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PHYSIOLOGIC RACE SURVEY

FINAL REPORT

1969

NOT FOR PUBLICATION

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Physiologic Race Survey Committee (Cereal Pathogens)

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Physiologic Race Surveys - Final Report for 1969

Introduction

The majority of disease samples collected for physiologic race identification in 1969 have now been tested. The results of the identifications are presented in the following pages.

In 1969 the number of disease samples sent to the four centres was the highest in the three years the surveys have been officially conducted. 1,741 samples of disease were collected in 1969 compared with 932 in 1968 and 1,034 in 1967 (Table 1).

Table 1. Numbers of disease samples collected for race identification

Disease	No. of Samples		
	1967	1968	1969
Yellow rust - Wheat	343	118	227
Yellow rust - Barley	48	49	48
Brown rust - Barley	-	40	289
Grown rust - Oats	17	4	28
Mildew - Wheat	122	253	173
Mildew - Barley	173	283	359
Mildew - Oats	42	31	105
Rhynchosporium - Barley	227	137	512
Leaf spot - Oats	62	17	-
TOTAL	1034	932	1741

The samples were collected by Advisory Plant Pathologists, NIAB Regional Trials Officers, members of the British Association of Plant Breeders and staff of Agricultural Research Stations and Colleges of Agriculture/Agricultural Science in England, Wales, Scotland, N. Ireland and Eire. We are grateful to all participants who have contributed to the race survey by collecting disease samples (Table 2) and we hope for your co-operation in the future.

In the 1969 survey 78 different races were identified and some of these were new, not having been recorded in Britain by previous surveys.

Some of the races were identified from samples collected from hitherto resistant varieties and are potentially important. The other races were variants of existing races or race groups and are less important. The effect these new races will have on cereal varieties has yet to be determined by tests carried out under controlled conditions in the glasshouse and also field tests. It will not be until samples collected in 1970 are identified that the spread of the new races can be assessed, and thus their potential importance as causes of loss of yield in cereals determined. Therefore participants are asked, in 1970, to look especially for any sign of the diseases being investigated, on any resistant varieties, or varieties on which a new race has recently been identified.

The results are now presented in one table only and are grouped into regions. England is divided according to the NABS regions. Within each region the results are divided into counties and sites within a county. It was felt that this arrangement would be more meaningful in that the prevalence of a race(s) in a given region or county could be easily ascertained as compared with the previous reports. The abbreviations used in the tables are as follows:--

F.T.E. - Failed to establish  
N.Y.T. - Not yet tested

Table 2.

Source of samples collected in 1969

	Wheat Yellow Rust	Barley Yellow Rust	Barley Brown Rust	Oat Crown Rust	Wheat Mildew	Barley Mildew	Oat Mildew	Rhynchosporium	Total
NIAS Plant Pathologists	27	7	68	2	33	120	5	99	361
NIAB Regional Trials Officers	89	1	22	18	54	57	21	61	322
NIAB Headquarters	65	15	123	5	6	28	10	215	467
British Assoc. of Plant Breeders	8		1		30	40	8	39	126
Dept. of Agriculture for Scotland	1				36	66	1	1	105
Scottish Agricultural Colleges	22	17	48				15	54	156
Plant Breeding Institute	3		2			5			10
Welsh Plant Breeding Station			1		2	4	11		18
University of Reading								8	8
Dept. of Agriculture, Eire	2		8	1	4	0	8	3	26
Agricultural Services, N. Ireland			3		2	17	21	26	69
Guernsey							2		2
Others	10	8	13	2	6	22	3	7	71
TOTAL	227	48	289	28	173	359	105	512	1741

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1. During 1969, 227 samples of wheat yellow rust were received by the N.I.A.B.

2. Varieties from which samples were received  
Winter wheat varieties are given in Table 3, spring wheat varieties in Table 4.

Table 3

Winter wheat	No. of samples
Cappelle-Desprez	25
Hybrid 46	15
Maris Beacon	14
Gama	13
Maris Ranger	11
Champlein	10
Mildress	10
Viking	7
Joss Cambier	6
Maris Settler	6
Maris Widgeon	6
Zorba (Engelen 565)	6
Heima Desprez	3
Tommy (Benoiist 1499)	3
Maris Envoy	2
Maris Nimrod	2
Maris Teal	2
TJB 32/218 B	2
Armentieres (D 36/5)	1
Bouquet (FDA 15)	1
Elite Lepuple	1
Marglin	1
Rothwell Perdix	1
Chalk (Rothwell 355)	1
Rothwell 63116	1
West Desprez	1
TOTAL	151

Table 4

Spring Wheat	No. of samples
Rothwell Sprite	10
Janus	4
Kloka	3
Kolibri	3
Opal	3
Sirius	3
Clarion	2
Koga II	2
Maris Butler	2
Svenno	2
Kleiber (HPG 2772/60)	1
Maris Ensign	1
Pompe (W9248)	1
Troll	1
Rask (W11276)	1
W11693	1
Drabant (W11882)	1
TOTAL	41

An additional 35 samples were received from other varieties, many of them in yellow rust nurseries. These varieties were:- Triticum vulgare (10), Heines VII (5), Lucas (3), Apex, Bon Fermier, Democrat, Dippes Triumph, Fiorello, Flamingo, Gains Winter Wheat, Harvest Queen, Heines Kolben, Little Club, Peko, Persian, Professeur Marchal, Rubis, Tadorna and an unknown variety.

### 3. Race Identification

A total of 194 samples were tested in 1969. Of these 9 were from inoculated plots. A high percentage of samples were identified as mixtures of two or more races or gave unusual reactions on the differential varieties. The results of all tests are shown in Table 5.

Table 5 Yellow rust of wheat - race identification

Location	N.I.A.B. Code No. 1969/-	Date of reception 1969	Variety	Race
<u>Northern Region</u>				
Northumberland Cockle Park	159 188 189 190 191 192 193 194 195 196 217	17/7 8/8 " " " " " " " " 19/8	Rubis Heines VII Dippes Triumph Flamingo Rothwell Sprite Tadorna Cama Maris Settler Heines Kolben Cappelle-Desprez Mildress	60 60 60 60 60 60 58C 58C 60 3/55? 60
<u>East Midlands Reg.</u>				
Leicestershire Sutton Bonington	118 119 120 121 122	8/7 " " " "	Bon Fermier Harvest Queen Mildress Lucas Persian	3/55 3/55 FTE 3/55 3/55
Lincolnshire Boston	186 187	7/8 "	Chalk Cama	60 3/55D
Friskney	116 117	1/7 "	Cappelle-Desprez Hybrid 46	FTE "
Gosberton	93 94	30/6 "	Hybrid 46 Cappelle-Desprez	3/55 3/55
Wylveham	43	25/6	Hybrid 46	3/55
Northamptonshire Farthinghoe	161	15/7	Janus	3/55
<u>West Midland Region</u>				
Herefordshire Rosemaund	160 221	17/7 25/8	Cappelle-Desprez Kleiber	3/55 FTE
Warwickshire Drayton	109 110 111 125	2/7 " " 11/7	Maris Widgeon Cappelle-Desprez Hybrid 46 Kloka	FTE " " 3/55
Worcestershire Kinver	151 162	14/7 17/7	Cappelle-Desprez Joss Cambier	3/55 60

Table 5 cont'd.

Eastern Region							
Cambridgeshire Boxworth Lolworth	36	19/6	Cappelle-Desprez	3/55			
	20	10/6	Champlein	3/55			
	123	10/7	Maris Ranger	FTE			
N.I.A.B.	176	29/7	Maris Beacon	Brown rust			
	5	4/6	Hybrid 46	FTE			
	9	9/6	Michigan Amber	3/55+60			
	10	"	Lucas	58C			
	11	10/6	} - Triticum vulgare samples from inoculated plots	60			
	12	"		3/55D?			
	13	"		3/55			
	14	"		8B			
	15	"		58C			
	16	"	2B	60			
17	"	} -	3/55D?				
18	"		3/55+60				
19	"		58C				
21	12/6	Cama	60				
22	"	Democrat	60				
23	"	Fiorello	58C				
24	17/6	Tommy	3/55				
25	"	Helma Desprez	3/55+				
26	"	Cappelle-Desprez	3/55				
27	"	Hybrid 46	3/55				
28	"	Rothwell Sprite	60				
29	"	Viking	3/55				
53	30/6	Cama	58C				
54	"	Maris Settler	58C				
55	"	Maris Beacon	3/55				
56	"	Maris Envoy	3/55				
57	"	Maris Settler	3/55D				
58	"	Maris Beacon	3/55				
113	7/7	Joss Gambier	3/55				
205	14/8	Peko	60				
50	25/6	Maris Envoy	FTE				
51	"	TJB 32/218 B	58C				
124	10/7	Maris Beacon	3/55D				
126	15/7	Maris Beacon	3/55D				
163	16/7	Maris Beacon	3/55D				
Essex	112	7/7	Champlein	3/55			
	77	1/7	Cappelle-Desprez	3/55			
	37	24/6	Mildress	60			
	38	"	Professeur Marchal	3/55 Cleo			
	166	22/7	Cama	3/55D			
	179	30/7	Cama	3/55D			
	180	"	Joss Gambier	Brown rust			
	95	2/7	Champlein	3/55			
	76	1/7	Rothwell Perdix	3/55+ 58C+?			
	Hertfordshire Rothamsted	78	30/6	Gaines Winter	LB		
167		22/7	Wheat Rothwell Sprite	3/55			
Norfolk Docking Hilgay	177	28/7	Maris Ranger	FTE			
	1	30/5	Champlein	FTE			
	2	2/6	Champlein	3/55			
	3	"	Hybrid 46	3/55+58C			
	4	"	Cappelle-Desprez	3/55			
	44	25/6	Cappelle-Desprez	3/55			
	45	"	Hybrid 46	FTE			
	46	"	Champlein	3/55			
	152	16/7	Rothwell Sprite	LB			
	153	"	Maris Ranger	3/55			
154	"	Viking	3/55				
155	"	Heines VII	60				
156	"	Hybrid 46	3/55				
157	"	Armentieres	3/55D				
158	"	Cappelle-Desprez	3/55				

Table 5 cont'd.

Terrington	96	1/7	Svenno	3/55
	97	"	Koga II	3/55 Cleo +60
	98	"	Rask	3/55
	99	"	Maris Butler	3/55
	100	"	Pompe	FTE
	101	"	Drabant	3/55
	102	"	Kloka	3/55
	103	"	Cappelle-Desprez	3/55
	104	"	Hybrid 46	3/55
	105	"	Maris Widgeon	3/55
	106	"	Rothwell Sprite	3/55
	107	"	Heines VII	60
	108	"	Viking	3/55
	127	15/7	Maris Ensign	3/55
	128	"	TJB 32/218 B	3/55
	129	"	Maris Settler	3/55
	130	"	Sirius	LB
	131	"	Maris Butler	3/55
	132	"	W11693	3/55
	133	"	Rothwell 63116	3/55
	134	"	Maris Ranger	LB
	135	"	Rothwell Sprite	60
	136	"	Heines VII	60
	137	"	Maris Nimrod	3/55
	138	"	Hybrid 46	3/55
	139	"	Maris Widgeon	3/55
	140	"	Maris Widgeon	3/55
	141	"	Viking	60
	142	"	Elite Lepeuple	3/55
	143	"	Cama	3/55D
	144	"	Cappelle-Desprez	3/55
	145	"	Champlein	3/55
	146	"	Joss Cambier	3/55
	147	"	Maris Ranger	3/55
	148	"	Maris Ranger	FTE
	149	"	Maris Teal	3/55
	150	"	Unknown	3/55
South East Region				
Berkshire				
Reading	169	24/7	Joss Cambier	FTE
Buckinghamshire				
Stokenchurch	115	8/7	Triticum vulgare	3/55
	171	22/7	Cappelle-Desprez	2B
	172	"	Champlein	3/55
	173	"	Sirius	FTE
	174	"	Sirius	60
	175	"	Kolibri	60
Hampshire				
Sparsholt	119	8/8	Viking	FTE
Kent				
Romney Marsh	52	26/6	Cappelle-Desprez	58C?
Wye	6	4/6	Cappelle-Desprez	3/55
	7	"	Champlein	2B
	8	"	Hybrid 46	FTE
	30	19/6	Mildress	3/55
	31	"	Tommy	3/55 +58C
	32	"	Maris Ranger	3/55
	33	"	Zorba	3/55 +58C
	34	"	Cama	3/55
	35	"	Maris Beacon	3/55
	59	1/7	Rothwell Sprite	FTE
	60	"	West Desprez	2B
	61	"	Bouquet	2B
	62	"	Mildress	3/55 +58C



Table 5 cont'd.

