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SPELEOLOGICAL STUDIES IN UPPER WHARFEDALE

by

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Speleological studies in Upper Wharfedale have been limited to the study of the composition of various waters and the waters, flora and fauna in Springs Wood Level.

As the work is as yet very much in a state of infancy it is not intended to go deeply into any particular aspect during the course of this paper but rather to give a general picture of the work being carried [98] out and to indicate how it is intended to further the work.

The earliest work consisted of the chemical analyses of water samples from various points in the dale and some of these results are given on the accompanying table.

It can be seen from the results that the waters of the Buckden-Cray area at the head of the dale all have relatively high magnesium contents. This can perhaps be explained by the fact that in this area lead bearing minerals are to be found and that dolomite is often associated with such ore-bodies.

The River Wharfe at this point carries relatively small amounts of hardness salts but by the time it reaches Low Mill below Grassington the figures have almost doubled.

Black Keld is of course of interest being the main resurgence for water from Mossdale Caverns. The fact that this very large stream carries free carbon dioxide is interesting for it suggests that the water either flows in a completely water filled channel or receives large quantities of water which has had long contact with limestone and soil air. Braith Gill also shows similar characteristics.

The Kilnsey waters call for individual attention. Firstly the three waters quoted all appear within a short distance of one another the ‘well’ is in the field on the Kettlewell side of the Crag and How Gill is a little lower down on the Grassington side.

The analyses suggest that these waters have different origins. The water issuing from beneath the Crag itself is perhaps the most interesting. It has obviously had long contact with limestone and soil air (high hardness and free carbon dioxide) and it is tufa producing which may well be related to the high free carbon dioxide/hardness salt content.

To sum up – these waters show sufficient differences in composition to warrant further investigation and as for Kilnsey Crag main rising is concerned it is proposed to carry out more detailed work.

As to magnesium content and its probable relationship to dolomite intrusions it will be necessary to obtain figures of the calcium – magnesium content of the limestones in the area before forming more precise conclusions.

[99]

UPPER WHARFEDALE WATERS

SOURCE	NGR.	HARDNESS			Ca Salts	Mg. Salts	Free. CO_2	p.H.
		Total	Alk.	Non-Alk.				
Spring Dale Head Scar	9562 8045	127	103	24	98	29	3.4	8.0
Spring Dale Head Scar	9530 8041	167	143	24	121	46	0	8.3
Chow Close Gill	9543 7943	117	96	21	79	38	0	8.4
Haws Ings	9321 7838	148	122	26	128	20	3.4	7.6
Crook Gill – Cray Gill Stream	9337 7851	130	112	18	103	27	0	8.4
R. Wharfe – Hubberholme	9268 7829	79	60	19	68	11	0	8.2
Buckden Beck	9437 7736	109	88	21	92	17	0	8.4
Ki1nsey Crag Main Rising	9735 6735	246	221	25	229	17	34.1	7.1
Kilnsey – Well Under Tree	9730 6855	179	151	28	171	8	13.6	7.3
Kilnsey – How Gill	9760 6735	196	169	27	189	7	0	8.1
Black Keld	9743 7099	101	79	22	86	15	11.4	7.3
Low Mill *	0073 6324	120	89	31	108	12	4.5	7.1
R. Wharfe -* Low Mill	0069 6310	124	79	45	113	11	4.5	7.8
Braith Gill	9955 6431	177	162	15	167	10	22.7	7.2

Results in mgs $CaCO_3$ per 1000mls. N.G.R. SBD except * which are SE.

SPRINGS WOOD LEVEL

Spiders

Several spiders have been identified but Meta menardi and Meta merianae predominate.

As yet no attempt has been made to ascertain whether or not a particular species occupies a particular zone but a study of their distribution along the level has been made and the results of one of these investigations is shown in a diagramatic form on Plate 19.

It should be noted that the level runs straight for the first 600 ft (183m) the light gradually diminishing in intensity along this distance. The diagram indicates that the spiders occupy the first 200 ft (61m) of the level their numbers being greatest between 50 and 175 ft (15 to 53m) a factor confirmed by subsequent observations.

Whilst the light is relatively good throughout the first 200ft (61m), flies, which one presumes are the spiders main diet, predominate and occupy the level for a much further distance, so we are left to ponder as to why the spiders do not occupy the whole of the zone in which the flies abound – or have they bad eyesight?

