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SLEETS GILL CAVE, LITTONDALE
PRELIMINARY SCIENTIFIC SURVEY

by

D.T. Richardson A.R.I.C.

A visit was made to Sleets Gill Cave, Littondale (N.G.R. SD 959693) on the 4th July, 1965, with a view to finding out what difficulties would present themselves during a comprehensive scientific survey of a cave. No attempt was made to carry out a physical survey and for this reason tables of results are presented without reference being made to the exact positions within the cave.

It is recognised that comprehensive surveys of this nature should be referred to an accurate survey of the system.

Determinations of air temperature, relative humidity, water temperatures, and p.H values were made as well as collecting samples of water for analysis.

Relative humidity was determined using both the "Whirling Hygrometer" and a Fischer Type III Hair Hygrometer; p.H by means of miniature transistorised battery operated meter.

TABLE 7

	Air Temp. °Cent.	Relative Humidity %
Outside Cave entrance	12.2	65
Half way down entrance slope	11.1	75
Bottom of Entrance Slope	9.2	82
Station 1	9.2	92
" 2	8.6	100
" 3	8.4	95
" 4	8.4	98
" 5	8.4	100
" 6	8.4	96
" 7	8.6	94
" 8	8.6	99
" 9	8.6	100
Innermost point in cave	8.6	100

The figures indicate that once the entrance slope has been negotiated the air temperature and relative humidity of the cave assumes an almost constant value. There appears to be some fluctuation in the relative humidity but on the whole this lies between 94 and 100% - the higher figures in almost every case being associated with areas containing large amounts of water or areas in which there was profuse dripping from the roof of the cave.

No difficulties were encountered in reading the thermometer or in the reading of either the hair hygrometer or whirling hygrometer, there was of course ample room in which to whirl the latter instrument. In the case of the hair hygrometer one lesson at least was learnt and that was that the hair mechanism must be protected from actual contact with droplets of water - when the mechanism became contaminated with actual water droplets there was a tendency for readings over 100% being indicated.

Water Temperatures and pH Values
For convenience these figures are included in the table of water analyses.

No difficulty was encountered in using the p.H. meter underground particularly as it had a built in mechanical standard which obviated the necessity for carrying buffer solutions.

One thing soon became obvious - if one wants to preserve the leather carrying case in any reasonable conditions it would be an excellent idea to make some sort of an additional polythene cover to cover the whole carrying case.

The accompanying table of results starts with samples taken at the furthest point in the cave working progressively back towards the entrance and finally ending up with figures for the surface stream outside the cave.

The total hardiness of the waters from the various gours are very similar, the non-alkaline hardness (permanent hardness) of these waters being more or less constant. There is, however, some variation in the magnesium content of these waters a phenomena which may repay further investigation. All these waters contain approximately the same amount of free carbon dioxide and show similar p.H values.

The water in the “canal” is interesting from the point of view of its relatively high magnesium content.

All the waters near the entrance of the cave show a higher total hardness content that the waters further in the cave and the main stream water inside the cave has an almost identical composition to that of the water re-appearing as the stream outside the cave.

SLEETS GILL CAVE WATERS

TABLE 8

	HARDNESS			Ca. Salts $CaCO_3$	Mg. Salts $CaCO_3$	Free CO_2 $CaCO_3$	pH	Temp °Cent.
	Tota1 $CaCO_3$	Alk. $CaCO_3$	Non Alk. $CaCO_3$					
Standing Pool end of cave	172.0	146.0	26.0	158.0	14.0	13.0	7.40	8.6°
Gours fed by Drips	169.0	145.0	24.0	126.0	43.0	12.4	7.40	8.6°
Gours with crystals	180.0	154.0	26.0	141.0	39.0	10.0	7.60	8.6°
Gours fed by drips	170.0	148.0	22.0	153.0	17.0	12.4	7.60	8.6°
Canal fed by drips	192.0	169.0	23.0	132.0	60.0	11.4	7.60	8.4°
Gours fed by roof drips	-	-	-	-	-	-	7.60	8.6°
Gours on top of boss	184.0	160.0	24.0	162.0	22.0	10.0	7.50	8.6°
Drops on Stalactites	-	-	-	-	-	-	7.50	-
Sump	203.0	180.0	23.0	194.0	9.0	11.0	7.40	8.6°
Roof drips	-	-	-	-	-	-	7.20	8.6°
Main Stream	222.0	202.0	20.0	209.0	13.0	13·0	7.55	8.6°
Pool near Entrance	204.0	192.0	12.0	188.0	16.0	16.4	7.20	8.4°
Surface Stream – Running	218.0	198.0	20.0	205.0	13.0	8.0	7.75	12.2°
Surface Stream – Stagnant Pool	231.0	209.0	22.0	225.0	6.0	9.0	7.70	12.2°

Air Temperature inside cave (average) 8.6°C Air Temp. Outside Cave 12.2°C.

Results in milligrammes per litre. Analyses by D.T. Richardson, A.R.I.C.

The temperature of' the various waters inside the cave was constant.

My thanks go to John D. Wilcock and my son, Bernard, for their help in carrying out this project.

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