				1/7	Maris Beacon	3/55D
				"	Viking	60
				"	Heines VII	3/55
				"	Maris Widgeon	3/55
				"	Cappelle-Desprez	3/55
				"	Maris Nimrod	3/55D
				"	Margjn	3/55
				"	Champlein	3/55
				"	Heima Desprez	3/55
				"	Tommy	3/55
				"	Hybrid 46	3/55
				"	Maris Ranger	3/55D
				"	Zorba	3/55
				"	Kloka	+60
				"	Rothwell Sprite	3/55
				"	Maris Widgeon	3/55
				"	Joss Cambier	3/55
				"	Mildress	3/55?
				"	Maris Ranger	3/55D
				"	Maris Ranger	1B
				"	Viking	3/55
				"	Zorba	3/55
				"	Cama	3/55D
				"	Maris Teal	3/55
				"	Maris Ranger	3/55
				"	Maris Beacon	3/55
				"	Heima Desprez	3/55D
				"		60
<u>South West Region</u>						
Devon						
Cannington	181	30/7	Troll	3/55		
	182	"	Janus	2B		
	183	"	Clarion	FTE		
Seale-Hayne	185	7/8	Opal	3/55		
	202	11/8	Svenno	FTE		
	203	"	Clarion	3/55		
	204	"	Rothwell Sprite	60		
Gloucestershire						
Cirencester	114	7/7	Janus	3/55D		
	178	20/7	Janus	3/55		
Somerset						
Spaxton	39	23/6	Zorba	3/55		
	40	"	Mildress	+60		
	41	"	Maris Beacon	3/55		
	42	"	Cama	+58C		
	47	24/6	Mildress	3/55		
	48	"	Cama	+58C		
	49	"	Maris Beacon	3/55D		
Wiltshire						
Chitterne	168	21/7	Cappelle-Desprez	3/55		
Wales						
Anglesey	197	8/8	Apex	1B		
Scotland						
Angus						
Carnoustie	218	19/8	Koga II	FTE		
Berwickshire						
Duns	211	14/8	Cappelle-Desprez	3/55		
	212	"	Hybrid 46	1B		
	213	"	Rothwell Sprite	FTE		
	222	1/9	Hybrid 46	58C+?		
	223	"	Mildress	No yellow rust		

Table 5 cont'd.

	224	1/9	Zorba	No yellow rust
West Foulden	225 226 206 207 208 209	" " 14/8 " " "	Maris Beacon Maris Beacon Mildress Zorba Maris Beacon Maris Settler	3/55 3/55 3/55 3/55 FTE FTE
Edinburgh	200 201 170	12/8 " 22/7	Opal Lucas Cappelle-Desprez	3/55 3/55 3/55
East Craigs				
East Lothian				
Gullane	214 215 227 228	14/8 " 1/9 "	Cappelle-Desprez Cama Cappelle-Desprez Cama	60+1B 58C 3/55 3/55
N. Belton	164 165 198	21/7 " 8/8	Cappelle-Desprez Cappelle-Desprez Maris Settler	2B 2B 58C
Winton Hill				
Perthshire				
Invergowrie	219 220	19/8 "	Opal Little Club	3/55 3/55 Cleo +58C
<u>Fire</u>				
Co. Kildare				
Backweston	216	14/8	Kolibri	FTE

FTE = Failed to establish  
? = Unsatisfactory test

Table 6 Summary of wheat yellow rust identification

Race	Number of samples	Frequency as % of samples tested
1B	7	3.78
2B	7	3.78
3/55	98	52.97
3/55 Cleo	1	0.54
3/55D	17	9.18
58C	11	5.94
60	25	14.05
Mixed races	19	10.27
ex inoculated plots	9	
Failed to establish	33	% failure 14.09
TOTAL	227	

Race 3/55

In 1969 the race 3/55 group was most frequently identified, being obtained from 63% of the samples tested. Race 3/55 was separated into three distinct types depending on the reaction on the differential varieties.

The most frequently identified type of race 3/55 has been named 3/55 Opal by Stubbs (Holland) because it initially caused severe infections on the variety Opal. This race is widespread in the British Isles and is the main cause of infection on varieties such as Cappelle-Desprez, Champlein and Hybrid 46.

Three samples of yellow rust, 69/38 from Dunmow, 69/97 from Terrington and 69/220 from Invergowrie were identified as race 3/55 Cleo or a mixture of race 3/55 Cleo and another race. Race 3/55 Cleo has not been recorded by the race surveys in previous years and therefore this race is new to Britain. The race has basically the same host range as the other two types of race 3/55.

The third type of race 3/55, now named 3/55D, was first recorded by the race surveys in 1969 and it was important because of its ability to infect the hitherto resistant variety Maris Beacon. In all, 17 samples were identified as race 3/55D. These samples were collected from widely scattered places mainly in the south of England, and from several different varieties as shown in Table 7.

Table 7 Samples identified as race 3/55D

N.I.A.B. No.	Location	Variety
69/47	Spaxton, Somerset	Gama
69/57	N.I.A.B., Cambridge	Maris Settler
69/63	Wye, Kent	Maris Beacon
69/68	"	Maris Nimrod
69/74	"	Maris Ranger
69/84	"	"
69/88	"	Gama
69/91	"	Maris Beacon
69/114	Cirencester, Glos	Janus
69/124	P.B.I., Cambridge	Maris Beacon
69/126	Thriplow, Cambs	"
69/143	Terrington, Norfolk	Gama
69/145	Morley, Norfolk	Armentieres
69/157	Thriplow, Cambs.	Maris Beacon
69/163	Hockley, Essex	Gama
69/166	"	"
69/179	"	"
69/187	Boston, Lincs	"

Race 3/55D has a similar pattern of reactions on the differential varieties as race 3/55 Opal; but with added virulence on Maris Beacon and Gama. Neither of these varieties were included in the differential sets in 1968 and therefore 28 of the samples identified as race 3/55 in 1968 were re-tested on differentials, in which the variety Gama was included. In all cases Gama was resistant to infection and it was concluded that race 3/55D was not present in 1968.

However in 1969 a sample of rust, obtained from the variety Maris Beacon, was identified as race 3/55 on basic differentials but with added virulence on Maris Beacon. The isolate was however unable to infect seedlings of Gama. It would therefore seem that another type of 3/55 is present in Britain. To determine if this variant was present in 1968, samples identified as race 3/55 in 1968 will be tested on the variety Maris Beacon.

#### Race 60

Race 60 was the next most frequently identified race in 1969, being identified from 14% of the samples tested. The frequency with which this race has been identified, has declined steadily for the last three years, when, in 1966-67 it was the most frequently identified race.

The decline of race 60, together with the increase of the race 3/55 group, is probably associated with a change in the pattern of varieties grown in Britain. Very few winter wheat varieties grown commercially are susceptible to race 60, compared with 1966-67 but the large majority of these varieties are susceptible to one or more of the types within the race 3/55 group. Therefore race 3/55 has been able to increase in frequency and the lack of a susceptible host has resulted in the decline of race 60.

### Race 58C

Since it was first identified in 1967, race 58C has been recorded very few times. In 1969 only four samples were obtained from sites away from any source of artificial inoculum. Two samples were obtained from Cockle Park (Northumberland) and one each obtained from Gullane and Winton Hill in East Lothian. It was from these same two areas that samples of race 58C were obtained in 1968. The remaining samples of race 58C were obtained from the trial grounds at the N.I.A.B. and P.B.I., Cambridge.

Eight samples of yellow rust collected in the south of England were identified as mixtures of two races, one of these being race 58C. This may indicate that the race has spread from the North.

### Race 2B

In the early 1950's race 2B, also known as the Cappelle race, was very important and was the most frequently recorded race in Britain. Gradually the frequency of the race declined until in 1968 it was not identified from any samples and it was thought that the race had become superceded by the race 3/55 group which has basically the same host range as race 2B. However in 1969 seven samples of race 2B were identified. Race 2B has not therefore been completely superceded by race 3/55 and it will be of interest to see if there is any increase in its frequency.

### Race 1B

For the first time in Britain samples of rust were obtained, which were identified as race 1. Subsequent tests at the N.I.A.B. and also by Dr. Eva Fuchs in Germany have shown that the 1969 isolates of race 1 are different from race 1, identified by Fuchs when tested on differential varieties. It is therefore proposed to name the British isolates Race 1B.

In 1969 seven isolates of race 1B were identified from six widely scattered sites in the British Isles; and from several different varieties as shown in Table 8.

Table 8 Samples identified as race 1B

N.I.A.B. No.	Location	Variety
69/78	Rothamsted, Herts.	Gaines winter wheat
69/85	Wye, Kent	Maris Ranger
69/130	Terrington, Norfolk	Sirius
69/134	"	Maris Ranger
69/152	Morley, Norfolk	Rothwell Sprite
69/197	Anglesey	Apex
69/212	Duns, Berwick	Hybrid 46

The importance of race 1B lies in its ability to infect the hitherto resistant variety Maris Ranger. Its importance in the field has yet to be determined, but in seedling tests it has proved to be virulent in its reaction on a large number of varieties. It is disturbing that the race should have been identified from so many widely scattered sites in Britain but it will not be until the 1970 samples of rust are identified that the spread of the race can be determined.

Several samples collected in 1969, when tested on differential varieties, gave mixed and unusual reactions. The majority of these samples were re-tested and confirmed mixtures but some of the mixtures again gave unusual reactions on the differential varieties. Further tests are still in progress to determine the possible presence of other new races of yellow rust.

Yellow rust - barley

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1. During 1969 48 samples of barley yellow rust were received at the NIAB.
2. Varieties from which samples were received  
One sample only was received from a winter barley variety (Bigo). The spring barley varieties are shown in Table 9.

Table 9

Spring Barley	No. of Samples
Berac (GIV490/4)	5
Clermont (BKF 15)	4
Betina (Ringot V34)	3
Julia	3
Vada	3
Wing (W6040)	3
Akka	2
Deba Abed	2
Golden Promise	2
Hassan (Gebeco 6402)	2
Impala	2
Sultan	2
Crusader	1
Felda	1
Imber	1
Inis	1
LBW 5542/60/4	1
Lofa Abed	1
Midas	1
Mosane	1
Proctor	1
Tern	1
VR 555B	1
Ymer	1
Zephyr	1
Unknown	1
TOTAL	47

3. Race identification

26 of the barley yellow rust samples were successfully tested. Race 23 was only identified once, the remaining samples being identified as race 24. The results of all the tests are shown in Table 10.

Table 10 Barley yellow rust race identification

LOCATION	NIAB CODE NO. 13/1969	DATE OF RECEPTION 1969	VARIETY	RACE
<u>Eastern Region</u>				
Cambridgeshire	2	7/7	Golden Promise	FTE
-NIAB	5	15/7	Crusader	24
	11	16/7	Deba Abed	24
	12	"	Vada	24
	16	21/7	VR 555B	24
	17	"	Berac	24
	18	"	Felda	24
	19	"	Betina	24
	20	"	Betina	24
	21	"	Berac	24
	22	"	Berac	24
	23	"	Clermont	24
	24	"	Clermont	24
	25	"	LBW 554/2/60/4	24
Essex -				
- Dunmow	1	24/6	Akka	23
Norfolk -				
- Terrington	6	15/7	Vada	24
<u>South East Region</u>				
Buckinghamshire -				
- Stokenchurch	3	8/7	Akka	24
	4	"	Julia	24
	8	14/7	Clermont	FTE
	9	"	Betina	24
	10	"	Vada	24
	13	15/7	Imber	24
	14	"	Hassan	Brown rust
Hampshire -				
- Monk Sherborne	15	16/7	Zephyr	FTE
- Sparsholt	43	8/8	Bigo	FTE
Kent -				
- Wye	26	21/7	Deba Abed	24
	27	"	Mosane	24
	28	"	Sultan	24
	29	"	Berac	24
	30	"	Inis	24
<u>Wales</u>				
Pembrokeshire -				
- Boncath	7	14/7	Julia	No yellow rust
<u>Scotland</u>				
Caithness -				
- Thurdistoft	31	30/7	Ymer	No yellow rust
	32	"	Wing	"
	33	"	Wing	"
	34	"	Golden Promise	"

Table 10 (conts.)

