Україна 1998

Imperial College Expedition to Ukraine: Summer 1998

[Preliminary Report: November 1998]

Contents

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Introduction

The Imperial College Expedition to Ukraine 1998 consisted of four finalist students from Imperial College of Science, Technology and Medicine, University of London. The expedition lasted for six weeks between 10 July and 22 August 1998.

Formerly known as the breadbasket of the Soviet Union, Ukraine at one time supplied about a quarter of the USSR's food supplies. Now, rapidly finding its own independence, financially troubled as ever, Ukraine is now left with the scars of a Soviet empire that believed nature should to be conquered. Vast irrigation systems and whole industrial cities are often the norm. For some, Ukraine is still this way, however for the young, it is a time of great change. Civilisation in Ukraine is built upon the Dnieper River which cuts right the way through the country for over 400 miles.

The *aim* of the expedition was generally to get an overview of pollution now present in post USSR Ukraine. Since the Chernobyl disaster, pollution in the former USSR has been often looked at with lack of perspective and naivity. More specifically however, to examine pollution ourselves especially to explore pollution surveying techniques little if ever used in Ukraine.
The next section: *Biomonotoring*, explores the feasibility of using the BMWP (Biological Monotoring Working Party) system of Entomological Biomonotoring in Ukraine. We also aimed to support our findings with Geochemical sampling. The true result of this work remains to be seen as testing back in London is still taking place. This somewhat multi-disciplined approach did not work as well as hoped but what we did achieve stretched the boundaries we were faced with.

The overall result of the expedition was an amazing experience that would be impossible to recreate anywhere: a one for me that broke down the old divides of communist/capitalism

The Team

James Carter (Leader) Just completed BSc Physics at Imperial College.
Antony Butts (Safety and Welfare) Antony has also just finished in physics.
James Grellier (Photographer & Geologist) has just obtained a 1st in Geology with environmental applications at Imperial. He is now studying Photography for a year in Southend-on-Sea.
John Wilson (Biology/Ecology) having finished his Biology degree is now starting an ecology based PhD at Imperial College based out at Silwood Park, Ascot.

Travel

In order to get a thorough look at the country, it was decided that the only way to travel about Ukraine was by road in our own vehicle. Hiring out there would have been difficult, unreliable and expensive. It enabled us to get a look at the country that would have been impossible without our own vehicle.

Driving in Ukraine was probably the biggest adventure of all. The vehicle for our travels was the leader's trusty and ageing Nissan Vanette Diesel. This was soon proved to be the most ideal vehicle for travelling about Ukraine. The main advantage was that for one of the few British cars in the country (if not the only one) it was very inconspicuous and battled well in order to keep up with the constant rumblings of some of the poorest quality roads in Europe (I have never seen roads look so good on exiting the country into Poland on the way back). A superb feature that is missing on western European roads is the traffic police. A long days driving would mean approximately five stops to present documents. One eventually became to see them as ones friends even if it meant giving a guided tour of sometimes up to five documents in succession to keep them content.

Another bonus was with diesel at about 14 pence a litre we were able to travel 2,500 miles inside the country for under £50 in fuel costs. However, savings made in this way were soon made up for in heavy vehicle wear and tear and a handful of mysterious traffic offences (totalling four fines at about £4 each) and other mysterious export/import taxes (50US$).

The results of the saying - 'if it ain't broke, don't fix it' were very apparent. Extremely old diesel lorries would gush out smoke that could be seen on the horizon. Some would see this as a pollution at its finest, however for a country the size of Ukraine (2½ times that of the UK and the largest all European country), lorries are far and few between compared to Western Europe.

Health and Safety

We tried our very best to keep out of harms way. Morale was always reasonable to very good and the team held together at all times. What was surprising to me was the number of cuts and bruises gained by all. On one occasion Antony's 'jippy tummy' was partially cured by a Ukrainian cure involving swiftly drinking about 50ml of vodka saturated with table salt followed by strong black tea strictly taken 30 minutes later. I am still searching for the theory behind this. All in all we were fortunate enough to have no serious problems, much of this was down to over-prevention on the Ukrainians part. It was sometimes difficult to make any mistakes at all however hard we tried.

