not very deep. We learnt from a passing hunter that there were many caves up the valley and that some could be ridden into on a horse. He had retrieved an Ibex he had shot and wounded from one cave but gave us the impression that most of the caves he had seen were not deep.

We headed back up the main valley to where we had seen some caves of interest and there we had lunch. Once again one or two of the crew prayed at the little shrine, perhaps for the poorly Tyvan.

In the event we chose Mount Marchudi for our exploration and at 1400 hours the climb began, initially with the help of the Ursula. A flock of black vultures was using a gradually steepening grassy slope for a launch pad, Mongush chose the same place to attack the mountain. Incredibly, he gained several hundred metres before the now near-vertical machine gave him cause to give up the climb. After that, it was a hard



Sengilen team left to right. Valerei Popov, Allan Richardson, Valerie Dyrty-oolovich, Bill Thompson, Elena Samba, Bhaylak, Chagan, Lin Martin, Feoder, Mongush, Melvin Penn, Peter Martin.



Mongush.

Feoder.





Oovoo at a sulphurous spring.

Opencast gold mine.



Black vultures climbing hill.



The Ursula.



Sengilen
mountains
limestone
panarama.



B'Loo River
valley.





A B'Loo River
valley cave.



Tyvinian homestead.

Caves on Mt Marchurdi.



slog on foot; there were no paths and it was too steep and the weather too hot for a direct ascent, only a zig-zagging route reduced the strain. Chagan also came along and proved to be something of a mountain goat despite being a smoker and even though he carried some of the equipment. He asked us to give him a nickname as he had noticed that Peter was referred to as Pete, Linda as Lin and William as Bill so Lin decided to call him Chag. Chagan was very pleased with this, feeling that he was now more accepted by our group, so from then on he was known as Chag. The climb was exhausting and to alleviate the heat we carried a good quantity of water.

Using ridges and rocky outcrops, we wound our way up toward the caves, the first few of which were found to be small resurgent caves at the base of some of the lower escarpments. Above 1900m bigger caves were found and at 2300m, and only 100m below the summit, we found caves in abundance. The biggest one had a large chamber with several side passages, the most impressive of which had an ice floor and thick flowstone down one side. In avens above the chamber broken stalactite curtains were much in evidence and there were active speleothems. Some high complex avens were climbable and above the chamber a related system was a veritable honeycomb and very difficult for Allan and Bill to survey. One cave we named Birthday Cave to celebrate Lin's birthday. There were too many to survey so we had to be content with noting the position of the caves and photographing them.

The longest cave we found went in over 10m and a number of others seemed to pass through the mountain in a fairly shallow band of limestone. Nesting birds, bats and possibly deer and Ibex used the bigger chambers. The caves we were exploring were high up, generally at a level above 1900m. As well as caves on this mountain we could see caves on other mountains: some of the cave entrances were large and looked promising although certain ones would involve a rock climb or abseil to gain access.

Chag was in his element: nimble footed he charged about the mountain, finding holes and drawing our attention to them. He loved wearing a helmet and lamp and was thrilled when we called him Tyva's first caver.

As the afternoon's activity progressed we noted that the wind had changed and smoke clouds were passing below us. We began our descent using a different route, working our way down to the saddle between two peaks and then heading into a valley. Crossing the tree line, Popov found an active spring. By the time we dropped into the main valley the air was so thick with smoke that it gave the impression that dusk had arrived early. High up on one of the western mountain ridges we saw what at first looked like the sun setting, but it was only eight o'clock. It was soon evident it was flames we were seeing. I remembered the words of the wife of the minibus driver who drove us to Erzin, "When I see the fires it makes me want to cry." Billowing plumes of smoke rose up and blackened the sky giving a menacing aspect to the evening.

We arrived back at camp to find Feoder and the Ursula missing. The men had gone up river to fish. Elena and Valerie had stayed behind and they prepared some fresh, fried fish, tomatoes, garlic salad and bread. It was excellent. After a while the others returned with more fish: the river was living up to its name. We celebrated Lin's birthday in style, and despite the fact that we had already eaten our friends prepared a banquet of boiled rice topped with chopped tomato and garlic and, of course, lots of fried fish. Feoder said we must eat a whole fish each. Having made a makeshift table and improvised a tablecloth, Peter and Lin produced two bottles of wine and Feoder a litre bottle of Vodka. Lin was honoured with a toast. Then began a round of toasting with each person taking their turn to make a speech to thank each other and

praise each others' contribution to the success of the expedition and a safe journey back. Feoder only allowed Bhaylak and Chagan one drink each. The evening passed in excellent good humour and we went happily to bed. As usual Popov slept under the stars with only his ex-army mattress and sleeping bag and the Ursula crew slept in the Ursula. Throughout the night Feoder's men took turns to patrol the camp; the forest was still burning and the wind blowing towards us.

Through the fires.

15th August Thursday.

The Tyvinians were up early, despite Mongush having a headache, to check out the engine for the return journey. After making absolutely sure our fire was out by flooding it with water we got away by 1100 hours, a little later than intended. We called in at the empty fuel depot and as the driver with his broken down truck was still there Feoder left some more food. Without stopping to look at caves, we headed up the valley until the engine conveniently overheated next to a good place for fishing. Although we did not stop for long there was time enough to catch the fish, gut them and boil them whole, head and tail. With the addition of potatoes, onions and garlic we ended up with a nourishing, bony soup. Before eating, Feoder sprinkled some food on the fire and bowed to the flames, another Tyvan tradition.

As we progressed up the valley it became darker and clouds of smoke drifted overhead. On gaining the top of the pass Mongush stopped to gather a sack full of juniper. His brother, a monk, had walked all the way to Tibet and had sent a message back requesting the Juniper. We were told that juniper is the third most important Tyvan herb. It is good for people who have bad dreams, for ill children and to place in a strange house. It is also a good luck plant and can be used fresh, dried or placed on burning coals. Bhaylak said it must not be put in boots or the wearer would be punished, it must be put in the back pocket. Traditional Tyvan boots have a raised toe so as not to disturb the ground. Curiously, Bhaylak insisted on having his photograph taken with Pete and took his shirt off and posed with a bouquet of juniper. I fear Pete may not have grasped the significance of this.

Before leaving the oovoo Feoder blessed it with fruit juice. I noted that among the several gifts that lay about the oovoo there were some live rounds of ammunition and several empty glass bottles. Could it be that bottles left as gifts and the general manner of discarding empty bottles contributes to the potential for forest fires?

Back down the Naren valley Popov stopped the Ursula and went to chat with the miners. After a short while he returned with a bag of alluvium deposits. He then went back to the manager to show him his identity card, which established him as an academic. Down past the mine we were shocked at the devastation of the forest. Only random isolated pockets of green remained. For miles around it was a blacked landscape, the ground still smouldering. The once lushly adorned trees were stripped and broken and within a stones' throw of the track flames still danced from tree to tree. Tyva was suffering the most serious fires in decades. Despite the drivers offering to drive non-stop to Kyzyl, approximately a five hour journey, we voted to spend our last night in the Sengilen camped by a forest stream, next to some of the remaining green trees. Whilst the other expedition members attempted to teach our Tyvan friends some English, I discussed with Popov how I might obtain some data on precipitation etc., and how I might obtain some geological maps. Popov was not optimistic; he had only



Sacred Mountain.