LOCATION	NIAB CODE NO. 13/1969	DATE OF RECEPTION 1969	VARIETY	RACE	
- Thurdstoft	35	30/7	Midas	No Yellow rust	
	36	"	Lofa Abed	"	
	37	"	Clermont	"	
	38	"	Julia	"	
	39	"	Sultan	"	
	40	"	Hassan	"	
	41	"	Berac	"	
	42	"	Impala	Brown rust	
	Fife - - Pilnuir	44	27/8	Proctor	FTE
		45	"	Impala	"
46		"	Wing	"	
47		"	Term	24	
48	"	Unknown	FTE		

FTE = Failed to establish

The 1969 race survey again reflects the dominance of race 24 of barley yellow rust. Only one sample, i.e. the first sample received, was identified as race 23. This agrees with previous surveys which have found that race 23 appears in the field early in the season when the weather is cooler, and race 24 later in the season. As the large majority of samples were collected in July it was to be expected that race 24 would be dominant.

The widespread occurrence of race 24 is probably also due to the susceptibility of barley varieties. Relatively few varieties are resistant to race 24 whereas the majority of varieties grown commercially are resistant to race 23.

Participants are requested to collect samples of barley yellow rust as early in the season as possible.





Brown rust - barley  
Welsh Plant Breeding Station, Aberystwyth  
B. Clifford

1. The Welsh Plant Breeding Station received 289 samples of barley brown rust during 1989.

2. Varieties from which samples were received

Two samples were received from the winter barley Maris Otter. Spring barley varieties are given in Table 11.

Table 11

Spring Barley	No. of Samples
Sultan	25
Proctor	21
Akka	16
Clermont (BKF 15)	14
Midas	14
Zephyr	13
Inis	13
Feida	12
Impala	11
Julia	11
Deba Abed	11
Maris Canon (HB380/22)	10
Gerakra	10
Imber	9
Ruby	8
Wing (W. 6040)	8
Vada	8
Berac (CIVL90/4)	7
Lofa Abed (Abed 0317)	6
Tern	6
Hassan (Cebeco 6402)	6
Golden Promise	5
Anchor (Twyfords 59/7)	5
Crusader	3
Betina (Ringot V. 34)	3
Bala	3
Guardsman (PAJ 545/2)	2
Streng 1223	2
Peronia (W309/65)	2
155/49	2
Pegasus (Elgina)	1
Freegold (GPF 65)	1
HO 149/1	1
Mazurka (MGH 62663)	1
VR 555 B	1
TOTAL	259

A further 28 samples were received from the following varieties:- Tellus (2), Rika (2), Ymer (2), CI.1237 (2), Maris Concord, Banba, Helias, Kristina, Union, Cambrinus, Topper, Pallas, HB411, Domen x Pallas, Nessa, S.V.P., WPBS 10487 CO/3, IBDN-69, No.109, Maris Beacon, Maris Teal, Hordeum murinum, a winter segregate and 2 samples from unknown varieties.

3. Race identification

75 of the 289 samples were cultured successfully and the race identified. Eight race groups were identified and the number of samples identified in each group is shown in Table 12. The full results are shown in Table 13.

Table 12

Race group	No. of samples
A	3
B	8
C	5
D	7
E	16
F	23
G	9
H	4
Failed to establish	214
TOTAL	289







Landscape, Ashburton	207	Gerkra	"	
	208	Crusader	"	
	209	Deba	"	
		Abed	"	
		Akka	"	
Mortehoe	211	Sultan	E	
	156	Proctor	FTE	
	157	Gerkra	"	
	158	Wing	"	
	159	Maris	"	
	160	Otter	"	
	161	Akka	"	
	162	155/49	H	
	199	Felda	FTE	
Millbrook	200	Ruby	"	
	201	Clermont	"	
	202	Inis	"	
	203	Imber	D	
	204	Deba	"	
	205	Abed	FTE	
Posbury, Crediton	4	Gerkra	"	
	5	Akka	"	
	194	Sultan	"	
	195	"	"	
	196	Iofa	"	
	197	Abed	"	
	198	Julia	F	
		Gerkra	FTE	
		Maris	"	
		Otter	"	
	163	Julia	H	
Roborough	164	Akka	FTE	
	165	Felda	F	
	166	Midas	FTE	
	167	Imber	F	
	168	Rika	FTE	
	169	Ruby	"	
	170	Impala	F	
	171	Proctor	FTE	
	172	Clermont	"	
	173	Proctor	"	
	174	Deba	"	
	175	Abed	"	
	176	Sultan	F	
		Iofa	"	
		Abed	"	
	177	Zephyr	E	
	178	"	E	
	179	Tern	G	
	193	Berac	G	
	54	Maris Teal	FTE	
	55	Maris	"	
Seale Hayne	217	Beacon	"	
	218	Wing	"	
	219	Maris	D?	
		Proctor	FTE	
Dorset	183	Zephyr	FTE	
Portesham	184	Deba	"	
		Abed	C?	
	185	Felda	FTE	
	186	Ruby	B	
	187	Midas	FTE	
	188	Sultan	"	
	125	Ruby	"	
Woodcuts				
Gloucestershire	124	Sultan	"	
Chedworth	289	"	G	
Cirencester				
Somerset	189	Midas	FTE	
Ilminster	190	Proctor	"	
	191	Gerkra	G	
	192	Sultan	E	

Table 13 cont

Wiltshire								
All Cannings	182	24/7	Sultan	E				
Boyton	118	21/7	"	FTE				
	119	"	Felda	"				
	120	"	Ruby	"				
	121	"	Zephyr	"				
	123	"	Golden	"				
			Promise	"				
			Julia	2				
Cotford		"						
Wales								
Cardiganshire								
Tympyfarch	288	29/10	IBDN-69	E				
			No. 109					
W. P. B. S. Aberystwyth	1	24/6	Winter	F				
			segregate					
Ystrad Meurig	227	8/8	Proctor	FTE				
Scotland								
Angus								
Aldbarr, Brechin	206	31/7	Ymer	F				
Woodhill, Carnoustie	245	19/8	Proctor	F				
	246	"	Impala	FTE				
	247	"	Inis	F				
	248	"	Julia	E				
	249	"	Sultan	F				
	250	"	Vada	FTE				
	251	"	Lofa					
			Abed	F				
	252	"	Maris					
			Canon	F				
	253	"	Hassan	F				
	254	"	Betina	FTE				
	255	"	Wing	F				
	256	"	Akka	F?				
Fife								
Dunfermline	243	13/8	"	FTE				
Pilmuir, Leven	261	19/8	Proctor	E				
	262	"	Impala	E				
	263	19/8	Inis	F				
	264	"	Julia	FTE				
	265	"	Sultan	"				
	266	"	Vada	"				
	267	"	Lofa					
			Abed	E				
	268	"	M. Canon	B				
	269	"	Hassan	FTE				
	270	"	Betina	"				
	271	"	Wing	"				
	272	"	Tern	F				
Kinross-shire								
Walkmill	242	13/8	Ymer	FTE				
Perthshire	273	25/8	Proctor	"				
Blairgowrie	274	"	Impala	"				
	275	"	Inis	"				
	276	"	Julia	"				
	277	"	Sultan	A				
	278	"	Vada	FTE				
	279	"	Lofa					
			Abed	F				
	280	"	Maris					
			Canon	FTE				
	281	"	Hassan	"				
	282	"	Betina	"				
	283	"	Wing	"				
	284	"	Tern	"				
	285	"	Akka	"				
Invergowrie	257	19/8	Union	"				
	258	"	Cambrinus	"				
	259	"	Topper	"				
	260	"	C1 1237	F				
West Lothian								
Linlithgow	238	12/8	Impala	FTE				

Table 13 cont

					" F FTE
<u>Northern Ireland</u> Co. Armagh Loughgall	239	12/8	Inis	"	
	240	"	Wing	"	
	241	"	Akka	"	
<u>Eire</u> Co. Kildare Backweston	225	5/8	Pallas	"	
	226	"	Domen x Pallas	"	
	228	8/8	Sultan	"	
	229	"	Julia	"	
	230	"	Banba	"	
	231	"	Nessa	"	
	232	"	Ruby	"	
	233	"	Kristina	"	
	234	"	Hellas	"	
	235	"	Inis	"	

? = Unsatisfactory test.

FTE = Failed to establish.



The 5 major race groups detected in the 1968 survey were again isolated in the current survey. In addition to these know race groups, three further groups were detected, bringing the total number of race groups to 8. The reactions of these race groups to the standard set of 11 differential varieties are given below (Table 14).

Table 14  
Reaction of barley brown rust race groups on  
differential varieties

Race Group	Differential										
	Bolivia	Reka I	Quinn	Sudan	Gold	Egypt 4	Estate	Batna	Peruvian	Cebada Capa	Ricardo
A	R	R	R	S	S	R	R	R	R	R	R
B	R	R	R	S	S	S	R	R	R	R	R
C	R	R	R	S	S	S	R	R	R	R	R
D	R	R	S	R	S	S	R	R	R	R	R
E	R	R	S	R	S	S	R	R	R	R	R
F	R	R	S	R	S	S	R	R	R	R	R
G	R	R	S	R	S	S	R	R	R	R	R
H	R	R	S	R	S	S	R	R	R	R	R

Of the three additional races detected this year, group F was the most common and the most widely virulent on the standard set of differentials. Most samples of this race came from Scotland although it also occurred in Wales, Devon and Kent.

The surveys made to date indicate that Puccinia hordei exists in a number of physiologically specialised forms in Britain which are, together, capable of overcoming a number of host resistance genes represented in the set of differential varieties. None of these genes is present in British commercial varieties and breeders should take into account the level of specialisation which already exists in the rust population. Of the differential varieties, only Estate and Cebada Capa provide resistance to all cultures tested.



Crown Rust - oats

Welsh Plant Breeding Station Aberystwyth

B. Clifford

1. During 1969 28 samples of oat crown rust were received by the Welsh Plant Breeding Station.
2. Varieties from which samples were received  
Winter oat varieties are given in Table 15, spring oat varieties in Table 16.

Table 15

Winter Oat	No. of samples
Maris Quest	3
Pendrwn	2
Padarn	1
Peniarth	1
TOTAL	7

Table 16

Spring Oat	No. of samples
Astor	4
Mostyn	2
SY60430	1
Condor	1
Bento	1
Helga (CB 6571)	1
Rosinante	1
AJB 4/1/B2	1
Cebeco 6731	1
Mero (MCH 63258)	1
Selma	1
Manod	1
Ponta	1
TOTAL	17

A further 4 samples were received, from wild oats, WPBS 6316 on 18/4/14 and two from volunteer plants.

3. Race identification

Eleven races were identified from the 1969 samples. The full results of all tests are shown in table 17.