Itinerary

10 July
Depart UK.
11-17 July
Travel through France, Germany, Czech Republic and Hungary to enter into west Ukraine.
18 July
Enter Ukraine through the Chop border point and spend the day driving to L'viv. This is said to be the poor area of Ukraine and was a sharp contrast to Hungary and the majority of the rest of Ukraine even.
19-20 July
Attempt settling in to the country in L'viv, Ukraine's most westerly city.
21 July
Drive to Kiev and spend a week being introduced to the city including meeting many new contacts especially at the Institute of Hyrobiology.
25-27 July
Stay in the Kaniv nature reserve area south of Kiev. Explore different types of river in Ukraine and carry out preliminary Entomological work.
28 July
Back to Kiev to join the start of a 'green' public awareness tour led by three of Ukraine's new environmental pressure groups. First stop is Cherkassy.
29-31 July
Stay in Kremenchuk where we are hosted on their nature reserve. Carry out Entomological work.
1-3 August
Travel to Dnipopetrovsk, Zaporozhye, Melitopol on to Ka'hovka
Rest in Ka'hovka where we attended the largest Ukrainian music festival (Tavariski Igri).
Also visit of Ka'hovka's water treatment facilities.
4-10 August
Move back to Zaporozhye to stay with the regional environment agency. Carry out a Geo-chemical reconnaissance survey of Zaporozhye with support from the agency.
11 August-13 August
Slowly move out of Ukraine, first to Crimea for three days then to Odessa.
14 August-22 August
Depart Ukraine at the Mostyska point, travel back to UK via Krakov and Berlin.

Biomonitoring in Ukraine

The primary aim of this part of the expedition was to test the techniques of the Biological Monitoring Working Party System (BMWP) in the Ukraine. Hopefully the information generated would tie in with the results of the Geochemical survey as was intended in the original BMWP report. In this report we hope to first introduce the use of biological indicators in river water quality monitoring and how the BMWP System operates. Then we will discuss the ecology of the Dnieper. Next we will present and discuss our results before concluding this section of the report.

Biological Indicators of river water quality

Biological monitoring uses the responses of living organisms to determine whether the environment is favourable to living material (Cairns & Pratt, 1993). This includes assessing drinking water quality by examining for the presence of coliform bacteria, to determining long-term river health by examining fish catches. Biological methods of assessing river water quality have distinct advantages over chemical surveillance in that they have a relatively low cost, they need no power supply, they can often be operated by a relatively unskilled person and they provide an integrated measure of pollutant load (McNeill, unpublished). However, chemical surveillance provides an quantitative measurement of the various pollutants and as such is more compatible with making and enforcing regulations.

The main question for biological monitoring is what organisms to use - whether to use specific species or groups of species; whether to use microbes, vertebrates or plants. Some techniques use indicator groups e.g. Frantsevich and co-workers, 1996, found that freshwater mussel shells provided an outline of the general patterns of radionucleide pollution in the Dnieper. Similarly, it has been proposed that monitoring the ratio of *Gammarus pulex* to *Asellus aquaticus* provides a simple measure of changes in river water quality especially with reference to organic enrichment (Whitehurst, 1991). However, a reliance on a few indicator species has been critised as presence or absence in a sample is dependent on population dynamics, seasonal effects, flow conditions and chance (Cairns & Pratt, 1993). River fauna and flora have different responses to varying water quality and so changes in communities can provide an index of pollution (McNeill, unpublished). Indicator communities possibly have the advantage

of being less dependent on the stochastic events that govern individual species population dynamics. In this study the community used is the benthic macroinvertebrates.

Benthic macroinvertebrates are animals living on or in the bottom substrates of aquatic environments that are visible to the unaided eye (p10-58, Eaton et. al., 1995) and as such is a size and not taxonomic class. This group has a number of advantages for use in surveillance.

- Ubiquitous. They are present in virtually all environments in large numbers which makes them easy to sample.
- Large number of species. This offers a complete spectrum of responses to environmental stresses
- Sedentary. This allows effective spatial or analyses of pollutants or disturbance effects
- Sedentary. This allows effective spatial analyses of pollutants or disturbance effects
- Life-cycle. The community is dynamic enough to revert if conditions improve, but the response is slow enough to allow temporal changes in pollution to be observed (this is a major advantage over chemical point sampling which may miss sporadic pollution).