Chag in
Ridge Cave 3.





Smoke and distant flames.



Lin's birthday celebrations.





Fires in
the
Sengilen
Mountains.





Above: Feeder fishing.



Left: Valerie gutting fish.

Below: Old fuel dump.



photocopies of suitable maps with him. He told me it did not snow in these valleys and that it should have rained in May and June, but did not. The evening, our last together as a team, passed pleasantly and through the night the Tyvinians again took turns to patrol.

16th August Friday.

Once again our intended early start suffered from delays. Underway at last we were soon passing through more burnt and burning forest. In places the track was blocked by fallen trees and fine ash blew around in the air, yet there were still a surprising number of birds about given the fire damage. We had not been travelling long when we met another truck going the other way. The drivers stopped for a chat and we learned that the other truck was filled with men going on a twenty-day hunting trip in the Kungurtug area. The leader of the men was a large Russian man with a fine bass voice which he was pleased to demonstrate. He claimed to be related by marriage to someone at the British Embassy. We all gathered in a circle to chat and out came bread, tomatoes and cucumber, all to be washed down with the proverbial Vodka. One man poured each of us a large shot which we had to down in one before the next person could drink.

Parting company with the hunters we continued towards Naren until we spotted some yurts. This was Bill's last full day in Tyva and we realised he had never been in a yurt, an omission we immediately remedied. We followed strict Tyvan etiquette on entering the yurt and shared tea with the incumbent family in the prescribed fashion: holding the bowl with the right hand and touching the elbow with the left - starting with the oldest male, naturally. Despite the poverty of the family we saw a seven-year-old girl, who was about to start school this year, wearing new Harry Potter shorts. The families spoke Mongolian, as do many in this region, so Feoder translated into Tyvan and Elena further translated into English. We were told that the Mongolians steal the Tyvan cattle so the Tyvinians do the same in Mongolia.

Back on the track and we made good progress with the Ursula travelling as fast 90kph along the hardened, corrugated section past Naren. Nevertheless we arrived in Erzin forty minutes late and could not find the minibus that should have been meeting us. We had hoped to buy some local goods in Erzin but could only find a tiny kiosk open, so we made do with buying mineral water. We discovered the minibus driver at the local hotel and were soon on our way again, only to stop shortly, this time for lunch at a roadside café. This was situated at the site of the last battle between the Red and the White armies, which took place in 1923.

We made one more stop before Kyzyl, to visit the salt lake there and have a swim. A holiday and medical centre, all now in decline, had been constructed on the shore of the lake: there was an odd, decaying smell in the air. It was fun to float effortlessly in the water but the bottom of the shallow lake was a grey mud, which released hydrogen sulphide when disturbed. Shoals of small shrimp like creatures sought out any open cuts. Maybe this was part of the treatment? Although told the bathing was supposed to be good for us, we did not feel much benefit. There were no showers to rinse the salt off and we were told to let the air dry us. We return to Kyzyl baked in salt.

17th August Saturday.

Bill was leaving and had to catch an early flight so we rose at five a.m. to see him off.

The Naadan was under way and Elena would be our escort to the wrestling competition. On the way, we were pleased to meet Feoder and the crew dressed in their best clothes. Chag joined us for the day, wearing the same design of shirt that we wore on the expedition. We had bought these cheap bush shirts on the market, as a bit of a joke uniform; now Chag was truly a member of the club. His English had come on by leaps and bounds, from knowing nothing only a week ago to being able to greet us in English, replying to our comments with a most refined, "you are welcome." He is very proud to show us off to his friends. We did not intend staying until the end of the wrestling but, somehow, the time passed and we saw the prize of a new car being presented to the winner, by no less than the President. The President announced that next year a new car would also be the prize for the winner of the Marathon. Chag won a carpet when he entered the competition last year.

The evening was spent at the flat of Valerie Ondar, where he introduced us to modern Tyvan music. The evening got progressively close, stuffy and humid then, to great excitement, thunder was heard. Soon, to the accompaniment of thunder and lightning, it rained. Elena could hardly contain herself; she said it was like the relief of a long siege.

18th August Sunday.

In the morning and we received a message from Nicolai that Bill was stuck in a Krasnoyarsk hotel, due to flooding. A huge storm had passed through mid-Siberia wreaking havoc.

We become tourists for the day and visited shops to look for souvenirs. We were particularly looking for examples of local crafts; there were some wonderful, carved soapstone pieces available. Elena, being a Pentecostal Christian, had gone to church and Chechek was also to have gone, even though she was Buddhist and her husband Muslim. Allan and me managed to go to the fringe of Kyzyl to photograph some petroglyphs. In the evening we visited a local artist, Vera Sagaan, whom we had visited last year. I got a little annoyed as Nicolai attempted play matchmaker between Vera and myself.

Back to Red Cave

19th August Monday.

Linda was unwell; she was suffering from the usual expedition stomach bug. Last year we had only time to visit the Red Cave area for one day and this year we planned to camp overnight, allowing a full two days to explore. There are over 60 square kilometres of cave-bearing limestone to look at in the area. We left at 0930 with Volodya driving and took the main road east, passing the city's untidy looking power station which bathes the city in black smoke when the cold, winter winds blow in from the east. We took a different route to that of last year and headed for yet another Arzhan and found the usual company of spring worshippers encamped to take the water. Many children gathered to watch us as we arrived and, after unloading, the minibus was driven back to Kyzyl to fetch Vera, whom Nicolai had asked to act as cook instead of Chechek.

Popov told us of a pothole he had found on one of the ridges so Pete, Allan, and me followed Popov up the mountain. Brave Lin had to turn back as she was still suffering the effects of the bug. It was extremely hot and the landscape appeared much more arid and barren than it did last year. After a hard climb we found the pothole, a small hole rapidly enlarging as it descended 14 metres into the remains of a large diameter,



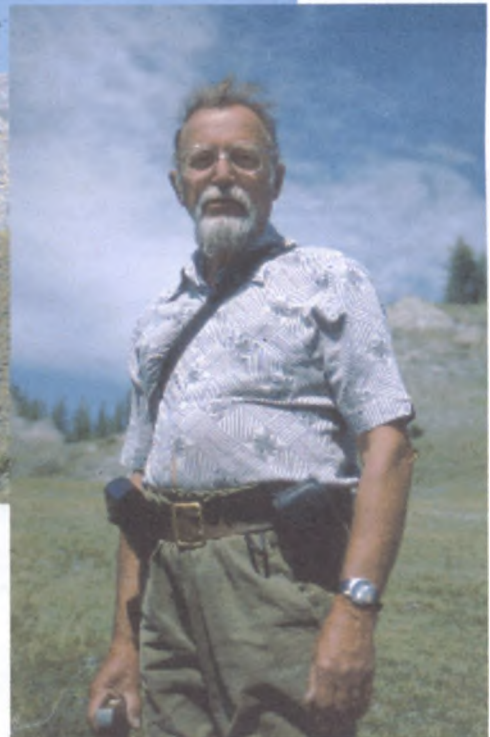
Red Cave area.

Arch of cave remnant.



Unexplored caves in distant cliff.

Valerie Popov.





View towards
Kyzyl.

Right: Peter Martin descending
cliff.



Left: Valerie Popov in Red Cave.