Diptera

Several species of diptera occupy the level – some are present all the year round (e.g. Leria serrata) whilst others must be considered as seasonal visitors (e.g. Crumomyia nigra; Culex and caddis flies).

Leria serrata is present throughout the year and studies have been confined to this species.

These flies occupy the level throughout the whole of the twilight zone (i.e. up to 600ft (183m) and the largest concentrations occur between 100 and 350ft (30 and l07m) (Plate 19). These flies take up residence on the walls and roof and tend to congregate in shot holes where these occur. They are normally quite inactive crawling away in preference to flying if touched in all but the warmest weather. If brought out of the level and put into a temperature of say l6-l8°C (60-65°F) they become quite active and fly about as rapidly as their domestic counterparts so one would suppose they are quite sensitive to fluctuations in temperature.

They appear to spend their lifetime in the level but this cannot as yet be considered proved for one thing no larval stages have been observed to date.

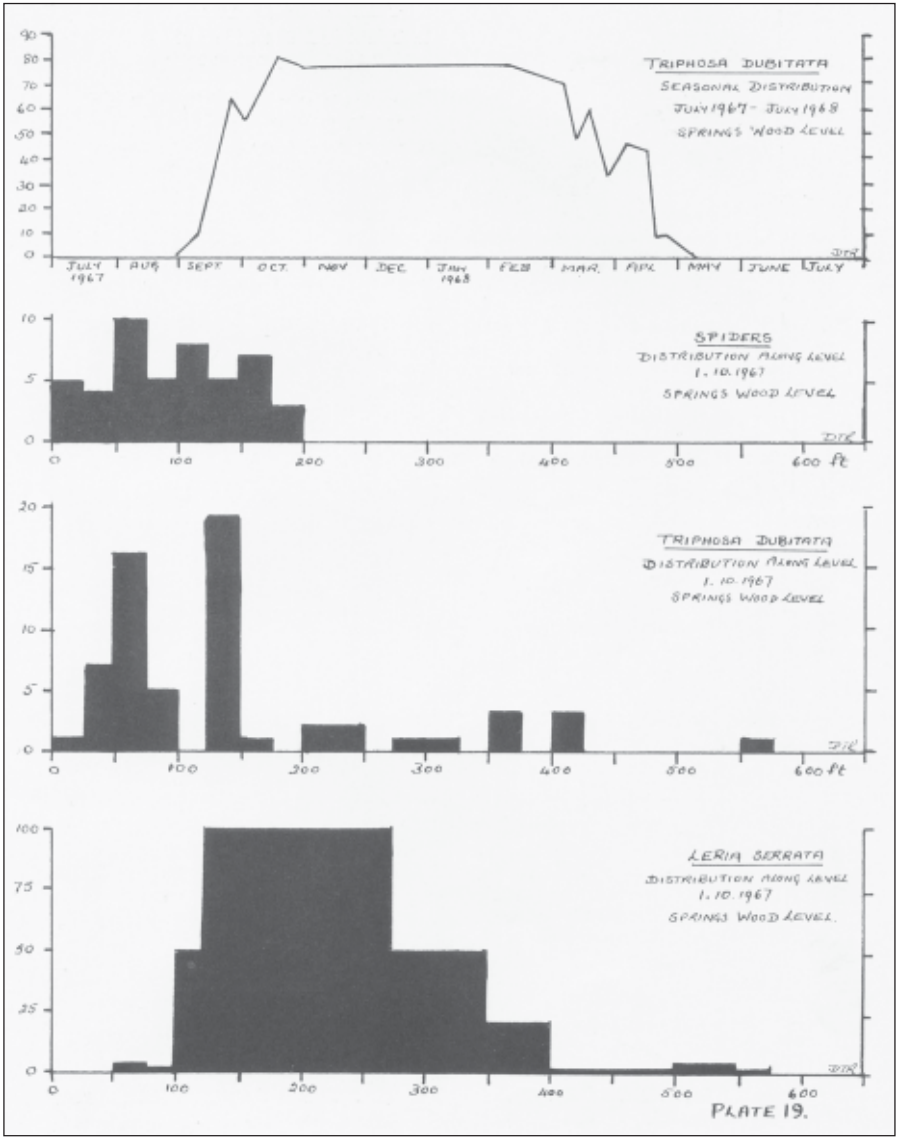
TRIPHOSA DUBITATA
SEASONAL DISTRIBUTION
JULY 1967 - JULY 1968
SPRINGS WOOD LEVEL
JULY 1967
AUG
SEPT
OCT
NOV
DEC
JAN 1968
FEB
MAR
APL
MAY
JUNE
JULY
SPIDERS
DISTRIBUTION ALONG LEVEL
1.10.1967
SPRINGS WOOD LEVEL
TRIPHOSA DUBITATA
DISTRIBUTION ALONG LEVEL
1.10.1967
SPRINGS WOOD LEVEL
LERIA SERRATA
DISTRIBUTION ALONG LEVEL
1.10.1967
SPRINGS WOOD LEVEL
600 ft

PLATE 19.