As a result, monitoring the benthic macroinvertebrate community can provide long-term analysis of both regular and intermittent discharges, variable concentrations of pollutants, single, multiple and novel pollutants and even synergistic or antagonistic effects (Rosenberg & Resh, 1993).

The disadvantages include seasonality, drift in lotic waters and most importantly their distribution and abundance is affected by factors other than river water quality e.g. the communities in eroding and depositing environments are very different (Hawkes, 1998). Given ecological knowledge, these problems can be overcome by adjusting for natural features of the river. Such a database has been set up in the United Kingdom that allows the community found to be compared with the expected community - RIVPACS (River InVertebrate Prediction And Classification System) (Wright et. al., 1993). Each taxonomic group is assigned a value equal to the pollution tolerance of the most tolerant member of a group. A total score is obtained by summing the values of the taxonomic groups present. The average score per taxon can also be calculated. Furthermore, if abundnace data is known this can be used to give a weighting to the values. The value is finally compared in the database which should contain the necessary information to adjust for river type. The end result is a semi-quantitative measure of river water quality.

The use of the BMWP Score has been spreading in Europe e.g. it has been successfully used in the Biscay of Spain (Bargos, et. al., 1990).

The Dnieper

After the Volga and the Danube, the Dnieper is the third largest river in Europe. The lower reaches of the Dnieper comprises of six large artificial reservoirs - Kiev, Kanev, Krementchug, Dneprodzerdzinsk, Zaporozhyne and Kakhovka (Sansone, et. al., 1996).

The area studied is alternately agricultural and industrial with little land being left in its natural state. Over 95% of historical steppeland is believed to have been converted to agriculture (Potapenko, pers. com.) and in a reserve we saw near Kakhovka, it was stocked with non-native large ungulates, including zebra. At Zaporozhyne there was a series of rapids that were of historical importance. The Dnieper was dammed and the rapids flooded early this century which will obviously have strongly influenced the ecology.

The damming caused migratory fish to disappear, and a drop in the abundance of rheophilic invertebrates and an increase in lacustine species. In an effort to increase the food supply of the reservoirs, several species of invertebrates were introduced from the Caspian Region (Pligin & Yemel'yanova, 1989). Many of these Caspian species appear to still be spreading.

Methods and Results

Samples were taken from two locations. The first was on 26 July 1998 at the Stugna River near Kazuca. The second location was 30 July 1998 at the Gelechkavskaya Reserve on the opposite bank of the Dnieper from Kremenchuk. This corresponds to sediment sample 103.0. Samples were taken using a standard pond net of maximum aperture size 950μm (obtained from GB Nets). Samples were taken using kick-sampling for three minutes as described by McNeill.

Unfortunately, we were unable to sample sites in Zaporozhyne. In most of the sites surveyed there were organisms present, indeed we saw people fishing at more than three of the sites. However, at some sites the sediment was unstable and the procedure was deemed unsafe. An additional problem which we had not planned for was the presence of water-snakes. On the upper sites sampled of some of the streams, we were advised that kick sampling for three minutes would not have been safe despite the protection of waders. I am in no doubt that

these problems can be overcome, but it was beyond the scope of this expedition in the time available.

The first site was dominated by oligochaetes, but did contain some leeches. The second site was more diverse and included many mussels (Preissensiidae), a few Sphaeridae and Hydrobiidae, many Mallocostra and Gammaridae and three small fish fry (bozak?). In the area studied the Dnieper system is devoid of stonefly and mayfly larvae (Pligin, pers. com.). This is simply because the area studied was relatively flat and did not contain these invertebrates which are more typical of mountain streams. Another noted feature of the Ukraine was the prevalence of crayfish. There were a couple of crayfish in the sample that was aborted because of water-snakes.

Discussion

One of the advantages of the BMWP System is the speed and economy with which it can be carried out. However, in an expedition of this sort, collecting samples to be analysed at leisure on return is preferable. With a limited amount of time available in the field, it was unfortunate that we could not have become established sooner and been able to sample the fauna in conjuction with the geochemical samples.