Left: Ascending
a ridge,
Red Cave area

short passage, open at both ends to form a big arch. We noted the details of the cave and continued climbing until we gained the summit ridge and, for the first time, were able to view the northern slopes. This side descends more gently and most of it is covered in Taiga. I was a little disappointed because I was hoping to look for the presence of dolines and shake holes. It would need aerial surveillance to identify the features we were interested in. Back in 1993, I was led to believe that there were entrances and possibly potholes in a valley on the other side of these mountains. There were numerous large caves in the southern escarpment faces and many would need roped climbs to enter.

After taking a lunch break in the shade of a few trees, we continued our exploration and crossed the head of the valley that runs down below Red Cave. Popov wanted us to enter some holes at the valley head; they required an abseil to drop down into them so I "volunteered" Peter for the job. The rock was crumbly and he had to clean up as he descended. The caves turned out to be very short. Going further down valley we passed another two holes and established that at least one could be accessed without a climb. This one would wait until tomorrow.

Back at camp, the atmosphere was not good. The women were unhappy and one of the men was the worse for drink. Popov had produced some valuable meteorological information dating to the 1950's and Elena worked hard throughout the day, translating it. Nicolai, Pete, Lin and me all crashed out early, leaving Allan to chat with the rest and eat sausage and chocolate together.

20th August Tuesday.

Up at eight o'clock, we had breakfast and struck camp. Nicolai, Volodya and Vera were to take the gear back to Kyzyl and Nicolai and Volodya would meet us later in the day at the old, now abandoned, smallholding that we had started our climb from last year. The day was thankfully cooler than yesterday and the sky overcast. I found the climb harder now, as my arthritic bones were not cooperating with my mission to get to Red Cave. The others got well ahead of me and Elena, too, was suffering from the exertion and drank at least a half litre of Alan's water. She used to be a goatherd as a child, but these days admits to getting little exercise. Once at Red Cave, Pete and Allan went off to look at the caves we passed yesterday. They entered one, which went to a depth of 10 metres and had a hibernation pit at the back. Another, in a face of crumbly rock, was 10 metres above a steeply inclined ramp that ran up from a precipitous valley edge. I was not up to the climb so we left that cave for future exploration. We all entered Red Cave and Allan thought the main way on needed digging. Down the valley we passed an obvious large entrance which may also benefit from a dig. Mentioning digs, Popov was disappointed we did not have time to dig a cave I entered last year, near the base of the valley where it dips into the hillside and where I had started an investigative dig.

We had agreed to meet at about three in the afternoon but only Volodya was waiting when we arrived at the meeting place. The minibus was further down the valley because much of the track had been washed away. Sure enough, further down we found large sections of valley floor had disappeared. The main flood occurred below the valley's resurgence, although it is doubtful the resurgence could have provided all the water. There must have been considerable hillside run-off converging on the valley.

On returning to Kyzyl we learned that Bill had got home safely. This evening was our last in Tyva so naturally we had to have a farewell party. A goodly number of our

friends gathered to enjoy a meal and offer toasts in whisky and beer. We exchanged presents: Rollanda gave us a book each and Popov a copy of a video he made on the expedition together with, at last, proper geological maps (although to the Russian conventions). I gave Popov my caving helmet, lamp and over suit together with my sleeping bag, and Allan gave his for passing on to Bhaylak. Chag had already been given a helmet and lamp by Peter and Linda. We also left rope so Tyva now had its first caving group with some basic equipment.



CRUSHED SKULL OF DEER
(KILLED BY WOLVES, ACCORDING TO CHAISU)
FOUND ON N. FRINGES OF GOBI DESERT NEAR ERZIN



Melvin Penn emerging from
Borodinskaya Cave.



"Groznyi," Siberia's tallest stalagmite.

Peter Martin in Borodinskaya Cave.





Landscape above Borodinskaya Cave.



Borodinskaya Cave entrance passage.

Abakan.

21st August Wednesday.

Breakfast was bread, jam and honey followed by freshly cooked dumplings with sour cream. Nicolai had organised things well and had arranged for a minibus from Abakan, the capital of Khakassia, where we would stay for the next two nights, to come and collect us. With the driver was Sergei Metchtanov, a former teacher who would act as our guide for the next two days and organise our stay in Khakassia. After exchanging goodbyes we headed north into the Sayan and, by taking a short detour, revisited the Arzhan archaeological dig that we had seen last year. Much of the site had now been excavated and the open pits filled. However, Allan did find a small stone slab with patterned markings similar to the stones from the Scythian period. Moving on we passed more forest fires and some poverty stricken forest people struggling to sell forest produce.

Sergei spoke excellent English and was well informed and he had made some good connections for us. He was anxious to create a good impression and encourage more people to visit Khakassia. Khakassia is a country the size of Belgium with a population of 580,000, of whom 10% are of ethnic origin, the majority of the rest being Russian. This is the country from where Russia gets most of its marble. Indeed, Khakassians brag of producing 20 different colours of marble. Khakassia has a claim to fame in that Lenin was exiled to the country before the revolution. On our own that evening, we struggled to find a restaurant but eventually found a very good class establishment in which no one spoke a word of English. Fortunately, the staff had a great sense of humour and our efforts to communicate were rewarded with an excellent meal.

22nd August Thursday.

There was very heavy rain in the night and many of the streets were flooded as there were no street drains. Sergei arrived with Eugene, who was once a caver and is now a member of the local rescue service. This service has twelve full-time members and six part timers. There is no caving club in Khakassia at the moment; the last club closed due to lack of interest but some of the rescuers were members of the caving club when it was active. Eugene was one such member. Most of the 150 recorded caves in Khakassia are horizontal in nature and the longest has 18km of passage.

On our way to the caving area southeast of Abakan we stopped at an open archaeological dig at a Kurgan. Students from St. Petersburg University had used this as a practice dig; there were pieces of pottery and bones left lying out in the open.

On entering the caving area of some eighty square kilometres, and passing through the village of Tolcheya, we were surprised to see pleasant, rolling green hills of pasture and woodland, with the occasional rocky outcrop. We left the vehicle at a place where the track became impassable for vehicles and continued on foot until we reached a dry valley, then climbed a path until the obvious entrance of Borodinskaya Cave came into view. It was clear from the remains of a concrete barricade, metal steps and Russian signs that the cave was once developed as a show cave. Allan was surprised to find that on checking of the GPS readings the entrance was only 618 metres above sea level, this seemed low for Central Asia, but a look at the maps confirmed the height.

Inside the cave, Eugene guided us along a huge passageway up to 30 metres high. There was a distinct smell of paraffin and the walls were blackened with the soot of previous visitors' pitch torches. A large stalagmite, over 6 metres high, stood near the entrance and further in there was a fine, wedding cake shaped boss. We clambered

over boulders, passing two chambers, until a large chamber about 15 metres across was reached. We learned that this was a caver's camp area and there was evidence of a old fire. The way forward was a slippery three metre climb but as Allan and I did not have caving helmets, having given them away in Tyva, we stayed behind and allowed Eugene and Pete to continue with the exploration. The way on took them through a narrow, awkward, twisting passage which descended and, by a roundabout route, came back into another section of the large chamber, where we were reunited. On the way out I took photographs but I was not optimistic about my success: my flashes were inadequate for such a large passage and the blackened walls absorbed a lot of the light. Near the entrance we met two female Russian reporters dressed as though going for a stroll in the town. A Russian was guiding them with a homemade floodlight powered by a car battery carried in a shoulder bag.