Table 17 Crown rust of oats - race identification

Location	W.P.B.S. Code No. CRS/1969	Date of re-ception 1969	Variety	Race
<u>Eastern Region</u>				
Essex -				
- St. Osyth	28	27/10	Volunteer oats	234*
<u>South East Region</u>				
Hampshire -				
- Sparsholt	23	8/8	Volunteer oats	272*
Kent -				
Wye	2	16/7	Maris Quest	235
	3	"	Padarn	275*
	4	"	Peniarth	330
	5	"	Pendrwm	275*
<u>South West Region</u>				
Cornwall -				
- Boscastle	25	29/8	Manod	234*
	26	"	Astor	251
- St. Erth	6	21/7	WPBS 6316 Cn 18/4/14	232*
Devon -				
- Landscope	10	31/7	Astor	251
- Roborough	7	24/7	Wild Oats	251
- Seale-Hayne	1	16/7	Maris Quest	251
	8	24/7	Pendrwm	296
	9	"	Maris Quest	251
	11	5/8	SV 60430	251
	12	"	Condor	296
	13	"	Bento	251
	14	"	Helga	296
	15	"	Rosinante	FTE
	16	"	Mostyn	275*
	17	"	AJB 4/1/B2	FTE
	18	"	CB 6731	"
	19	"	Ponta	265
	20	"	Mero	275*
	21	"	Astor	275*
	22	"	Selma	Vic-toria race?
<u>Wales</u>				
Cardiganshire -				
- Tregaron	27	20/10	Mostyn	275*
<u>Eire</u>				
Co. Kildare	1	15/8	Astor	229*

\* Races previously recorded in Britain

FTE = Failed to establish

A larger number of samples was received this year and success in culturing was high (90%). With the larger number of samples came a corresponding increase in the number of races identified. A number of these races had not been previously recorded in Britain, but the majority of these represent relatively minor variations in known races and so do not significantly alter the "race group" spectrum. The main exception was the detection of race 265 on the variety Ponta from Seale-Hayne in Devon. Occurring at very low frequency it is nevertheless interesting in being the only British race capable of attacking Landhafer and Santa Fe. It is also the only race not capable of attacking Sala and as such is similar to a U.V. mutant, (Race 277) produced at the Welsh Plant Breeding Station by Griffiths and Carr (1961). The other race of interest, also from Seale-Hayne in Devon, attacks the Victoria resistance but does not correspond to a known international race. It is similar to the known race 274. Details of race relationships are given in Table 18.

Table 18

Race	DIFFERENTIAL										
	Anthony	Victoria	Appler	Bond	Landhafer	Santa Fe	Ukraine	Trispernia	Bondvic	Saia	Ascencao
/ 234	R	R	R	R	R	R	R	R	R	S	R
235	S	R	R	R	R	R	R	R	R	S	R
/ 232	S	R	R	R	R	R	S	R	R	S	R
/ 229	R	R	R	R	R	R	R	R	R	S	R
296	R	R	R	S	R	R	R	R	R	S	R
330	R	R	R	S	R	R	R	R	R	S	R
251	R	R	S	S	R	R	R	R	R	S	R
/ 275	R	R	S	S	R	R	R	R	R	S	R
/ 274	R	S	S	S	R	R	R	R	R	S	R
"Victoria race"	S	S	S	R	R	R	R	I	R	I	R
/ 272	R	R	S	R	R	R	S	R	R	S	R
/ 273	S	R	S	R	R	R	S	R	R	S	R
/ 271	S	R	R	R	R	R	S	S	R	S	R
/ 277 Mutant	S	R	S	R	S	S	R	S	R	R	R
265	R	R	S	S	S	S	S	S	S	R	R

/ Previously known in Britain.

The number of samples identified for each race is shown in Table 19.

Table 19

Race	Number of Samples
251	7
275	6
296	3
234	2
229	1
232	1
235	1
265	1
272	1
330	1
"Victoria race"	1
Failed to establish	3
TOTAL - 11 races	28 samples

Mildew - Wheat

Plant Breeding Institute, Cambridge

M.S. Wolfe

1. During 1969, 173 samples of wheat mildew were sent to the P.B.I.

2. Varieties from which samples were received

Winter varieties are given in Table 20 spring varieties in Table 21.

Table 20

Winter Wheat	No. of Samples
Cappelle Desprez	25
Mildress	25
Maris Beacon	21
Tommy	19
Zorba	13
Joss Cambier	3
Camra	2
Champlein	2
Hybrid 46	1
Maris Envoy	1
Maris Ranger	1
Chalk(Rothwell 355)	1
Rothwell 651116	1
TOTAL	116

Table 21

Spring Wheat	No. of Samples
Maris Ensign	19
Kolibri	17
Koga II	10
Cardinal (Petkus 74/64)	4
Janus	1
Kleiber(HPG 2772-60)	1
Maris Dove	1
Rothwell Sprite	1
TOTAL	54

A further 3 samples were collected from the following varieties:-  
Little Club, Pilot, unknown variety.

3. Race identification

17 races were identified from the 1969 samples. Of these race 3, 13 and 26 were most frequently identified. The full results are shown in table 22.

Table 22

Wheat Mildew - race identification

Location	P.B.I. Code No. 1969 W9/	Date of reception 1969	Variety	Race
<u>Northern Region</u>				
Northumberland Cockle-Park	136 137	7/8 "	Mildress Cappelle Desprez	26 NYT FTE
	138 139	" "	Tommy Maris	NYT NYT
	140	"	Beacon Maris	4 13
	141	"	Ensign Koga II	
<u>Yorks &amp; Lanes Region</u>				
Yorkshire - Headley Hall	63 64	9/7 "	Tommy Cappelle Desprez	35 16
	65	"	Maris	33
	66	"	Beacon Maris	13
	101	18/7	Envoy Maris	FTE "
	102	"	Ensign	"
	103	"	Kolibri	14
	41	30/6	Koga II Cappelle Desprez	FTE
- Lisset				
<u>East Midlands Region</u>				
Leicestershire - Sutton Bonington	73 74	10/7 "	Kolibri Maris	FTE NYT
	75 99	" 16/7	Beacon Mildress Kolibri	13 13
<u>Lincolnshire - Gosberton</u>	45 46	1/7 "	Hybrid 46 Koga II	13 FTE
- Kirton	35	27/6	Cappelle Desprez	13
	36	"	Maris	8
- Rothwell	82	11/7	Beacon Cappelle	FTE
	83	"	Desprez	
	84	"	Joss	13
	85	"	Cambier	FTE
	86	"	Tommy	16
	87	"	Chalk Champlein	FTE
	88	"	Rothwell	3
- Spalding	37 38	27/6 "	63116 Pilot Tommy Hybrid 46	NYT 13 4
Northamptonshire - Barnwell	53	2/7	Mildress	FTE



Table 22 cont

<u>West Midland Region</u>					
<u>Herefordshire - Rosemaund</u>	1	7/5	Cappelle Desprez	FTE	
	2	"	Tommy	3	
	3	"	Maris Beacon	3	
	4	"	Mildress	16	
	23	24/6	Cappelle Desprez	3	
	24	"	Tommy	FTE	
	25	"	Maris Beacon	8	
	26	"	Zorba	26	
	27	"	Mildress	35	
	131	6/8	Koga II	NYT	
132	"	Maris Ensign	26		
133	"	Kolibri	13		
134	"	Maris Dove	10		
135	"	Cardinal	23		
<u>Vowchurch</u>	56	4/7	Cappelle Desprez	NYT	
	57	"	Mildress	19	
<u>Shropshire - Harper Adams</u>	96	15/7	Mildress	26	
	97	"	Maris Beacoh	8	
	98	"	Maris Ensign	13	
<u>Staffordshire - Wolverhampton</u>	76	11/7	Maris Ensign	FTE	
	77	"	Kolibri	FTE	
<u>Warwickshire - Stoneleigh</u>	60	7/7	Zorba	FTE	
	47	2/7	Joss Gambier	16	
<u>Worcestershire Croome</u>	48	"	Camplein	14	
	49	"	Maris Rangen	FTE	
	50	"	Cama	NYT	
	51	"	Mildress	NYT	
	52	"	Cappelle Desprez	FTE	
	13	17/8	Cappelle Desprez	26	
	28	24/8	Tommy	26	
	61	8/7	Cardinal	13	
	62	"	Kolibri	3	
	91	15/7	Mildress	26	
92	"	Zorba	32		
93	"	Koga II	19		
94	"	Maris Ensign	13		
95	"	Maris Beacon	18		
<u>Eastern Region</u>					
<u>Cambridgeshire - N.I.A.B.</u>	14	18/6	Tommy	3	
	15	"	Zorba	FTE	
	16	"	Maris Beacon	9	
	17	"	Cappelle Desprez	26	
	18	"	Mildress	4	
	100	17/7	Mildress	NYT	
<u>Essex - Kelvedon</u>	6	11/6	Cappelle Desprez	FTE	
	7	"	Maris Beacon	NYT	
	8	"	Mildress	16	
	9	"	Kolibri	13	
	10	"	Maris Ensign	NYT	

Table 22 cont

<u>West Midlands Region</u> Herefordshire - Rosemaund	1	7/5	Cappelle Desprez	FTE
	2	"	Tommy	3
	3	"	Maris Beacon	3
	4	"	Mildress	16
	23	24/6	Cappelle Desprez	3
	24	"	Tommy	FTE
	25	"	Maris Beacon	8
	26	"	Zorba	26
	27	"	Mildress	35
	131	6/8	Koga II	NYT
	132	"	Maris Ensign	26
	133	"	Kolibri	13
	134	"	Maris Dove	10
	135	"	Cardinal	23
	56	4/7	Cappelle Desprez	NYT
57	"	Mildress	19	
Shropshire - Harper Adams	96	15/7	Mildress	26
	97	"	Maris Beacon	8
	98	"	Maris Ensign	13
Staffordshire - Wolverhampton	76	11/7	Maris Ensign	FTE
	77	"	Kolibri	FTE
Warwickshire - Stoneleigh	60	7/7	Zorba	FTE
Worcestershire Croome	47	2/7	Joss Cambier	16
	48	"	Camplein	14
	49	"	Maris Ranger	FTE
	50	"	Cama	NYT
	51	"	Mildress	NYT
	52	"	Cappelle Desprez	FTE
Kinver	13	17/8	Cappelle Desprez	26
	28	24/8	Tommy	26
	61	8/7	Cardinal	13
	62	"	Kolibri	3
	91	15/7	Mildress	26
	92	"	Zorba	32
	93	"	Koga II	19
	94	"	Maris Ensign	13
	95	"	Maris Beacon	18
<u>Eastern Region</u> Cambridgeshire - N.I.A.B.	14	18/6	Tommy	3
	15	"	Zorba	FTE
	16	"	Maris Beacon	9
	17	"	Cappelle Desprez	26
	18	"	Mildress	4
	100	17/7	Mildress	NYT
	6	11/6	Cappelle Desprez	FTE
	7	"	Maris Beacon	NYT
	8	"	Mildress	16
9	"	Kolibri	13	
10	"	Maris Ensign	NYT	
<u>Essex</u> Kelvedon				

Table 22 cont

Hertfordshire - Rothamsted	42 43 44 126 127	1/7 " 5/8 "	Cappelle Desprez Maris Beacon Kolibri Kolibri Kolibri	13 NYT 26 13 13
Norfolk Morley	105	24/7	Kolibri	FTE
- Docking	89	15/7	Mildress	35
Suffolk - Elmswell	80 81	11/7 "	Rothwell Sprite Maris Ensign	3 FTE
<u>South East Region</u>				
Buckinghamshire - Stokenchurch	67 68-4 69 70 71 72	10/7 " " " " "	Cappelle Desprez Tommy Mildress Kolibri Maris Ensign Cardinal	3 6 16 15 32 13 13
Kent - Wye	19 20 21 22 54	19/6 " " 2/7	Tommy Maris Beacon Zorba Mildress Mildress	FTE " " NYT
Oxfordshire - Nuffield	29 30	26/6 "	Maris Ensign Kolibri	3 3
<u>South West Region</u>				
Devon - Seale-Hayne	128 129 130	5/8 " "	Maris Beacon Cappelle Desprez Zorba	FTE " 26
Dorset - Kingston	39 40	27/6 "	Zorba Mildress	21 FTE
Gloucester - Chedworth	104	18/7	Cappelle Desprez	FTE
Cirencester	58 59 117 118	4/7 " 29/7 "	Maris Ensign Kolibri Janus Maris Ensign	10 FTE " "
Somerset - Spaxton	31 32 33 34	26/6 " " "	Mildress Cama Zorba Maris Beacon	3 FTE " 10
- Sutton Montis	78 79	11/7 "	Maris Ensign Kolibri	NYT FTE