In the ways that Britain was ideal to test the River InVertebrate Prediction And Classification System (RIVPACS) may prove to be why the Ukraine is less ideal. Notably, the macroinvertebrate fauna is less restricted in a continental environment and there are no dangerous river fauna in British streams. However, the macroinvertebrate fauna is well documented and physical and chemical data is avaiable. Chemical surveillance was routine in the area we saw and the plankton was assessed. With an increase in ecological knowledge that would accompany the implimentation of a RIVPACS system, this approach of producing a biological index of river water quality would complement exisiting measurements. Moreover, it is important to look at river water quality in terms of the community present as well as in physiochemical terms.

Conclusions

While this section of the expedition was not as productive as we would have liked, we have hopefully identified some practical concerns in using biomonitoring. For example, the invading Caspian macroinvertebrates may have an impact on the results of a comprehensive survey.

Furthermore, techniques are needed to ensure safety while sampling. There appears to be an increasing interest in the environment in the Ukraine and hopefully the use of insects in biomonitoring may move from the realm of scientific establishment and government agencies into common usage.

References

Bargos, T., Mesanza, J. M., Basaguren, A., Orive, E., (1990) Assessing river water quality by means of multifactorial methods using macroinvertebrates - a comparative study of the main water courses of Biscay, *Water Research*, **24**, (1), pp 1-10.

Cains, J. Jr. & Pratt, J. R., (1993), A history of biological monitoring using benthic macroinvertebrates, Chapter 2, pp 10-27 in *Freshwater biomonitoring and benthic macroinvertebtrates* (edited by D. M. Rosenberg & V. H. Resh), Chapman & Hall, London.

Eaton, A. D., Clesceri, L. S. & Greenberg, A. E., (1995), Standard methods for the examination of water and wastewater 19th edition, American Public Health Association, Washington DC, USA

Frantsevich, L., Korniushin, A., Pankov, I., Ermakov, A., Zakharchuk, T., (1996) Application of molluscs for radioecological monitoring of the Chernobyl outburst, *Environmental Pollution*, **94**, pp 91-100.

Hawkes, H. A., (1997), Origin and development of the Biological Monitoring Working Party Score System, *Water Research*, **32**, (3), pp. 964-968.

McNeill, S., (unpublished), Biomonitoring, Imperial College Centre for Environmental Technology.

McNeill, S., (unpublished), Method for the assessment of river water quality using benthic macroinvertebrates, Imperial College Centre for Environmental Technology.

Pligin, Yu. V., Yemel'yanova, L. V., (1989), Acclimatization of Caspian Invertebrates in Dnieper Reservoirs, *Hydrobiological Journal*, **25**, (1), pp 1-8.