Back at the vehicle Eugene produced an excellent snack of tomatoes, potatoes, boiled eggs, pork fat, cheese, bread and a large flask of refreshing tea with basil. Whilst enjoying this picnic in the sunshine another small group of people appeared and, during a conversation, produced some iron slag, which they claimed to have found in a small cave in the area. The slag was rich in iron so was probably quite old.

On the way back to Abakan Eugene negotiated an exchange with Peter and swapped his lock-knife for Pete's expensive Petzl headlamp. Eugene was over the moon with the deal and also with the roubles we paid him for the trip.

Back in Abakan we were taken to the national museum and had a guided tour around the exhibits. The museum had a fine collection of standing stones. One, a canoe shaped stone, stood 4 metres high. This large stone was where the dead were taken before burial to ensure their spirits would float away. Another stone was in the shape of an old woman and had the legend that it was originally a woman who bore 99 children. Childless women and those about to get married still visit the stone to put fat on its lips, lay food at its feet and pray for children. Many of the stones were carved with men's faces and woman's bodies and bear various significant symbols of fertility and the sun. The museum was kept open late so that we could complete our tour and buy souvenirs.

On the way back to our hotel Sergei pointed out a Georgian restaurant which he recommended, so in the evening this was our objective for a meal. We were fortunate to discover that the son of the restaurant's owner spoke excellent English, which he had not had the opportunity to practice for some time, so he spent the evening with us and ensured we got the best food and drink.

23rd August Friday

It was pouring down with rain when we rose at six thirty to pack our bags for leaving. Sergei had everything organised and assured us we would arrive at the airport in good time. We waited in the departure lounge, which had no facilities at all, and had to pay 463 roubles for our excess luggage. On the aircraft, Allan and I made sure we had good seats by the mid bulkhead with plenty of leg room. The cabin crew were not very fussy where the passengers sat. We enjoyed a good in-flight meal and touched down in Moscow an amazing forty five minutes later... such was the effect of flying through four time zones! In Moscow we become tourists again and enjoyed two days seeing the sights before returning to England.

Administration and logistics.

Visas were required to enter the Russian Federation. However, before visas could be obtained an invitation had to be sought. These could be obtained from a number of sources, such as the London agency Intourist. After a certain amount of homework, I found it best to obtain them through the travel agent in Russia. Visa application forms were downloaded from the Russian Embassy web page - they could be ordered by phone but we were aware that any calls made to the Russian Embassy were charged at a premium rate. The Application, which had to be made in good time, had also to include passports. It would have been possible to get a visa very quickly by paying additional charges.

After several abortive trips to London, involving queuing from 5.30a.m., to process the visa applications myself and still not getting into the Embassy, I resorted to using one of the consular agencies. The cost for a visa was £30 and a similar fee for the agency. We also had to pay for the invitation which was, again, about the same charge. The invitation itself and the passport with its visa had to be presented to the authorities in Tyva.

2001 Expedition air travel.

We flew with KLM from Manchester to Moscow via Schipol and were met at Moscow airport by a representative of Paradise Travel Agency, Krasnoyarsk, who organised the Russian end of our travel arrangements. The representative gave us our onward flight tickets and found transport to take us from Sheremetrevo 2 airport to Sheremetrevo 1, where we had a long wait for the onward flight to Krasnoyarsk. This was on a Krasair flight, a large, wide-bodied, aircraft which was very comfortable and had an excellent in-flight service. We were met in Krasnoyarsk by a member of Paradise Travel staff who assisted us in making a very quick transfer; we had only 25 minutes to transfer to the plane to Kyzyl. This later aircraft, a Yak-40 jet, was small, about 30 seats and was not for the nervous flier. The flight from Moscow took 4 hours 30 minutes, and the flight to Kyzyl, by Tyvan Airlines, 1 hour 20 minutes. We broke the return with two nights in Moscow and went sight seeing. There were four time zones to cross, so by the clock we landed in Moscow only 50 minutes after taking off!

2002 Expedition air travel.

We flew from Heathrow to Moscow with Swiss Air, via Geneva. This flight had the advantage of arriving at the same airport, Domodedovo, on the outskirts of Moscow, from which our onward flight had departed. We were met and given the onward tickets by a representative of Paradise Travel. After a long wait, we boarded an old Abakan aircraft, with hard seats, belonging to Khakassia Airlines. This flight took four and a half hours. At Abakan we were met by Rollanda and Nicolai, with transport for the 600km drive to Kyzyl.

On the return, Bill had to leave a week earlier than the rest of us so he flew from Kyzyl to Krasnoyarsk on a delayed flight. Floods and severe turbulence made it impossible to land at Krasnoyarsk airport, so the flight was diverted to Abakan where he waited four hours before being flown back to Krasnoyarsk. Paradise Travel coped commendably with the situation and took Bill by car to a hotel for the night and reorganised the flight arrangements. Next day he flew to Sheremetrevo 1 airport in Moscow and from there he was taxied to Domodedovo - where he had to stay yet another night, by now having missed his connecting flight. By the time he arrived home the journey had taken him three days. Our own return was much more relaxed. Allan and me were able to get

two roomy seats by the mid bulkhead; the cabin crew were not fussy where people sat. After flying from Abakan, a flight of nearly five hours, we spent three nights in Moscow before returning home via Zurich without our luggage. Fortunately, this was delivered safely to our homes within three days of our return. There were other occasional flights direct from Moscow to Kyzyl, but these could not be relied upon. I understand a regular service was due to start and this would make access to Tyva much easier and probably cheaper.

Paradise Travel was very efficient and helpful and organised the invitations both years. They also saw to it that we were met at every airport and transported between airports and hotels. International flights were booked through Dial-A-Flight.

Insurance was taken out on the British Cave Research Association scheme through Jardine Lloyd Thompson Leisure.

Internal travel.

Our hosts organised the transport and were able to provide, for the first part of the 2001 expedition, a comfortable bus able to cope with the lack of good roads. Minibuses were our main form of travel with the drivers playing the dual role of driver, cook or camp-hand. The Russian built minibuses generally carry up to nine persons: however, with equipment five passengers was the comfortable maximum. These vehicles can travel over rough country and had two fuel tanks for long distances. Fuel stations were few and far between. Our original plan for the 2002 expedition was to use a helicopter to get to Kungurtug. There is a regular service but it is prone to delays and cancellations, owing mainly to the poor weather. We were fortunate in acquiring the use of an Ursula, a heavy, Russian, six wheeled, rough-terrain vehicle. This was a brilliant expedition vehicle, especially when it carried an additional high capacity fuel tank. Our vehicle easily carried our party of twelve with equipment. Fourteen or fifteen people could have been accommodated.

Security

There was high unemployment and drinking was a problem. We were warned not to walk out in the city late at night. We did see a number of drunken people but they were soon picked up by the police. Pickpockets were a problem, and one had to be constantly on guard. Only the sharp eyes of my friends prevented me from becoming a victim when visiting one of the street kiosks. We frequently saw police, some of them armed. They were aware of our presence and regularly visited one of our camps to ensure we were not being pestered by any 'undesirables'. Whilst driving, one of our drivers was shot at with a semi-automatic rifle; fortunately he was not hit but his vehicle was damaged. He did not tell the police because he thought they would not do anything about it. Generally we found most people very considerate, friendly and happy to assist us and we were assured levels of crime and disorder are on the decline.