Table 22 cont

Wiltshire - Chisledon	55	4/7	Mildress	FTE
7 Hartham Park	90	15/7	Kleiber	NYT
<u>Wales</u>				
Cardiganshire - W.P.B.S. Aberystwyth	11 12	17/6 "	Maris Beacon Cappelle Desprez	21 FTE
Monmouthshire - Llanarth	5	6/6	Cappelle Desprez	13
<u>Scotland</u>				
Angus - Brechin	120 121 122 123 124	2/8 " " "	Tommy Maris Beacon Zorba Cappelle Desprez Mildress	FTE " 14 FTE "
Carnoustie	171 172 173	21/8 " "	Koga II Maris Ensign Tommy	FTE " "
Berwickshire - West Foulden	167 168 169 170	18/8 " " "	Cappelle Desprez Mildress Zorba Maris Beacon	FTE " " "
East Lothian - Gullane	142 143 144 145	8/8 " " "	Cappelle Desprez Maris Beacon Mildress Zorba	FTE NYT 16 13
- Haddington	146 147 148 149 150 151	" " " " " "	Tommy Kolibri Koga II Maris Ensign Cardinal Maris Dove	13 13 NYT FTE " "
Pencaitland	152 153 154 155 156	11/8 " " " "	Cappelle Desprez Mildress Tommy Maris Beacon Zorba	NYT FTE " " "
Edinburgh - Corstorphine	160 161 162 163	14/8 " " "	Cappelle Desprez Zorba Maris Beacon Tommy	FTE " NYT FTE
NIAB	110 111 112 113 114 115 116	29/7 " " " " "	Mildress Cappelle Desprez Maris Beacon Tommy Koga II Kolibri Maris Ensign	26 FTE " 16 FTE " "
Peebleshire - Burnetland	157 158 159	13/8 " "	Koga II Maris Ensign Tommy	3 13 13

Table 22 cont

West Lothian - Linlithgow	164 165 166	14/8 " "	Koga II Maris Ensign Tommy	FTEE " 19
<u>Northern Ireland</u>				
Co. Armargh - Loughgall	119	30/7	Little Club	FTEE
Co. Tyrone - Castlederg	125	4/8	Joss Cambier	"
<u>Fire</u>				
Co. Kildare Backweston	106 107 108 109	28/7 " " "	Cappelle Desprez Mildress Tommy Maris Ensign	FTEE " 13 FTEE

FTEE = Failed to establish

NYT = Not yet tested.

Summary of races identified

Table 23

Reces identified from each variety

Variety	<u>Races</u>																	<u>Totals</u>	
	3	4	8	9	10	13	14	15	16	18	19	21	23	26	32	33	35	Isolates	Races
Mildress	1	1	-	-	-	1	-	1	3	-	1	-	-	4	-	-	2	14	8
Tommy	2	-	-	-	-	3	-	-	2	-	1	-	-	1	-	-	1	10	6
Maris Beacon	1	-	3	1	1	-	-	-	-	1	-	1	-	-	-	1	-	9	7
Kolibri	2	-	-	-	-	5	-	-	-	-	-	-	-	1	1	-	-	8	4
Cappelle Desprez	2	-	-	-	-	3	-	-	1	-	-	-	-	2	-	-	-	8	4
Maris Ensign	1	1	-	-	1	4	-	-	-	-	-	-	-	1	-	-	-	8	5
Zorba	-	-	-	-	-	1	1	-	-	-	-	1	-	2	1	-	-	6	5
Koga II	1	-	-	-	-	1	1	-	-	-	1	-	-	-	-	-	-	4	4
Cardinal	-	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	3	2
Hybrid 46	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2	2
Joss Cambier	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	2	2
Champlein	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1
Maris Dove	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Maris Envoy	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	1
Rothwell Sprite	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
Chalk	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	1
Rothwell 63116	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
TOTAL	12	3	3	1	3	23	3	1	8	1	3	2	1	11	2	1	3	81	(17)

Several samples were received from resistant varieties the results of tests on these samples are shown in Table 24.

Table 24

Variety and race	No. of samples received	No. FPE	No. NYT	Reaction on Avirulent	Seedlings Virulent
Mildress Races	25	8	5	7 3,15,16 (3),19,26	5 4,26(2) 35(2)
Kolibri races	17	8	-	3 3,13(2)	6 3,13(3), 26,32
Zorba races	13	7	1	3 14,21,26	2 26,32
Cardinal races	4	1	-	2 13(2)	1 23+
Maris Dove races	2	1	-	0	1 10*

+ Race 23 identified for the first time attacks Weib M1 (T.carthlain) and EIS; a mixed reaction was produced with TP229

\* This race attacks H13471; six other isolates which all attack this variety but were not obtained from Maris Dove all attacked seedlings of Maris Dove.

The relative frequency with which races were identified in 1968 and 1969 is compared in table 25. The number of differential varieties which each race infects is also included in the table. Table 26 shows the frequency of races in terms of the number of differential varieties infected.

Table 25

Relative frequency of races in 1968 and 1969

	<u>Races</u>																				Absolute Total
	0	2	3	4	8	9	10	13	14	15	16	18	19	21	23	26	27	32	33	35	
1968	5	2	20	3	-	-	-	26	4	4	20	1	1	-	-	8	1	-	-	8	152
1969	-	-	15	4	4	1	4	29	4	1	10	1	4	2	1	14	-	2	1	4	81
No. of diffs. infected	0	1	1	2	3	3	4	2	1	2	3	3	2	2	2	3	3	2	5	4	

Table 26Frequency of races in terms of No. of differential varieties infected

No. of diffs. attacked	68		69	
	Abs. Freq.	Rel. Frequency	Abs. freq.	Rel. frequency
0	7	4.6	-	-
1	38	25.0	15	18.5
2	51	33.6	35	43.2
3	43	28.2	24	29.6
4	13	8.6	6	7.4
5	-	-	1	1.2
	152		81	



Mildew - barley

Plant Breeding Institute, Cambridge.

M. S. Wolfe

1. 359 samples of barley mildew were received by the P.B.I. during 1969.

2. Varieties from which samples were collected

The majority of samples were collected from spring barley varieties, and the number of samples collected from each variety is shown in Table 27.

Table 27

Spring barley	No. of Samples
Sulten	60
Julia	44
Proctor	43
Vada	26
Inis	25
Impala	24
Lofo Abed (Abed 0317)	21
Maris Canon	16
Emir	12
Fassan (Cebecco 6402)	11
Zephyr	11
Betina (Ringot V34)	10
Midas	7
Golden Promise	6
Tern	5
Wing (W6040)	5
Alka	5
Crusader	3
Deba Abed	3
Ruby	3
Bamba	2
Maris Concord	2
Ymer	1
Ciro	1
Imber	1
Clemont	1
Pallas	1
Gerkra	1
Berac (CIV490/4)	1
Felda	1
TOTAL	342

A further 17 samples were received from the following varieties:

HB 606, HB 614, HB 682, Ymer derivative, Senta, Cambrinus x Golden Promise, F7 Hybrid Menton x Pallas, F4 Hybrid Cambrinus x Domen, Maris Otter, + eight other samples.

3. Rate identification

172 samples were successfully tested on the basic differential varieties, Proctor, Europa, Maris Concord and Impala. Information concerning all samples is presented in Table 28. S after the race implies that the isolate is virulent on Sulten.

Mildew of Barley - race identification

Table 28

	P.B.I. Code No., 1969 B9/-	Date of Reception 1969	Variety	Race
<u>Northern Region</u>				
Northumberland				
Cockle Park	292	7/8	Inis	C26
	293	"	Proctor	C10
	294	"	Vada	C4
	295	"	Julia	Impala Group
	296	"	Impala	C26
<u>Yorks and Lancs. Region</u>				
Yorkshire				
Bilham	31	17/6	Sultan	C4
	281	5/8	Sultan	FTE
	282/1	"	Proctor	D1
	282/2	"	Proctor	A3
Bishops Burton	61	30/6	Lofa Abed	FTE
	62	"	Proctor	C10
	63	"	Maris Canon	NYT
Fawburn	155	16/7	Sultan	FTE
Headley Hall	180	18/7	Sultan	FTE
	181	"	Julia	"
	182	"	Inis	"
	183	"	Proctor	C10
Little Weighton	221	28/7	Julia	C9
Sandhutton	242	29/7	Sultan	D1-S
	243	"	Maris Canon	C26
	244	"	Lofa Abed	C6
	245	"	Julia	Impala Group
Welton Wold	222	28/7	Vada	FTE
	223	"	Julia	FTE
<u>East Midlands Region</u>				
Lincolnshire				
Cammeringham	67	30/6	Midas	C5
	68	"	Lofa Abed	FTE
	58	27/6	Proctor	C4
Kirton	59	"	Sultan	A7-S
Northamptonshire				
Warrington	18	2/6	Sultan	FTE
Oundle	19	10/6	Sultan	C5
	64	30/6	Sultan	FTE
	65	"	Sultan	"
Nottinghamshire				
Gleadthorpe	288	7/8	Vada	FTE
	289	"	Julia	Europa Group
	290	"	Midas	"
	291	"	Clermont	FTE
<u>West Midland Region</u>				
Herefordshire				
Rosemaund	283	7/8	Proctor	FTE
	284	"	Sultan	"
	285	"	Lofa Abed	"
	286	"	Maris Canon	"
	287	"	Hassan	"

Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race	
Shropshire Harper Adams	147	15/7	Sultan	D1-S	
	148	"	Vada	C5	
	355	26/8	Sultan	PTE	
Little Brampton	353	18/8	Sultan	PTE	
	Staffordshire Swynnerton	9/7	Sultan	C6-S	
		112	"	Lofa Abed	C2
113		"	Maris Canon	PTE	
Warwickshire Priors Marsten	114	"	Julia	C10	
	115	"	Proctor	C5	
	116	"			
Solihull	26	13/6	Sultan	PTE	
	27	"	Julia	"	
	28	"	Midas	"	
Worcestershire Abberley	214	23/7	Sultan	A7-S	
	84	2/7	Zephyr	C4	
	85	"	Julia	Impala	
Kinver	86	"	Sultan	D1-S	
	87	"	Crusader	Group	
	88	"	Midas	C7	
	50	24/6	Proctor	C5	
	51	"	Impala	C26	
	78	1/7	Vada	C5	
	79	"	Inis	A3	
	80	"	Julia	C10	
	103	8/7	Emir	C26	
	104	"	Betina	PTE	
	105	"	Sultan	"	
	145	15/7	Tern	A25	
	146	"	Lofa Abed	C5	
	203	22/7	Akka	C26	
	<u>Eastern Region</u> Cambridgeshire	29	5/6	Proctor	PTE
30		"	"	C7	
102		8/7	Deba Abed	C10	
117		9/7	Emir	C10	
Boxworth Kingston N.I.A.B.		1	14/5	Julia	NYT
		2	"	Inis	PTE
		3	"	Tern	"
4		"	Proctor	"	
5		"	Proctor	"	
6		"	Proctor	"	
7		"	Impala	"	
8		"	Lofa Abed	-	
9		"	Julia	"	
10		"	Impala	"	
11		"	Vada	"	
12	"	Lofa Abed	"		
13	"	Inis	"		
14	"	Sultan	"		
52	25/6	Golden Promise	"		
53	"	Impala	C10		
54	"	Maris Concord	C26		
55	"	Sulton	C26		
56	"	Zephyr	B1-S		
158	17/7	Julia	C5		
159	"	Maris Canon	C5		

Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race
	160	17/7	Vada	C5
	161	"	Hassan	A7-S
	162	"	Proctor	C4
	163	"	Inis	FTE
	164	"	Sultan	"
	165	"	Lofa Abed	"
P.B.I.	200	21/7	HB 606	A3-S
	201	"	HB 614	D5-S
	202	"	HB 682	B3-S
	25	13/6	Sulton	C7-S
Wicken				
Essex				
Bures	131	11/7	Julia	FTE
Colchester	15	20/5	Proctor	C7
Kelvedon	20	11/6	Proctor	Proctor group
	21	"	Impala	C26
	22	"	Julia	C10
	23	"	Sultan	A23-S
	24	"	Vada	C5
Peldon	356	29/10	Sultan volunteers	C7-S
Writtle	38	18/6	Impala	C5
	39	"	Inis	C26
	40	"	Julia	C26
Hertfordshire				
Rothamsted	82	1/7	Julia	C5
	83	"	Senta	D1-S
Norfolk				
Bircham	359	26/11	Maris Otter	C5
Docking	101	8/7	Proctor	C2
	16	20/5	Sultan	Impala group
	17	"	Emir	C4-S
	98	8/7	Derivative	C10
Grimston	359	26/11	Proctor	C5
Hattishall Burgh	89	4/7	Maris Otter	A7-S
Morley	166	17/7	Sultan	FTE
	167	"	Lofa Abed	"
	99	8/7	Hassan	C5
Weasenham	100	"	Zephyr	A7-S
			Sultan	
Suffolk				
Boxford	357	30/10	Proctor	C26
Suborne-Orford	168	17/7	Emir	FTE
South East Region				
Berkshire				
Jealotts Hill	139	15/7	Sultan	FTE
	140	"	Julia	C26
	141	"	Midas	FTE
	220	28/7	Sultan	FTE
Twyford				
Buckinghamshire				
Medmenham	57/2	26/6	Sultan	D1-S
	169	17/7	Sultan	FTE
	170	"	Proctor	"
	129	10/7	Julia	C2
	130	"	Akka	FTE
	149	16/7	Sultan	"
	150	"	Vada	"
	151	"	Proctor	"
	152	"	Betina	"
	153	"	Lofa Abed	"

Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race
Hampshire Monk Sherborne	217 218	24/7 "	Zephyr Julia	FTEE "
Sussex Arundel	46 47 48	23/6 " "	Vada Maris Canon Lofa Abed	D group FTEE "
<u>South West Region</u>				
Bristol Westbury-on-Trym	126	10/7	Sultan	C9-S
Cornwall Hayle Newquay	194 118 119 120 121 122 123 124 125	18/7 10/7 " " " " " " "	Proctor Deba Abed Inis Impala Maris Canon Sultan Vada Proctor Julia	FTEE " " " " " " " "
Devon				
Barnstable Bicton Culhampton Durweston Landscope	135 60 193 81 268 269 270 271 272 273 274 275 276 277/1 277/2	11/7 27/6 15/7 1/7 1/8 " " " " " " " " " "	Julia Emir Inis Maris Canon Midas Sultan Proctor Emir Impala Hassan Inis Julia Vada Lofa Abed Lofa Abed Gerkra Emir Sultan Julia	FTEE 33-S FTEE C5 C5 D1-S C5 D3-S C26 FTEE C5 C26 A7 C5 C4 FTEE FTEE FTEE FTEE Impala group
Millbrook Mortehoe	266 267 227 228	1/8 " 29/7 "	Emir Sultan Julia	FTEE FTEE FTEE
Posbury Roborough	229 230/4 231 232 91 90 233 234 235 236 176 177 184 185 186 187 188 189 190	" " " " 4/7 4/7 29/7 " " " 17/7 " 18/7 " " " " " "	Inis Proctor Emir Vada Emir Emir Julia Impala Proctor Inis Impala Vada Vada Sultan Deba Abed Inis Impala Julia	FTEE C5 FTEE FTEE FTEE C5 FTEE FTEE FTEE C5 FTEE FTEE FTEE FTEE FTEE FTEE FTEE FTEE C10 C4
Starcross				

Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race
Starcross	191	18/7	Proctor	C5
Stoke Climsland	192	"	Maris Canon	FTE
	297	7/8	Vada	"
	298	"	Tern	"
	299	"	Julia	"
	300	"	Lofa Abed	"
	301	"	Inis	"
	302	"	Sultan	"
	303	"	Impala	"
	304	"	Hassan	"
	305	"	Proctor	"
Dorset				
Great Minterne	136	12/7	Sultan	FTE
Portesham	253	30/7	Proctor	"
	254	"	Impala	"
	255	"	Inis	"
Gloucestershire				
Avening	154	16/7	Sultan	C2-S
Chedworth	213	23/7	Sultan	FTE
Frampton Mansell	256	30/7	Crusader	"
	257	"	Imber	"
Somerset				
Camerton	137	14/7	Sultan	FTE
	138	"	Lofa Abed	"
Wiltshire				
All Canings	246	19/7	Sultan	FTE
Boyton	127	10/7	Sultan	"
	128	"	Maris Canon	"
	210	23/7	Crusader	"
	211	"	Proctor	"
	212	"	Vada	"
Chilterne	208	23/7	Golden Promise	C10
Codford	209	23/7	Julia	C5
Hartham Park	143	15/7	Julia	C4
	144	"	Zephyr	FTE
West Overton	195	18/7	Sultan	"
<u>Wales</u>				
Anglesey				
Brynsiencyn	196	18/7	Sultan	A7-S
	197	"	Proctor	C26-S
	106	8/7	Julia	C10
	107	"	Vada	C5
	108	"	Zephyr	FTE
	109	"	Sultan	C5-S
	110	"	Inis	FTE
	111	"	Proctor	C6
Cardiganshire				
W.P.B.S.Aberystwyth	34	17/6	Sultan	A7-S
	35	"	Impala	C5
	36	"	Julia	C5
	37	"	Proctor	C5
Flintshire				
Whitchurch - Maelor	219	25/7	Zephyr	NYT
Mongomeryshire				
Y-Gaer Forden	179	18/7	Julia	C26
Pembrokeshire				
Boncath	142	15/7	Julia	FTE
Ambleston	178	18/7	Ruby	FTE

Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race
<u>Scotland</u> Gairthness Thurdistoft	261	31/7	Betina	FTE
	262	"	Vada	"
	263	"	Julia	"
	264	"	Imis	"
265	"	Impala	"	
Dunfermline Dunduff	342	15/8	Proctor	FTE
	343	"	Impala	"
	344	"	Imis	"
	345	"	Julia	C4
	346	"	Sultan	FTE
	347	"	Vada	AO
	348	"	Lofa Abed	FTE
	349	"	Maris Canon	FTE
	350	"	Hassan	"
	351	"	Betina	"
	352	"	Wing	"
	East Lothian Haddington	306	8/8	Proctor
307		"	Impala	C5
308		"	Imis	C4
309		"	Julia	C10-S
309/4		"	Julia	C10
310		"	Sultan	FTE
311		"	Vada	C4
312		"	Lofa Abed	A7
313		"	Maris Canon	C4
314		"	Hassan	A23-S
315	"	Betina	C2	
316	"	Wing	FTE	
317	"	Tern	"	
318	"	Alka	"	
Edinburgh East Craigs	156	10/7	Betina	FTE
	157	"	Vada	"
	171	"	Julia	FTE
	172	"	Lofa Abed	"
	173	"	Wing	"
	174	"	Sultan	"
	175	"	Hassan	"
	247	29/7	Ciro	C7
	248	"	Imis	C10
	249	"	Impala	C4
	250	"	Maris Canon	C5
	251	"	Emir	AO-S
	252	"	Proctor	Impala group
N.I.A.B.	237	"	Proctor	C5
	238	"	Impala	C4
	239	"	Imis	C10
	240	"	Julia	C5
	241	"	Vada	C9

Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race	
Peeblesshire Burnetland	319	13/8	Proctor	Europa group FTE	
	320	"	Impala	C10	
	321	"	Inis	C10	
	322	"	Julia	Proctor group	
	323	"	Sultan	C7	
	324	"	Vada	A7-S	
	325	"	Lofa Abed	Impala group	
	326	"	Maris Canon	Proctor group	
	327	"	Hassan	A7 FTE	
	328	"	Betina	"	
	329	"	Wing	"	
	330	"	Tern	"	
	280	4/8	Sultan	D5-S	
	Perthshire SHRI Invergowrie West Lothian W. Philipstown	331	14/8	Proctor	D1 FTE
332		"	Impala	C5	
333		"	Inis	Impala group	
334		"	Julia	D1-S	
335		"	Sultan	C10	
336		"	Vada	NYT	
337		"	Lofa Abed	"	
338		"	Maris Canon	A7-S	
339		"	Hassan	A7-S	
340		"	Betina	FTE	
341		"	Wing	"	
134		11/7	Banba	Impala group	
Northern Ireland Co. Armagh Loughgall		198	21/7	F7 Menton x Pallas	FTE
		199	"	F4 Cambrinus x Domen	"
	215	24/7	Pallas	"	
	216	"	Cambrinus x Golden Promise	"	
	204	22/7	Proctor	C5	
	205	"	Golden Promise	C26	
Belfast Crossnacreevy	206	"	Zephyr	C5	
	207	"	Ymer	C10	
	278	2/8	Zephyr	FTE	
	132	11/7	Golden Promise	C10	
	133	"	Banba	FTE	
	299	21/8	Golden Promise	"	
County Down Bangor Castlereagh Comber Hillsborough	258	31/7	Proctor	C5	



Table 28 continued

	P.B.I. Code No. 1969 B9/-	Date of Reception 1969	Variety	Race
<u>Fire</u>				
Co. Kildare	224	28/7	Inis	PTL
Backweston	225	"	Impala	"
	226	"	Julia	"

PTL = Failed to establish  
 NYP = Not yet tested

Barley mildew races are readily separated into race groups depending on their ability to infect Proctor, Maris Concord, Europa and Impala. Table 29 indicates the races identified in each race group and also the varieties from which they were obtained.

Table 29

Race	Source Variety	No of Samples
<u>I Proctor group</u>		
A0	Vada	1
A0-S	Emir	1
A3	Vada, Proctor	2
A3-S	HB606	1
A7	Vada, Iofa Abed, Betina	3
A7-S	Sultan (7) Hassan (2) Iofa Abed, Betina	11
A23-S	Sultan, Hassan	2
D1	Proctor (2)	2
D1-S	Sultan (8)	8
D3-S	Emir	1
D5-S	Emir, HB 614	2
Others	Proctor, Vada, Sultan, Hassan	4
	TOTAL	38
<u>II Europa group</u>		
B3-S	Emir, HB 682	2
C2	Proctor, Iofa Abed, Julia, Betina	4
C2-S	Sultan	4
C6	Proctor, Iofa Abed	1
C6-S	Sultan	2
C7	Proctor (2) Zephyr, Crusader, Giro, Vada	1
C7-S	Sultan (2)	6
C9	Julia, Vada	2
C9-S	Sultan (2)	2
Others	Julia, Midas, Proctor	2
	TOTAL	25
<u>III Maris Concord group</u>		
	No races belonging to the Concord group were identified	0
	TOTAL	0

Table 29 continued

Race	Source Variety	No of Samples
<u>IV Impala Group</u>		
C4	Lofa Abed, Vada (2), Julia, Maris Canon (2), Emir, Sultan, Impala (3) Proctor (2) Inis (2) Zephyr (2) Emir derivative	17
C4-S		1
C5	Senta, Vada (4) Impala (6) Julia (5) Proctor (8) Zephyr (3) Midas (3) Maris Canon (3) Emir, Tern, Inis (2), Maris Otter, Lofa Abed	39
C5-S		1
C10	Sultan (6) Proctor (6), Golden Promise (2), Inis (4) Deba Abed, Impala, Ymer, Vada,	22
C10-S		1
C26	Julia Impala (4), Inis (2), Julia (5) Proctor (2) Maris Concord, Lofa Abed, Maris Canon,	17
C26-S	Golden Promise	1
Others	Proctor Sultan, Julia (6) Banba, Proctor, Maris Canon	10
	TOTAL	109
	GRAND TOTAL	172

Impala group races

After reaching a peak in 1968 (33%) the proportion of Impala virulent isolates fell to approximately 65% of the total in 1969. This is probably a reflection of the increase in the Sultan acreage and the decrease in the acreage of Impala and Inis. Impala virulent isolates were obtained from the Proctor group varieties (28), Europa group (30), Concord group (1), Impala group (31) and others (19) Thus the proportion of the Impala races from the Impala group was 28% representing a slight decrease from previous years (29% in 1967, 35% in 1968).