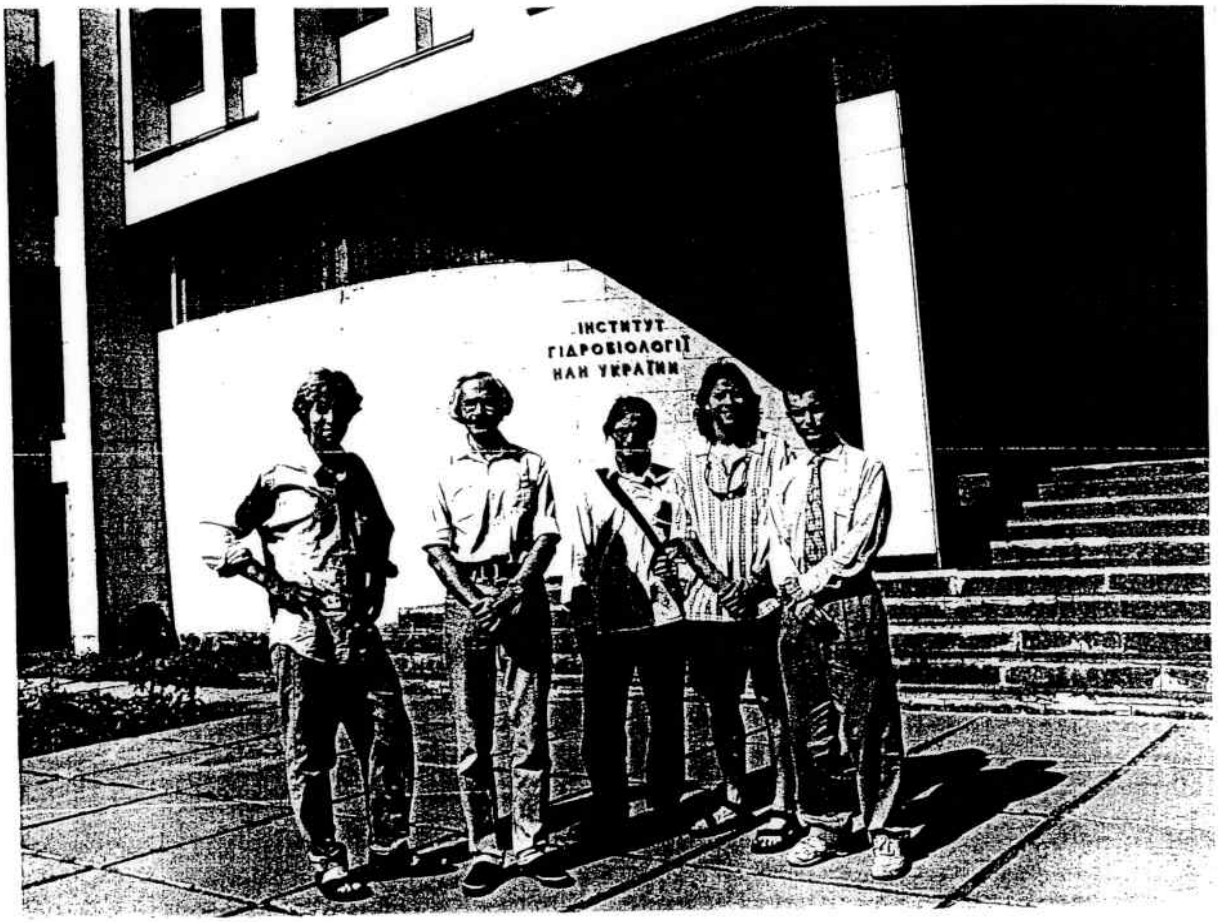
Quigley, M., (1997), Invertebrates of streams and rivers - a key to identification, Edward Arnold, London.

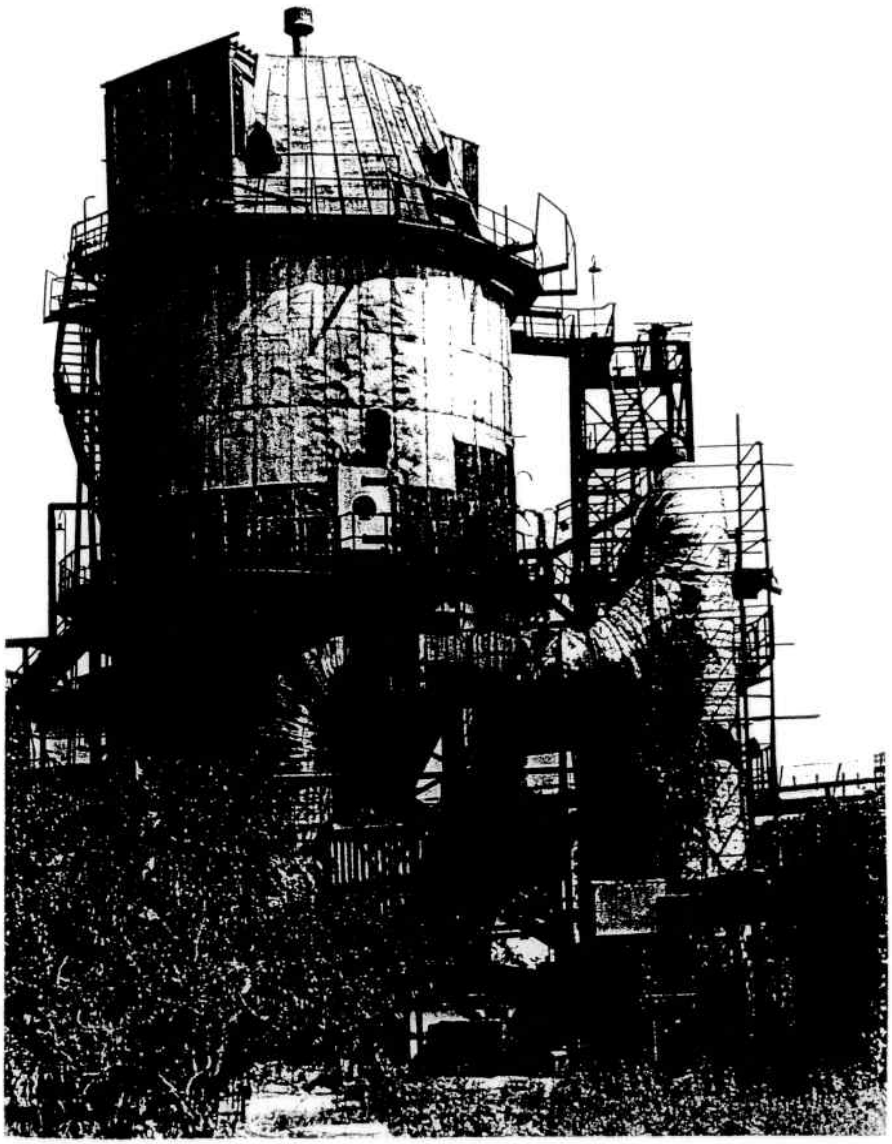
Rosenberg, D. M., Resh, V. H., (1993), Introduction to fresh-water biomonitoring and benthic macroinvertebrates, Chapter 1, pp 1-9 in *Freshwater biomonitoring and benthic macroinvertebtrates* (edited by D. M. Rosenberg & V. H. Resh), Chapman & Hall, London.