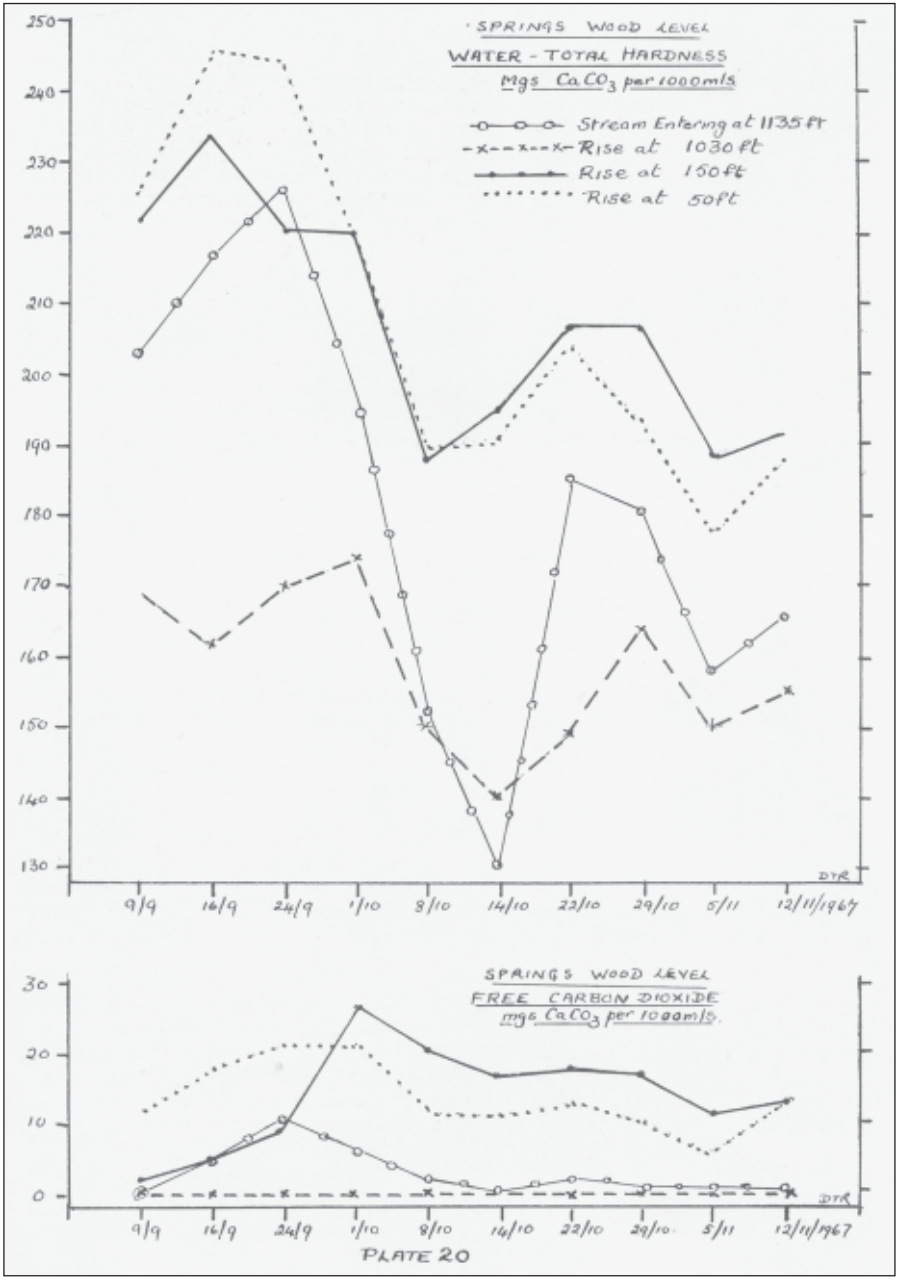
SPRINGS WOOD LEVEL
WATER - TOTAL HARDNESS
Mgs $CaCO_3$ per 1000 mls
Stream Entering at 1135 ft
Rise at 1030 ft
Rise at 150 ft
Rise at 50 ft
250
240
230
220
210
200
190
180
170
160
150
140
130
9/9
16/9
24/9
1/10
8/10
14/10
22/10
29/10
5/11
12/11/1967
DTR
SPRINGS WOOD LEVEL
FREE CARBON DIOXIDE
mgs $CaCO_3$ per 1000 mls.
30
20
10
0
9/9
16/9
24/9
1/10
8/10
14/10
22/10
29/10
5/11
12/11/1967
DTR