Health.

The recommended vaccinations are for diphtheria, polio, rabies, tetanus, typhoid and hepatitis A. We also had a series of injections for protection against tick-borne encephalitis, although the danger period for tick bites is May to July. The tick is found in birch forests of Siberia. Certificates of vaccinations should be carried with the passport. Medical assistance is free in the Russian Federation.

It should be realised that the provision of medical services in a country such as Tyva was limited. There was a large hospital in Kyzyl and smaller hospitals (which we

would describe as cottage hospitals) out in the provinces. To summon assistance one would first need to find a building with a phone. Out in the field you may be a couple of days away from a phone and mobile phones would be of no use whatsoever. We carried good, comprehensive, first-aid kits and expedition members had first aid training. (Basic first aid training is not adequate and training suitable for expeditions is recommended.) Included in our first aid kits were transfusion equipment, syringes and needles, temporary dental repair kit and antibiotics.

For those who are into herbal medicine and homeopathy, Tyva is probably the best place on earth for treatment and there were many shamans available to practice their skills.

Language.

The Tyvinian language, Turkic in origin, was difficult to learn but it was useful to learn a few words just to be polite, for example the greeting "ekki". The word for yes was yeh, so that was easy. Some Tyvinians in south Tyva speak only Mongolian – indeed, there are large numbers of Tyvinians living in Mongolia. Most Tyvinians could also speak Russian as it was compulsory learning during the times of the Soviet Union. Nowadays, many school children learn at least a little English, although there was a desperate shortage of English teachers. Interpreters were essential, particularly in the remote areas; fortunately there were teachers and students willing to supplement their income by acting as interpreters. Rollanda Kongar, who was probably the leading linguist in Tyva, had many good connections and was able to provide English speakers of a high standard. We had a number of interpreters, organised by Rollanda, thereby giving more English speaking Tyvinians the opportunity to practise.

Currency.

Although sterling is officially accepted in Russia the US dollar is the best currency to take, however, the notes must be in pristine condition, dirty or old notes and even slightly soiled notes will not be accepted. We found it a good idea to have smaller denominations. There are presently two cash machines in Kyzyl and I am not aware of there being any other such machines in Tyva. Many prices are shown in both Roubles and Dollars.

Food.

During the summer meat, fresh fruit and vegetables were in plentiful supply. Obviously there was not the variety of foods available as in the west, but certainly there was sufficient for a high standard of cuisine to be maintained and the Kyzil market was well stocked. All our meals were provided by our hosts from provisions they purchased and we were never left wanting, more over fed than under. Our cooks did an excellent job whether cooking indoors or out. All the outdoor cooking was done on open fires and our hosts provided all the necessary utensils. Although Tyva justifiably brags of having the world's cleanest water in its rivers we carried bottled spring water purchased locally. Beer of a tolerable standard was readily available and of course there was always Vodka. The traveller needs to be wary of the home-made beverages and the associated traditions, see appendix I. We were thankful we took tea bags and real coffee with us.

Photography.

Most of the photographs were taken on Fujichrome 35mm slide film 200 ASA.

Acknowledgements.

Thanks are offered to the following for their invaluable assistance.

Dr Jim Birchall who began the Central Asia Exploration and led most of the expeditions.

To Rollanda and Nicolai Kongar who between them acted as our contacts in Tyva and organised interpreters, accommodation, drivers, transport, guides and bought provisions.

Interpreters: Egor, Ulana Mongush, Elena Oyunzaevna Samba, Aidyn Mongush

Guides: Chaisue Assistant Director of Ubsu-Nur Biosphere Reserve. Feoder in the Sengilen Highlands. Eugene in Khakassia. Valerie Popov in Red Cave area.

Drivers: Ondar Valerie Dyrty-oolovich, Mongush, Volodya, Boris Hapylak and Voya.

Cooks: Chaichack and Delana who also gave up their flat for our use on both expeditions. Vadim Ondar, Elena Oyunzaevna Samba, Vera Sagaan.

Paradise Travel of Krasnoyarsk who organised invitations and air travel within Russia. Especially Dina Loktionova

Sergei Metchanov of Park-Hotel & Travel Service Bureau who looked after us in Khakassia.

Valerie Alexanaravitch Popov. expedition member and Senior Geologist who contributed maps, a video, and his experience and knowledge.

Tatyana Vereschagina, Curator of Turan Museum.

Irgit Sambu Mannai-ool, Archaeologist University of Tyva.

Mongush Murgut-oolovich, Archaeologist University of Tyva.

Biche-ool Salchakovich Mainy Chagan, Curator of Kyzyl Mashalyk Museum.

Professor John Gunn Huddersfield University.

2002 Expedition Support from the National Caving Association and the Sports Council through the Ghar Parau Foundation.

2002 Expedition Support from Mount Everest Foundation.

In completing the report.

Expedition notes from Allan Richardson and Peter Martin.

Illustrations and surveys. Peter Martin.

Photographs by Melvin Penn, Malcolm Craik, Peter and Linda Martin, Allan Richardson.

Paul Austin. Cover design, graphics and layout.

Dave Davenport. Editor of this report and home contact during expedition.

Sarah Lee. Geological and editorial Assistance.

Appendices.

Equipment- 2002 Expedition.

Rope 30 metres of 9mm. Rope 60 metres of 10mm. 20 bolts, hangers and spits. Two sets of Single Rope Technique equipment (SRT) including Petzl hand and chest jammers. In hindsight we really should have had a spare set available. One set of articulated crampons. It was felt that it would have been better to have had two sets. The crampons gave good advantage when moving about on the ice both vertical and otherwise. For navigation GPS Garmin 45, again it would have been prudent to have had another GPS. For surveying two sets of Suunto sighting compasses and clinometers and a large Silva Compass. Thirty metres survey tape and water proof survey pad. Two tackle bags.

All the team took light weight caving helmets, over-suits and harnesses. As we knew that we would have to contend with hot weather as well as cold caves we took mainly light thermal clothing and relied on adding layers to keep warm. We each had headlamps, mainly Petzl with LED and Halogen bulbs.

Although it was possible to purchase AA batteries in Tyva they were not generally of good quality. We took charges and were able to recharge batteries at the flat in Kyzyl.

Allan Richardson took a Psion computer which proved very useful for note taking.

We took several first aid kits which including, needles, transfusion kits, teeth repair kits. Each member carried their own antibiotics. Insect repellent was of great value.

Each individual expedition member was responsible for their own tent and sleeping bag. Light weight tents were carried, one Vango and the rest Hogan.

The members travelled with their main luggage packed in expedition rucksacks and used day sacks for hand luggage. Airport security personnel did take an interest in our hand luggage but we made sure such items as bolt hammers and knives were packed in the main luggage. One time an X-ray machine did pick out the scissors in my first aid kit, but when they were recognised as medical scissors I was allowed to continue and carry them without being arrested.

Summary of finances.