Sultan - virulent isolates

60 samples were received from Sultan, 11 from Emir, 11 from Hassan and four from other lines possession the same major gene resistance. The identification of races from these isolates is given in Table 30 totalling 40; the remainder were either avirulent (B9/16, B9/31) or failed to establish (44).

For the first time Sultan virulent isolates were obtained from varieties other than those possessing this form of resistance. These were identified as A7-S (Betina, Lofa Abed) C10-S (Julia) and C26-S (Proctor), Sultan - virulent samples were collected from Sultan or Hassan from the same location in each case.

Table 30

Sultan-avirulent isolates obtained in the general survey

Race Group	Isolate No.	Variety	Race	
<u>I Proctor</u>	B9/251	Emir	A0-S	
	B9/200	HB 606	A3-S	
	B9/34	Sultan	A7-S	
	B9/59	"	"	
	B9/89	"	"	
	B9/100	"	"	
	B9/105	"	"	
	B9/161	Hassan	"	
	B9/196	Sultan	"	
	B9/214	"	"	
	B9/325	Lofa Abed	"	
	B9/339	Hassan	"	
	B9/340	Betina	"	
	B9/23	Sultan	A23-S	
	B9/314	Hassan	"	
B9/55	Sultan	D1-S		
B9/57	"	"		
B9/83	"	"		
B9/86	"	"		
B9/147	"	"		
B9/242	"	"		
B9/269	"	"		
B9/335	"	"		
B9/271	Emir	D3-S		
B9/201	HB 614	D5-S		
B9/280	Emir	D5-S		
B9/323	Sultan	"		
B9/327	Hassan	"		
TOTAL			28	
<u>II Europa group</u>	B9/60	Emir	B3-S	
	B9/202	HB 682	"	
	B9/154	Sultan	C2-S	
	B9/112	"	C6-S	
	B9/25	"	C7-S	
	B9/356	Sultan	C7-S	
	B9/126	Sultan	C9-S	
	B9/358	"	"	
	TOTAL			8
	<u>IV Impela group</u>	B9/17	Emir deriv.	C4-S
B9/109		Sultan	C5-S	
B9/309		Julia	C10-S	
B9/197		Proctor	C26-S	
TOTAL			40	

Several samples were collected from varieties possessing other types of resistance. The results of tests on these samples are shown below.

## 1. Akka

All 3 samples failed to establish.

## 2. Tern

4 of the 5 samples failed to establish. The remaining sample was identified as C5 and was avirulent on Tern.

3. Midas

6 samples were received; 3 failed to establish and the other 3 were virulent on Midas and identified as C5.

4. Imber

One isolate received which failed to establish

5. Gerkra

One isolate received which failed to establish.

Seedlings of Imber and Gerkra are resistant to Proctor group races, but susceptible to Impala and Europa group races.

Supplementary survey of Sultan - virulent isolates from Wicken, Cambs.

In order to determine the development of races within an infected Sultan crop and also the variation of races within an infected crop, samples of mildew were collected from volunteer Sultan seedlings approximately three weeks after harvest. 137 samples were collected from volunteer seedlings together with 10 samples from mature plants of Sultan, 4 from Maris Badger and 1 from Maris Otter.

Of the 10 samples collected from mature Sultan plants 2 failed to establish, one was identified as a Europa group race (C7-S) 7 as Proctor group races, of which there was 1 each of the races A2-S, D3-S and D5-S, and 2 of A7-S. None of the samples from Maris Badger and Maris Otter were virulent on Sultan. The sample from Maris Otter was identified as an Impala group race. Two of the samples from Maris Badger failed to establish and one of the remainder was identified as C5.

14 of the 137 samples collected from volunteer plants of Sultan failed to establish. All of the remainder were virulent on Sultan; the results are shown in table 31. It is interesting to note that as in the main survey A7-S and D1-S were the two most common races. (Table 32)

Table 31  
Sultan races from volunteer Sultan seedlings at Wicken

Race	No of Isolates
<u>I Proctor group</u>	
A0-S	7
A1-S	2
A2-S	5
A3-S	6
A4-S	1
A7-S	33
A23-S	5
D1-S	17
D3-S	2
D5-S	15
D6-S	1
'New' races (see below)	2
TOTAL	96
<u>II Europa group</u>	
B3-S	3
C2-S	4
C7-S	1
C9-S	1
TOTAL	9

Table 31 continued

Race	No of Isolates
III Concord and IV Impala groups	0
<u>E group</u> <sup>*</sup>	
E1-S	1
E2-S	3
TOTAL	4
GRAND TOTAL	109

\* E group defined as races to which Goldfoil is susceptible but CP 27422 resistant.

'New' Races

The following 'new' races in addition to the Sultan races were identified:

S69/11 attacks W.41/145 and Sultan only.  
S69/16 attacks W.41/145, Maris Concord, H.1657 and Sultan.

The frequency of Sultan virulent isolates obtained in the Wicken survey is compared with that of the general survey. The relative frequency in each case is very similar as shown in Table 32 indicating that as much variation can be obtained from a single crop as from a general survey.

Table 32  
Frequency of Sultan - virulent races in General and Wicken surveys

Group Race	No. of diffs. attacked	General Survey Abs. totals	Wicken Survey Abs. totals	General Survey Relative* frequency	Wicken Survey Relative* frequency
I					
A0-S	1			3	6
A1-S	3			-	2
A2-S	3			-	5
A3-S	4			3	5
A4-S	4			-	1
A7-S	3			27	30
A23-S	2			6	5
D1-S	4			24	15
D3-S	4			3	2
D5-S	5			3	2
D6-S	3			6	14
Others	4			-	1
	2,4	24	96	-	2
II					
B3-S	4			6	3
C2-S	5			3	4
C6-S	5			3	4
C7-S	6			6	-
C9-S	4			6	1
IV					
C4-S	6			3	1
C5-S	8			3	-
E					
E1-S	5			-	1
E2-S	4			-	3
TOTAL	22	34	109		

\* Figures rounded off

(Table does not include Sultan - virulent isolates from non-Sultan type varieties).

The Wicken survey has also shown that where a single crop of Sultan is sampled the races tend to be simple, in that less of the differential varieties are infected. Table 33 shows the frequency distribution of races in terms of the numbers of differential varieties infected in the general and Wicken surveys.

Table 33

Relative frequency	No. of differential varieties infected								
	0	1	2	3	4	5	6	7	8
General Survey	1	1	3	11	11	15	26	24	1
Wicken Survey	0	6	6	51	30	7	1	0	0

Wildew - Oats

Welsh Plant Breeding Station, Aberystwyth

I. T. Jones

1. The Welsh Plant Breeding Station received 105 samples of oat mildew during 1969.

2. Varieties from which samples were received  
Spring oat varieties are given in Table 34, winter oat varieties in Table 35.

Table 34

Spring Oats	No. of samples
Condor	15
Manod	12
Mostyn	9
Astor	4
Ponta (W.16509)	3
Selma	3
Helga (Gebeco 6571)	2
Rosinante	2
Milford	2
Bento	1
W.66401	1
Colla (W.16628)	1
Gebeco 6731	1
Mero (MGH 63258)	1
Dunn's Spring Oats	1
TOTAL	58

Table 35

Winter Oats	No. of samples
Maris Quest	11
Peniarth	10
Padarn	7
Wild Oat	1
TOTAL	29

A further 18 samples were received from the following varieties: Cg4146(4), Stormont Sceptre (2), Stormont Sceptre x Marino (2), Forward x Stormont Sceptre, Cg3678, S84, 7718 Cn 20/3/1, 9065 Cn 6/3/74 (2), and unknown varieties (4).

3. Race Identification  
Of the 1969 samples 48 failed to establish. The remaining samples have been tested and the completed results are shown in Table 36.

Table 36 Mildew of oats - race identification

Location	W.P.B.S. Code No. 1969/-	Date of reception 1969	Variety	Race
<u>Northern Region</u>				
Northumberland Cockle Park	44 45 46	6/8 " "	Manod Mostyn Condor	2 2 2
<u>Yorks and Lancs R.</u>				
Yorkshire Headley Hall	74 75 76 77	13/8 " " "	Condor Maris Quest Padarn Manod	2 2 2 2
<u>East Midland Region</u>				
Leicestershire Sutton Bonington	12 13 14 15 16 17	8/7 " " " "	Selma Astor Bento Ponta Condor Rosinante	2 2 2 2 2 2
Lincolnshire Kirton	7 8 9	26/6 " "	Peniarth Manod Maris Quest	FTE " "
<u>West Midland Region</u>				
Herefordshire Rosemaund	35 36 37 38 39 40	4/8 " " " " "	Condor Manod Mostyn Maris Quest Peniarth Padarn	2 2 2 FTE " "
Worcestershire Kinver	11 19 21 34 41 42 43	7/7 14/7 21/7 1/8 5/8 " "	Condor Manod Maris Quest Manod Mostyn Padarn Peniarth	2 FTE 2 2 2 2 2
<u>Eastern Region</u>				
Cambridgeshire N.I.A.B.	2 3 4 22 52	17/6 " " 22/7 11/8	Padarn Maris Quest Peniarth Wild Oats Peniarth	2 2 2 FTE FTE
<u>South-East Region</u>				
Buckinghamshire Stokenchurch	18 23 24	8/7 22/7 "	Condor Astor Mostyn	FTE " "



Table 36 cont'd.

<u>South-West Region</u>					
Wiltshire					
Hartham Park	20	14/7	Dunn's Spring Out	PTE	
<u>Wales</u>					
Cardiganshire					
W.P.B.S.,	1	28/4	Millford	2	
Aberystwyth	5	23/6	Peniarth	2	
	6	"	9065Cn6/3/74	5	
	47	8/8	Mostyn	4	
	48	"	Cc4146	5	
	49	"	Mostyn	4	
	50	"	Cc4146	5	
	54	"	Cc4146	PTE	
	105	7/8	77/8Cn20/3/1	5	
Tympynfarch	79	16/8	Unknown	2	
	80	"	Unknown	2	
Radnorshire					
Maesllwch	30	28/7	Condor	PTE	
<u>Scotland</u>					
Edinburgh					
	25	27/7	Condor	2	
	26	"	Manod	2	
	27	"	Maris Quest	PTE	
	28	"	Peniarth	"	
	29	"	Padarn	"	
	51	11/8	Maris Quest	2	
	53	"	Padarn	2	
	98	19/8	Mostyn	PTE	
East Craigs					
Fife					
Dunfermline	78	13/8	Maris Quest	PTE	
Peebleshire					
Broughton	65	11/8	Maris Quest	2	
	66	"	Mostyn	2	
	67	"	Manod	2	
	68	"	Peniarth	2	
	64	"	Condor	2	
Burnetland					
Perthshire					
Blairgowrie	101	25/8	Condor	2	
	102	"	Maris Quest	2	
	103	"	Manod	PTE	
	104	"	Peniarth	"	
West Lothian					
Linlithgow	69	12/8	Condor	2	
	70	"	Maris Quest	2	
	71	"	Manod	2	
	72	"	Peniarth	2	
	73	"	Padarn	2	
<u>Northern Ireland</u>					
Co. Armagh					
Loughgall	31	28/7	Stormont Sceptre	PTE	
			x Marino	PTE	
	32	"	Selma	2	
	33	"	Condor	2	
	55	11/8	Stormont Sceptre		
			x Marino	PTE	
	56	"	Selma	"	
	57	"	Condor	"	
	58	"	Helga	"	
	59	"	Ponta	2	
	60	"	Astor	2	
	61	"	Rosinante	2	
	62	"	Stormont Sceptre	PTE	
	63	"	Forward x	"	
			Stormont Sceptre	"	

Table 36 cont'd.