Sansone, U., Belli, M., Vooitsekovitch, O. V., Kanivets, V. V., (1996), ^{90}Sr and ^{137}Cs in water and suspended particulate matter of theh Dnieper River-Reservoirs System, *Science of the Total Environment*, **186**, pp 257-271

Whitehurst, I. T., (1991), The Gammarus-Asellus ratio as an index of organic pollution, *Water Research*, **25**, (3), pp 333-339.

Wright, J. F., Furse, M. T., Armitage, P. D., (1993), RIVPACS - a technique for evaluating the biological quality of rivers in the U.K., *European Water Pollution Control*, **3**, (4), pp 15-25.





Above: The Team with Professor Pligin (a great admirer of the British monarchy) from The Ukrainian Institute of Hydrobiology, Kiev. From left to right James, Uri Pligin, Jim, Antony and John.

Left: Decaying Soviet Industry in Dnipopetrovsk.

Geo-Chemical Reconnaissance in Ukraine

Stream sediment samples were transported back to Britain as part of a survey undertaken in Zaporozhye. Samples have been tested by ICP-AES (Inductively Coupled Plasma Atomic Emissions) at Imperial College. This gives qualitative and quantitative data on a suite of 26 different elements. The results however have just been produced and are still under analysis. The final report will contain a full scientific report of this work.

Results in μg/g (parts-per-million)