Expenditure	£	p
Transport UK transport	300.00	
Air fare UK Moscow return	1322.75	
Air fare Russian Federation and Russian	1794.16	
Agency charges including airport transfers.		
Hire of Ursula truck and crew	690.30	
for Sengilen Mountains		
Khakassia/Tuva transport and accomodation.	103.55	
Transport within Tuva.	440.00	
Total	£4810.76	
 Other expenditure		
Consular fees visa	150.00	
Consular agents fees	125.00	
Russian invitation	103.55	
Bank charges	36.25	
Equipment		
Caving rope	160.00	
Hangers and spits	47.84	
Accommodation	110.45	
Gratuities	50.00	
Tyvan support, guides,	1470.90	
interpreters, cooks food etc.,		
Khakassia guide	20.83	
Insurance	438.90	
Photographic record	250.00	
First aid equipment	40.00	
Total	£3003.72	
Grand total	£7814.48	
 Income		
	£	p
Team contribution	6414.48	
Everest Foundation Grant	700.00	
Ghar Parau Foundation Grant (part)	750.00	
Total Income	£7864.48	
Deficit	£50.00	

Estimates of personnel equipment purchased for expedition £450.00

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e-mail: abtour@khakasnet.ru or
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Friends of Tuva. <http://www.fotuva.org>

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Equipment suppliers.
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British Cave Research Association.

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Mount Everest Foundation.

Tyva University.

Rollanda and Nicolai Kongar. Tyva.

Valerie Popov Tyva.

Sergei Metchtanova Abakan.

Link to Friends of Tyva web sight.

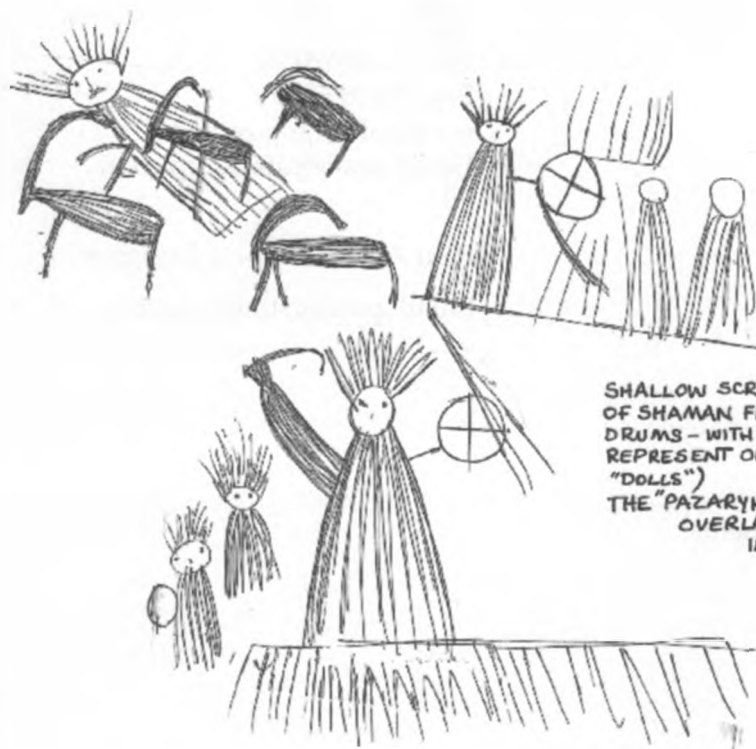
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Appendix I.

Extract from The main sights of Khakassia

Caves of Khakassia.

Shirinski district.

Efremkinski karst plot.

The cave "Kashkulakskaya"- is 9 km from the village Topanovo, the length of the entrances is 820 metres, the depth is 49 metres. It is an ancient cult cave with anomaly of the magnit field. Probably with this fact was connected the worship of ancients, they called her "Peschera of Chernyi Djyavol"(the cave of the Black Devil). The visitors to the cave sometimes feel inexplicable fear, someone had hallucinations of a shaman in white clothes.

The cave "Krutaya" - 5 km from the village Malaya Sya, in the dry ravine on the left bank of the river Belyi Iyus. The length of the entrances is 250 metres, the depth is 50 metres. The glacier.

The cave "Arhaeologicheskaya" is 2 km from the village M.Sya. The horizontal cavity, two big halls and a system of circular entrances. In the cave there is the site of an ancient man. The length of the entrances is 560 metres, the depth is 388 metres.

The cave "Kirilovskaya" - 5 km from the village Efremkino. The length of the entrance is 320 m., the depth is 115 m.

The cave "Pionerskaya" - 3,5 km from the v.Efremkino. The length of the entrances is 80 m, the depth is 15 m.

The cave "Krest" 2 km from the v.Malaya Sya. The length of the entrances is 300 m, the depth is 65 m. There is an entrance-crater on the top of the mountain. This cave is interesting due to its great hall- the grotto of Aida, measuring of 100x30m with various calcite deposits of all kinds of forms.

The cave "Yaschik of Pandora" (the box of Pandora)- 4 km from the v.Malaya Sya. The length of the entrances is 18 km., the depth is 183 m. The longest cave in Russia in limestone. There are a lot of underground lakes.

Also there are the following caves in the environs of the vv.Malaya Sya and Efremkino:

"Nakhodka" (116/32);

"Arkhimedov Proval" (7L/41D);

"Vinogradovskaya" (200/82- the vertical mine);

"Zapadnaya" (700/115)-the tectonic breach);

"KIP" (50/15);

"Myshinaya" (36/6).

Also this beautiful nook is famous for its paleontologic site near the v. Mallaya Sya (3rd-4th millennium B.C.) and on the right bank of Iyus, 12 km from Sya there is the Iyuskaya inscription on the river Aspad. There the rests of the Bronze stove were founded.

The Saksyrsk's caves.

The great karst district, forest-steppe zone, on the tributary of the middle current of the river Askiz. Several caves have cultural layers. There are coffins with rock carvings.

The cave "Pistagskaya" - the district of the lake Balankul -6 km from the st. Nijni Utugul. The archaeological rests - the offering of domestic animals, dated of 2nd century B.C. (the time of Gunski state), "Bolshesyrskaya (200/50), "Saksyrskaya (700/93), "Syrskaya" (260/50).

The caves of Askiz and Tom.

The cave "Akkord" - 7 km from the station Kakchul, the length of the entrances is 1260 m., the depth is 120 km, the lakes.

The cave "Khabzaskaya" - in 3 km. from the st.Khabzas (40/32).

"Shorskaya" - the right bank of the valley of the river Bolshaya Shora (562/40).

"Zimnyaya-1" - in 3 km from the st. Nanchul (200/83).

"Zimnyaya-2" - in 3 km from the st. Nanchul (200/40).

"Kuzneiskaya" - in 2 km from the st. Nanchul (380/110).

"Podarochnaya" - in 3 km from the st. Nanchul (190/98).

"Tuzuksu" - in 4 km from the st. Tuzuksu (800/38- very picturesque cave, with many karst calcite formations).

Abazinski district.

The cave "Stroktyshskaya" - in force bed of the underground river, the length of 550 m., is situated on the confluence of the rivers Stoktysh and Bolshoi A very picturesque cave in marble limestone. The length of the entrances is 450 m., the depth is 9 m.

The cave "Karovaya"-7 km from the Khakass zverosovkhoz. The length of the entrances is 96 m., the depth is 26 m.

Ust-Abakanski district.