PLATE 20

One interesting observation which was made in 1968 was as follows – up to the 13th April there were large numbers of living L.serrata in the level but on the 20th April only one living specimen could be found – the remainder had died and their bodies were still clinging to the walls of the level. By June they were again present in large numbers. There had been no marked fluctuations in either temperature or humidity during the period.

Whatever function they perform whilst alive there is little doubt that in death they provide ample food for a number of fungi. This feature has however been dealt with in greater detail by B.D. Cubbon earlier in this edition of the Memoirs.

It remains therefore to establish what is the true life-cycle of L.serrata, whether or not they do in fact breed underground and whether or not the fungi they support in death are parasitic or saprophytic and perhaps their sensitivity to temperature.

Lepidoptera

Two species of Lepidoptera inhabit the level:-

Operophtera brumata	-	Herald Moth
Triphosa dubitata	-	Tissue Moth

The Herald moth only uses the level for the purpose of hibernating and usually appears in October and remains fully dormant until about mid-April. This moth settles down into a complete state of hibernation within a few days of arrival and once it has done this does not respond in any way whilst in that state. It has as yet not been found further from the entrance than 25ft (7.5m).

The Tissue moth provides more food for thought - this moth usually starts to arrive about the beginning of September reaching maximum numbers by about mid-October. No change in numbers takes place until the end of February or early March when they begin to diminish until no more remain by the end of May - in other words the Tissue moth spends about 9 months in the level.

It does not hibernate but remains active throughout its stay. There are times when it appears to be hibernating but if touched or subjected to a bright light quickly moves away. It does not appear to pick any particular spot in the level and can be equally found in a damp situation or a dry one. They do however appear to avoid areas subjected to continual spray. On only one occasion has a specimen been found in the true dark zone and it is considered that this one must have strayed.

Seasonal distribution and distance distribution charts are shown on Plate 19.

Other Organisms
Quite a number of other organisms have been noted in the level but as yet time has not been available for detailed study.

Waters
Water enters the level at a number of points - in particular

Down final rise at 1050ft (320m)
Down rise at 1030ft (314m)
Via roof fissure at 150ft (46m)
Via roof fissure at 50ft (15m)

Detailed studies of the composition of these and other waters have been made over a long period of time. However for the sake of simplicity only the above four sources will be considered and the discussion limited to the total hardness and free carbon dioxide contents.

Before considering the results (given in graphical form on Plate 20) the following points should be noted:-

Periods of drought occurred between 16th Sept. and 1st October and again between the 22nd and 29th October.

Very heavy rain and flooding occurred between the 6th and 15th October and the 3rd and 6th November.

The effect of these periods of drought and heavy rain on the composition of the waters is easily seen on the graphs where a rise in the total hardness of all the waters takes place during drought with a very large drop in total hardness when flooding occurs. The free carbon dioxide figures tend to follow a similar pattern.

The results indicate that the waters entering at 50 and 150ft (15m and 46m) have similar characteristics and may well have the same source but that the water at 150ft (46m) tends to have an overall higher total hardness and free carbon dioxide content than the one entering at 50ft (15m). These figures suggest that both waters have had a relatively long contact with limestone and soil air.

The water entering via the rise at 1050ft (320m) has a higher overall hardness than the one entering at 1030ft (314m) and does on

occasions (e.g. during periods of drought) contain free carbon dioxide. This suggests slow flow and long contact with limestone during drought periods and higher flow with dilution by nearby surface water during periods of heavy rain. On the other hand the figures obtained for the water entering via the rise at 1030ft (314m) suggest that this is a surface water which has travelled only a short distance from the surface before falling down the rise.

Whilst the discussion does not go into the more detailed aspects of the composition of these various waters it serves to indicate what manner of conclusions can be arrived at and in what direction further studies could take.

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