Sample	Li	Na	K	Be	Mg	Ca	Sr	Ba	Al	La	Ti	V	Cr
101	0.92	25	281	0.074	237	960	5.19	12.8	1480	4.8	698	3.5	19.8
102	0.72	54	238	0.066	196	457	4.06	7.76	1310	5.6	616	1.5	14.8
103	0.72	25	342	0.082	256	741	4.65	9.68	1630	12.1	678	3.9	13
104	3.4	360	1280	0.18	3300	285000	1340	134	4890	4	187	6	44
105	7.6	230	1630	0.29	3310	172000	790	106	8050	33	428	10.5	66
106.1	11.2	374	3030	0.778	5650	46600	134	124	19900	21.9	834	32.7	409
106.2	11	344	2980	0.75	5360	45100	133	117	18500	23.5	822	30.8	367
107	13.1	476	4050	0.898	6430	40500	118	135	21100	23.9	847	35.8	347
108	16	609	4800	0.864	4750	39300	160	125	22600	25	826	38	269
109	6.04	308	1590	0.58	11700	48100	117	114	9740	15.1	573	37.9	-32768
110	11.5	813	3540	0.682	5570	86100	338	98.6	17400	5.3	809	34.9	199
111	7.84	576	1860	0.456	3650	31100	154	84.7	8550	26.2	834	20.3	194
112.1	13.3	547	3700	0.816	5850	38400	134	135	19800	27.3	932	33.3	258
112.2	13.4	598	3770	0.788	5380	27300	118	143	17300	31.6	907	29.2	98.6
113	9.16	587	2080	0.592	4740	25500	103	124	10300	20.9	713	19.5	67.6
114	9.52	482	2280	0.542	3080	15600	131	98	11100	33.2	877	21.3	58.2
115	9.12	459	2460	0.678	3710	10400	86.3	152	13600	32.9	790	24.4	226
116.1	13	381	2570	0.832	2870	8240	54.2	117	19100	29.7	900	61	381
116.2	15.4	474	3320	0.998	3720	16800	70.1	142	21500	33.2	921	60.1	292
117	13.1	540	3300	0.778	4810	22700	115	149	16800	33.4	865	33.6	138
118.1	6.8	1960	2450	0.45	8560	216000	1600	152	11200	28.5	331	21	17
118.2	6.2	2140	2380	0.42	8120	225000	1580	147	10100	26.5	333	18	17
119	7.08	335	1850	0.188	2140	7620	39.5	51.5	6680	33.1	474	12.7	19
120	12.4	589	3330	0.668	4780	28500	94.2	127	14400	26.8	826	24.5	38

Sample	Mo	Mn	Fe	Co	Ni	Cu	Ag	Zn	Cd	Pb	P	S	As
101	-32768	79.2	2470	0.5	1.2	3.84	0.16	11.5	-32768	6	86.8	31.8	0.8
102	-32768	128	2350	0.4	0.8	0.32	0.16	3.84	-32768	2.4	45.2	18	0.6
103	-32768	62.2	2600	0.4	1	0.38	-32768	3.98	-32768	2.4	65.6	80.4	0.6
104	-32768	741	5290	-32768	3	24	-32768	35.6	-32768	18	502	8010	-32768
105	-32768	1150	9670	-32768	5	14	-32768	24.3	-32768	6	324	6700	-32768
106.1	2.4	1460	31000	7.6	36.2	344	0.2	360	1	82.2	590	2360	6.8
106.2	2.6	1250	26900	7.3	36.2	456	0.16	319	1.4	113	476	2970	6
107	2.2	1630	21800	8.6	51	40.7	-32768	93.4	0.4	49.8	392	705	6.6
108	2.4	2020	23000	7.1	43	25.8	0.24	93.7	-32768	62.4	574	1950	12.6
109	3.4	4780	61900	8.5	80.6	64.6	0.28	382	-32768	241	415	893	8.8
110	3.4	1920	27200	7.1	50.2	51.9	0.24	109	-32768	41.4	749	11200	5.6
111	1.8	626	15800	4.6	46.4	26.3	0.16	51.6	-32768	61.2	314	2310	2.4
112.1	2.8	1170	27000	6.9	34.6	190	-32768	295	0.2	101	564	2990	6.6
112.2	2	819	19600	6.3	40	33.4	0.12	115	-32768	63.6	431	1870	5.2
113	1.2	797	15900	3.7	22.4	27.2	-32768	123	-32768	69	406	1490	4.4
114	2.4	266	14000	5.6	64.2	46.1	0.2	129	2.6	58.2	948	1570	5.4
115	3	300	17300	5.7	373	160	1.08	294	27.1	78	1340	1170	8
116.1	25.2	1100	176000	9.9	140	143	0.52	2600	11.9	789	871	2850	23.8
116.2	21.4	1350	149000	9.9	120	135	2.6	2240	8.6	650	807	2610	22
117	4.6	760	20300	8.6	162	105	0.6	217	8.5	78.6	936	2510	8.8
118.1	-32768	9670	9140	4	20	9.3	-32768	33.3	-32768	12	1930	8990	2
118.2	-32768	9810	8370	3	21	7.6	-32768	34.7	-32768	12	2020	8420	-32768
119	0.8	186	9520	2.6	9.4	10.9	0.08	32.1	-32768	14.4	208	865	2
120	1.2	721	15600	4.9	19.6	31.3	0.12	109	-32768	57	305	850	5

Initial attention can be drawn to sample 116 taken from Ukraine's 'red river' in Zaporozhye, heavily polluted by local metal industries. Molybdenum (used in alloys) is 20-25 ppm here opposed to normal levels of <2.