The cave "Borodinskaya"- 6 km from the v.Tolcheya. The length of the entrances is 1620 m., the depth is 60 m. The cave contains "Groznyi" the biggest stalagmite in Siberia, height of 6m. Unfortunately the cave is covered with litter due to the uncontrolled visits of tourists from the tourist complex "Drujba".

The cave "Bidginskaya" ("Ledenka")- is 5 km from the v.Tolcheya (150/40). The glacier.

The cave "Tainstvennaya" - is 5,5 km from the v.Tolcheya (80/29 - the glacier, the great entrance with big hall).

There were attempts to classify and explore all caves, found in Khakassia, by Abakan's club of speleologists and then by M.P "Miotis", but owing to failure in understanding on the side of the government and to the lack of means these attempts failed.

Appendix II.

Culture and traditions.

It is important when visiting a country like Tuva that one has a good understanding of its culture and traditions. Tyvinians are very much wrapped up in revisiting their past and are intensely proud of their unique heritage. Their country has gone through a difficult period where the old way of life was challenged and the people subjugated to accept an alien culture. In recent times Tyva has attempted to regain its independence and restore to itself a new sense of national identity. Although the traditions of the past are never likely to dominate today's Tyvinian society, revisiting these traditions is part of the process of establishing that new identity. Many sections of the Tyvinian society still give great weight to those traditions and in some quarters the old traditions or at least part have been re-established. Traditional customs are less important within the towns, but in the country and around the yurt it is polite to observe certain customs.



The Tyvinian greeting is "Ekii" and in formal surroundings the greeting would be offered and received with the hands together in prayer fashion and the head bowed. If one is received as an honoured guest one would be met outside the yurt and offered, by the more wealthy Tyvinians, a scarf called a *kadok*, which may be of silk. This would be placed around one's neck as in Buddhist tradition. A bowl of milky tea would also be offered and this should be received in cupped hands. It is polite to accept all gifts and at least taste the food and drinks, more of this later.

The traditional home of a Tyvinian is the Yurt, a felt covered tent on a trellis frame of six sections. Now a days it is more common to see a canvass covered yurt.

The name *yurt* is known as a *ger* in Mongolia. In Tyva the word is more correctly pronounced *oort* or hut without the h. (For convenience I shall continue to use *yurt*.)

Once in the yurt shoes are removed and left by the entrance, males to the left, females to the right. The yurt itself is to be considered to be divided into male and female halves although there would be no physical barrier. Males sit to the left facing into the yurt and females to the right. It is noticeable that all the dress, tools and accoutrements, such as saddles, whips, and knives of the males are to be found on the left. The female side has a kitchen table or cupboard, cooking implements, pots pans, food etc.,

At the back of the yurt is proudly displayed the family chest decorated in traditional designs and upon the chest are to be found the family treasures. These often consist of photographs of ancestors dressed in their finery and in some rare cases the most treasured possession, the family book, which covers the history of the family for generations. During soviet times these books were confiscated and destroyed as the soviet system tried to break the strong family ties which were along tribal lines. The heads of the principal families ran the country prior to the formation of a government in 1922. The use of family names was suppressed, also during these times, as whole communities were moved into cooperatives.

Once again family names are becoming important, as not only does the name give a sense of identity, but also it links its owner with their ancestry. Each name identifies the geographical origin of a particular family very much as the clan system does in Scotland. A list of family names or "clan" names appears as an appendix to this section.



The more wealthy family may have a table around which one may be seated, but otherwise it would be quite in order to sit on the edge of one of the beds, which are located around the perimeter of the room. The beds are for the adults; children tend to sleep on the floor with a filled quilt. Babies sleep in a cradle hung from the roof poles.

Food and drink is always served starting with the eldest male guest followed by the adult males of the family, then the females and last of all the children. Very often there is a dog about that would consume the scraps. A dog is very handy when you want to discard an item of unpalatable food such as an unchewable piece of boiled mutton. Otherwise the covert disposal of the indigestible must be performed with some subtlety if one is not to upset the host.

The first drink is offered in a bowl, which is received in the right hand palm upwards, the fingertips of the left hand touching the right elbow. Having once taken a sip, (I recommend a small sip for the first try) the bowl is passed to the person to the right by using the same method. The bowl then travels around the guests and the male hosts until empty.

The drink may consist of one of the following: -

Milky tea in which the milk and water is boiled and then just the suggestion of tea added. This drink may also contain salt and/or boiled butter. (The butter may last three years when kept in the traditional sheep's bladder.)

Kumyss, a traditional central Asian drink of fermented mares milk. This appears as an innocent, either clear or slightly cloudy, drink. Its hidden potency is often given away by the expectant watching eyes of the hosts as they peer at the guest in anticipation of a reaction. This drink is to be treated with caution. On these occasions the skill of appearing to drink when one isn't is very useful, however if every guest plays this game the host may become suspicious, as the guests stay sober and the host becomes progressively paralytic.

Khaipak is a milder version of the same drink.

Araga is probably the most traditional Tyvinian drink, it has a loose connection with vodka and is made from distilled cows milk.

Tyvinian Vodka, often home made. Again this has to be treated with respect. The tradition is that once a bottle has been opened it must be drained. Not too much of a problem unless the bottle turns out to be an urn or a small churn.

Once the welcome bowl has been served individual bowls may be served. One bowl may be used for both drinks and food. The hostess will always be ready to wash out a bowl so that it is clean for the next course. Food is most often offered on a help oneself basis with the eldest guest partaking first. Generally the food offered is excellent, particularly the wild fruits, whipped cream and yoghurt, which is often taken with bread and spoons full of sugar.

Millet, barley and chickpeas are a little more difficult to contend with and the sun dried hard cheese is definitely for the connoisseur. It is designed to be eaten by a shepherd or herder who may spend long hours on the steppes and needs a regular nibble to keep his mind alert. An empty bowl is interpreted as wanting more.

When travelling in the traditional manner it is not considered necessary for the Tyvinian to carry food. The rules of hospitality dictate that drink, food and shelter are offered freely to any visitor.

Traditional Tyvinian hospitality dictates that a sheep or goat be slaughtered for an honoured guest. However it is considered disrespectful to spill blood onto the ground, mother earth, even during the slaughtering of an animal. The method is therefore to lay the animal on its back and slit the animal's chest over the heart. The aorta of the animal is then grasped and squeezed, death then comes quickly. The offal is separated and cleaned and a kind of black pudding is made of the blood and intestines. The guests have first choice of the cooked offal. All meat is generally boiled. The cutting of meat is by means of a very sharp sheath knife, which may be passed around for everyone's use. More than one knife maybe available, but it would be quite acceptable to use your own. Forks are rarely seen in a yurt, spoons and knives are the traditional eating implements.

The Yurt itself is made up of six or eight wooden trellis frames with each length of wood tied together with leather thongs. The roof consists of a series of twelve poles, each supported at the lower end by the trellis and rising to a central wheel like structure in the roof. The wheel like structure also acts as the vent for the smoke or a stove chimney. One traditional yurt in which we were entertained on the outskirts of Kyzyl, had the stove outside. The fire brigade had inspected this yurt and directed that the stove be removed from the yurt, as it was a fire hazard. A large flap can be adjusted over the roof vent by the use of an exterior pole to allow for the direction of the wind and keep the rain out.

The wheel structure in the roof has significance in itself, as does virtually everything else around the Tyvinian family. The wheel is the wheel of life and has nine holes which relate to the nine heavens. The central supports, found in some yurts, are considered the gateways to heaven through which it is considered bad luck to pass, that is prematurely at any rate. A yurt can be dismantled or assembled within one hour and the door usually faces the rising sun or towards the south. The yurts are moved around to different pastures during the summer but in winter most families live in wooden cabins.



When a family has enough wool and wants to make felt they invite the whole village to take part in the process and the family has to feed everyone.

A married woman is likely to have a patterned and decorated dress whilst a single girl will have a plain dress or have at least less decoration. Clothes are worn with a sheep fleece lining during winter.

Families who are influenced by shamanic traditions hang an *ongan*, a small doll like figure, in the yurt. These are often the figure of a man carrying a bow and are considered to be living things with their own powers. Food is offered to the *ongan* before anyone eats. These shamanic items are passed from one generation to the next.

The traditional Tyvinian family system.

Although males appear to head the family great deference is given to the mother figure. This is illustrated below as I describe the courtship procedures, wedding and the bringing up of children in the traditional Tyvinian society as explained to us by our various hosts.

If a Tyvinian boy and girl wish to marry they visit both the parents, if the boy visits a second time and food is offered they can marry. A lama may be consulted to ascertain if the couple are compatible in which case the lama blesses the proposed union.

Before a wedding a horse, bearing a new saddle is brought to the bride. The oldest relative of the bride will take the horse, which carries the dowry on its back, and leads it by the reins at the head of the wedding caravan. The bride and her parents follow immediately behind the horse and in turn the rest of the relatives follow. The relatives of the groom meet the caravan three times as they travel and treat them to araga, tea and meat. The third meeting takes place near the yurt of the groom's parents.

On reaching the yurt the bride's caravan goes round the yurt three times in the direction of the sun whilst one of her relatives splashes milk to attract success for the bride, meanwhile the groom and his parents stay inside the yurt.

When the circumnavigation of the yurt is completed all the participants sit down on the *shirteki* (carpets) and are treated to a feast.

The Tyvinian bride will bring her own bed, cupboards, pots and pans etc., to the new home whilst the Tyvinian boy will bring his bed, tools, horse etc., The boy's mother greets them at the door and offers the girl a bowl of milk. When the bride drinks the milk she is declared married. The boy then carries his bride over the threshold.

The boy's first task is to plait the girl's hair into two plaits; an unmarried girl has three plaits in her hair. If the husband dies the woman's hair is shorn. In the past when a rich woman lost her husband she would be expected to kill herself so as not to be a burden on the household.

A more recent tradition in Kyzyl, but of obscure origin, is the practice of newly weds smashing bottles, for luck, on the white painted statue of a mother and baby deer overlooking Kyzyl. Incidentally the name for Friday in Tyvinian means wedding day.

Mothers give birth to children either squatting or stood up holding onto the central gateway posts of the yurt or roof poles. The babies are breast fed for four to five years unless another child comes along. The older children then look after the younger children. Families of sixteen children were not uncommon in the past and in communist times a mother would receive a medal for having many children.

Children are the responsibility of the mother for the first four to five years then the boys are the responsibility of the father who teaches them hunting, cattle herding, making tools etc., The mother trains the girls primarily to be good mothers not necessarily to be good wives.

Children must not speak until spoken too and must not interrupt parents. They must not walk in front of adults, but must walk behind; they learn to respect the knowledge of the older generation. Old people are most respected, especially the mothers, a Tyvinian man would feel closer to his mother than to his father. It is the mother who raises in her children the respect for nature and the observances of such customs as not to harm nature, for in harming nature a person brings harm to himself.

We are told the people have great wisdom in the preservation of green plants.

Traditionally a Tyvinian never cuts down a tree without special necessity; he never kills more beasts or catches more fish than he needs. The national footwear of the Tyvinian people, are boots with turned up toes and no heels, so the wearer may not destroy the soil cover. From time immemorial it has been forbidden, for example, to litter springs at their headwaters, to cut shrubbery, to trample grass, and to walk above the head of a spring - even to wash. At springs it was also prohibited to pull up closely on horses, to water animals, or to spend the night. Customs dictated that when arriving at a spring or an *oovoo** one should walk round three times clockwise and pray to the spirits of the spring or *oovoo*. Gifts of money, food, ribbons and trinkets etc., are left at the springs and the *oovoo*s.

*An *oovoo* is a cairn of stones or branches. They may be found at springs, on the tops of hills and mountains, at cave entrances, on mountain passes, junctions of paths or tracks or any place that may have spiritual significance.

Education is of high priority in Tyva and families are anxious to have their children well educated. Unfortunately there is a shortage of teachers, particularly to teach English, which is a much sought after language in this independently minded nation. Teachers are paid the equivalent of only 15 US dollars a month. Children attend school from seven years old and do community work one week in five; if they do not work they cannot attend school. In outlying areas children attend boarding school during winter months, in summer they stay at home and work with the family.

It would not be right to leave Tyva without mentioning Tyvinian guttural throat singing known as *khoomai*, as Tuvinians have brought this form of singing to a fine art. It was this style of singing, where one performer, a *gorloviki*, can produce two musical tones at the same time, that attracted the attention of the famous physicist and composer Richard Feynman. Richard Feynman planned to visit Tyva but died before he could fulfill his ambition so his friend, Ralph Leighton, wrote the best seller, *Tuva or Bust* and set up the *Friends of Tuva* web site. *Khoomai* singers such as the group *Ay-Kherel*, the Five Elements, travel abroad attending folk festivals and have recorded CD's. This group performed for us at the Yurt Hotel on the 2001 expedition. A visit to Tyva would not be complete without listening to *khoomai* in its home setting.



Ay-Kherel Tuvian folk group.

Tuvinian holidays.

Spring new moon (our easter). *Shagaa*, a two day celebration of the New Year.

Mid August the *Naadym*, the feast of cattle breeders.

15th August. The Day of the Republic.

21st October. The Day of Constitution.

Appenix IIa

Tyvinian tribe names.	Districts or areas.
Mongush	West Tyva.
Kuzhuget	West Tyva
Kuular	West districts
Oorzhak	West districts
Irgit	West districts
Salchak	West district; Kaa-Khem
Kara-sal	Far west
Baikara	North west
Maady	Turan, Uyuk North west.
Saaya	Mongun-Taiga west district.
Ondar	Sut-Khal district
Saryglar	Sut-Khal district
Homushku	Sut-Khal district
Oyun	Tangdy district.
Soyan	Erzin (south Tyva)
Dongak	Ulug-Khem
Kyrgys	Ulug-Khem, Erzin, Kungurtug
Dolaan	Ulug-Khem, Ak-Tal
Choodu	Bai-Dag, Erzin
Tumat	Ovur
Oaraan Kol	Todzha
Hoyuk	Todzha

This is not a definitive list, but most family or tribal names are listed. The list was drawn up for me by Elana Mongush, post graduate linguistic student, and Ondar Valerie Dyrty-oolovich Lecturer Kyzyl School of Arts.

If there are three names the first is the family name, the second is the given name and the third is the fathers name. Some Tyvan names have been Russified by adding vich.