Conclusion

Ukraine is an amazing country. The culture is traditionally one of being close to nature and this can be seen in many places. The capital of Kiev has trees and forest intermingled amongst the city. What this is highlights is the lack of rural life in Britain. If it was not for the rich land, and a nation of farmers, the Ukrainian people would be starving. Ukraine has always had to suffer for its riches. There have been countless struggles (the famine caused by Stalin in the 1920's killed up to 20 million people). Maybe things are changing for the better fast.

Environmentally, there is a lot of hope for Ukraine. It had never occurred to me that outside Britain, the British are often seen as the inventors of industrialisation and the pollution to go with it. There are significant environmental funding projects now been carried out, primarily from Canada. We saw some of the money from this beginning to be put to good use. However, it will be sometime before the 'concrete-heads' (almost any industrialist over 35/40) are out of power. Ukraine's greatest strength and asset however is its people, they are some of the most educated people in the world.

I would like to thank everybody again for a most rewarding experience.

Personal Statement from John Wilson:

First thing is thanks to James, Jim and Ant for making the expedition what it was. Of course thanks must also include everyone we stayed with or met in the Ukraine, especially to Stas who was correct in every way. We were repeatedly told that Ukrainians feel they have an obligation to hospitality. In my experience they certainly don't compromise on this. The myth of rude shop assistants is definitely overdone. Wherever we went people were happy to help us and were patient with our sometimes overriding indecision. The exception was L'viv. Although a stunningly beautiful place we found it to be riddled with xenophobia - presumably because of the proximity of the relative success of Poland and Hungary.

Someone in a rather surreal deserted campsite cum packed night-spot near the Hungarian/Ukrainian border summed it up perfectly. There are countries like the Czech Republic, Hungary and Poland and then there is Eastern Europe. Ukraine is still Europe, but there is a real change in terms of standards of living, culture and (perhaps most importantly) road quality when compared with the other former communist countries we passed through. Driving across Europe was one of the best aspects of the expedition, putting everything we saw in a more balanced perspective.

In terms of the work I was disappointed my contribution was so weak, but perhaps I should have been more flexible in the projects to be carried out. However, I found the experience of communicating with people very useful specifically in terms of trying to get scientific ideas across. Hopefully something useful may come from our discussions with Yuri at the Institute of Hydrobiology in Kiev.

Thanks again to James for organising it. I think we were all surprised by the lack of independence we had, there is certainly some residual bureaucracy left. The environment appears to be an increasingly important thanks to the work of Stas at Greenpeace and Anatol Dobrovolsky at the Zaporozhye region environment agency. The will and knowledge appear to be there to a large extent, however, funds, as always, limit. What it perhaps highlights is not their lack of effort, but ours. After all I have never tasted fresh fish caught from the Thames.

Imperial College Expedition to Ukraine 1998

Budget

Expenses (for 4 Persons)		Estimated pre-departure	Actual	
Travel	Vehicle Maintenance	£1,000	£1,080	
	Fuel	£350	£296	
	Channel Crossings	£180	£276	
	Additional Insurance [1]	£330	£160	
	Ukraine Visas	£80	£80	
Accommodation		£1,200	£1,603	
Food		£1,000	£970	
Guides (including gifts)		£140	£137	
Equipment		£260	£168	
Photographic		£260	£296	
Pre-Expedition expenses		£200	£230	
Report		£350	£650 [2]	
Sample testing		£200	£100	
Contingency		£560		
Total		**£6,110**	**£6,046**	

Income		
Personal Contributions	4 x £500	£2,000
IC Exploration Board	up to	£2,000
UL Convocation		£1,500
Albert Reckitt Charitable Trust [3]		£750
Royal Entomological Society		£100.00
	Total	**£6,350.00**

Notes:

(1) Personal insurance cover paid by Imperial College (not included in Budget)

(2) Estimated cost (still in progress)

(3) Estimated budget was originally based on income of £5600