Belfast Crossnacreevy	81	15/8	Condor	FTE	
	82	"	Helga	"	
	83	"	W66401	"	
	84	"	Mero	"	
	85	"	Cebeco 6731	"	
	86	"	Colla	"	
	87	"	Stormont Sceptre	"	
	88	"	Ponta	"	
	89	"	Astor	"	
	<u>Eire</u> Co. Kildare Backweston	90	15/8	9065Cn/6/3/74	FTE
91		"	Millford	"	
92		"	Mostyn	"	
93		"	Cc3678	"	
94		"	Condor	"	
95		"	S84	"	
96		"	Manod	"	
97		"	Cc4146	"	
<u>Guernsey</u> Beauchamp Catel Le Videclins		99	20/8	Unknown	FTE
		100	"	Unknown	"

FTE = Failed to establish

Three races were identified from the 1969 samples, race 2 being by far the most predominant. The other two races were race 4 and race 5 which are new to Britain and have so far only been identified from samples collected at the W.P.B.S., Aberystwyth. The varieties from which the races were identified are shown in Table 37.

Table 37

Race	Variety	No. of samples
2	Maris Quest (7), Manod (7), Condor (10), Mostyn (4), Peniarth (5), Padarn (5), Ponta (2), Astor (2), Selma (2), Rosinante (2), Millford, Bento, Unknown vars (2)	50
4	Mostyn	2
5	Cc4146 (2), 9065Cn6/3/74, 7718Cn20/3/1	4
	TOTAL	56

A number of samples were received from varieties with known major genes for resistance. The results of tests on these are given in Table 38.

Table 38

Variety	Sample No.	Location	Race
Mostyn	24	Stokenchurch, Bucks	Failed to establish
"	37	Rosemaund, Hereford	2
"	41	Kinver, Worcs	2
"	45	Cockle Park, Northumberland	2
"	47	W.P.B.S., Aberystwyth, Cards	4
"	49	"	4
"	66	Broughton, Peeblesshire	2
"	92	Backweston, Co. Kildare, Eire	Failed to establish
"	98	East Craigs, Edinburgh	"
9065Cn6/3/74	6	W.P.B.S., Aberystwyth, Cards.	5
"	90	Backweston, Co. Kildare, Eire	Failed to establish
Cc4146	48	W.P.B.S., Aberystwyth, Cards	5
"	50	"	5
"	54	"	Failed to establish
"	97	Backweston, Co. Kildare, Eire	"
7718Cn20/3/1	105	W.P.B.S., Aberystwyth, Cards	5
Manod	8	Kirton, Lincs	Failed to establish
"	10	Glasebury, Radnor	"
"	19	Kinver, Worcs	"
"	26	Edinburgh	2
"	34	Kinver, Worcs	2
"	36	Rosemaund, Hereford	2
"	44	Cockle Park, Northumberland	2
"	67	Broughton, Peeblesshire	2
"	71	Lilithgow, W. Lothian	2
"	77	Headley Hall, Yorks	2
"	96	Backweston, Co. Kildare, Eire	Failed to establish
"	103	Blairgowrie, Perthshire	"

Race 2 is still the prevalent oat mildew race in the British Isles and there is no major change in the race spectrum.

However 9 samples of mildew from Mostyn (2 from W.P.B.S. nursery) were received and of the 6 tested, 4 proved to be race 2, but the 2 isolates from W.P.B.S. were identified as race 4. A new race, race 5, was isolated for the first time in the field in the W.P.B.S. nursery. This race is virulent on both Cc4146 and 9065Cn6/3/74.

Although race 4 and 5 have been found in the field, the samples were not collected from commercial oat varieties, but from varieties grown in oat mildew nurseries.



Phynchosporium - barley  
University of Reading  
R. B. Clothier

1. During 1969, 512 samples were received by the University of Reading.

2. Varieties from which samples were received  
 Winter barley varieties are given in Table 39, Spring barley varieties in Table 40.

Table 39

Winter Barley	No. of Samples
Marris Otter	9
Malta	5
Pella	5
Senta	3
Atlas	2
La Mesita	2
Modoc	2
Pioneer	2
Trebi	2
Vulcan	2
Astrix (FDE 86/3/3)	1
Dea	1
Marris Puma	1
TOTAL	37

Table 40

Spring Barley	No. of Samples
Sultan	29
Proctor	28
Deba Abed	26
Julia	24
Vada	23
Lofa Abed (Abed 0317)	21
Clermont	20
Marris Canon (HB 380/22)	20
Zephyr	20
Tern	18
Midias	17
Impala	16
Inis	16
Akka	14
Gerkre	14
Hassan (Cebeco 6402)	14
Felda	13
Berac (CIV 490/4)	12
Crusader	11
Imber	11
Ruby	9
Fellus	8
Emir	7

Table 40 continued

Spring Barley	No. of Samples
Golden Promise	6
Wing (W.6040)	6
Betina (Ringot V.34)	5
Mosane	5
Rika	5
Delisa	3
Maris Badger	3
Mazurka (MGH.62663)	3
Ymer	2
Anchor	1
Pegasus (Elgina)	1
Freegold (GPF 65)	1
LBW. 5542/60/4	1
Drake (MGH.6445)	1
MGH.61229	1
VR. 555B	1
Feronia (W.309/65)	1
139/251	1
155/49	1
158/72	1
TOTAL	440

A further 35 samples were received from the following

varieties:  
 - Unknown (5), Hybrids (3), Europa, Dronto, Banba, Pallas,  
 Cambrinus, CIV.40, Pajbjero, Elbo, Abed 4904, HB.551/48/26/11,  
 HB. 609/2, HB.609/14, HB.612, Black Hulless, Brier,  
 CI.3926-3, CI.5823, Coast, Hudson, Osiris, Psaknon,  
 Russian 81, Turk, Weider, Wisconsin Winter x Glabron,  
 Eckendorf and Petkus.

### 3.

#### Race identification

Many samples were in poor condition on arrival at Reading and no attempt was made to isolate the fungus from them. 246 isolates of Rhynchosporium were obtained from the 512 samples and the results of tests on these isolates are shown in Table 41.

Table 41

Location	Reading Code No. 1969	Date of Reception 1969	Variety	Race
<u>Northern Region</u>				
Northernberland	2409	17/7	Proctor	U.K.1.
Cockle Park	2411	"	Malta	U.K.1.
	2680	8/8	Midas	U.K.1.
	2683	"	Mosane	U.K.1.
	2684	"	Julia	U.K.1.
	2686	"	Lofa Abed	U.K.1.
	2688	"	Sultan	U.K.1.
<u>Yorks &amp; Lancs Region</u>				
<u>West Riding of Yorkshire</u>				
Headley Hall	2249	17/6	Zephyr	U.K.1.
	2318	4/7	Maris Otter	U.K.1.
	2320	"	HB,612	U.K.1.
	2437	18/7	Deba Abed	U.K.1.
	2438	"	HB51/48/26/11	U.K.1.
	2481	23/7	Deba Abed	U.K.1.
Ponterfract	2210	6/6	Maris Otter	U.K.1.
<u>East Midland Region</u>				
<u>Lincolnshire</u>				
Kirton	2301	28/6	Zephyr	U.K.1.
	2302		Proctor	U.K.1.
<u>West Midland Region</u>				
<u>Herefordshire</u>				
Rosemaund	2203	7/5	Senta	U.K.2.
	2204	"	Maris Otter	U.K.1.
	2206	"	Pella	U.K.1.
Ross	2664	7/8	Clermont	U.K.1.
	2667	"	Midas	U.K.1.
	2673	"	Sultan	U.K.1.
<u>Shropshire</u>				
Harper Adams	2400	15/7	"	U.K.1.
<u>Worcestershire</u>				
Kinver	2343	8/7	Pella	U.K.2.
	2344	"	Hudson	U.K.2.
	2389	15/7	Brier	U.K.1.
	2453	22/7	Turk	U.K.1.
Stourbridge	2239	17/6	Modoc	U.K.1.
	2242	"	La Mesita	U.K.1.
	2243	"	Trebi	U.K.1.
	2244	"	Clermont	U.K.1.
	2245	"	Coast	U.K.1.
	2246	"	Weider	U.K.1.
	2285	25/6	Vulcan	U.K.1.
	2289	"	Modoc	U.K.1.
<u>Eastern Region</u>				
<u>Cambridgeshire</u>				
N.I.A.B.	2211	6/6	Maris Otter	U.K.1.
	2212	"	Maris Puma	U.K.1.
	2213	"	Malta	U.K.1.
	2214	"	Astrix	U.K.2.
	2216	"	Vulcan	U.K.1.
	2217	"	Sultan	U.K.1.
	2218	"	Zephyr	U.K.1.
	2219	"	Julia	U.K.1.
	2220	"	Impala	U.K.1.
	2221	"	Tuis	U.K.1.
	2222	"	Maris Concord	U.K.1.

Table 41 continued

Location	Reading Code No. 1969	Date of Region 1969	Variety	Race
Cambridgeshire N.I.A.B.	2223	6/6	Deba Abed	U.K.1.
	2225	"	Mosane	U.K.1.
	2226	"	Maris Badger	U.K.1.
	2227	"	Ehropa	U.K.1.
	2229	"	Tellus	U.K.1.
	2230	"	Crusader	U.K.1.
	2231	"	Lofa Abed	U.K.1.
	2459	23/7	"	U.K.1.
	2460	"	Clermont	U.K.1.
	2461	"	Maris Canon	U.K.1.
	2462	"	Lofa Abed	U.K.1.
	2463	"	Maris Canon	U.K.1.
	2464	"	Pegasus	U.K.1.
	2465	"	Mazurka	U.K.1.
	2466	"	"	U.K.f.
	2467	"	Pajbjero	U.K.1.
	2468	"	Clermont	U.K.1.
2469	"	Felda	U.K.1.	
Essex Peldon	2207	20/5	Maris Otter	U.K.1.
	2275	23/6	Sultan	U.K.1.
Norfolk Sprowston	2209	21/5	Maris Otter	U.K.1.
	2232	10/6	Malta	U.K.1.
	2233	"	Petkus	U.K.1.
	2407	17/7	Wing	U.K.1.
	2293	27/6	Vada	U.K.1.
South-Eastern Region Berkshire Aston Tirrold	2234	12/6	Unknown	U.K.1.
	2237	"	"	U.K.1.
	2238	"	"	U.K.1.
Buckinghamshire Stokenchurch	2385	15/7	Sultan	U.K.2.
	2386	"	Vada	U.K.1.
	2388	"	Lofa Abed	U.K.1.
Kent Wye	2250	20/6	Inis	U.K.1.
	2251	"	Vada	U.K.1.
	2252	"	Maris Otter	U.K.1.
	2254	"	Lofa Abed	U.K.1.
	2255	"	Impala	U.K.1.
	2258	"	Berac	U.K.1.
	2260	"	Hassan	U.K.1.
	2261	"	Julia	U.K.1.
	2262	"	Crusader	U.K.1.
	2263	"	Deba Abed	U.K.1.
	2265	"	Midas	U.K.1.
	2267	"	Clermont	U.K.1.
	2268	"	Imber	U.K.1.
	2269	"	Zephyr	U.K.1.
	2270	"	Senta	U.K.2.
2272	"	Felda	U.K.1.	
2273	"	Maris Canon	U.K.1.	



Table 41 continued

Location	Reading Code No. 1969	Date of Reception 1969	Variety	Race	
<u>South Western Region</u>					
Newquay	2294	27/6	Clermont	U.K.1.	
	2355	9/7	Zephyr	U.K.2.	
	"	"	"	U.K.1.	
	2357	"	Midas	U.K.2.	
	2358	"	Deba Abed	U.K.2.	
	2359	"	Berac	U.K.2.	
	2360	"	Felda	U.K.1.	
	2361	"	Inis	U.K.1.	
	2362	"	Akka	U.K.1.	
	2363	"	Impala	U.K.1.	
	2364	"	Marris Canon	U.K.1.	
	2365	"	Clermont	U.K.1.	
	2366	"	Sultan	U.K.1.	
	2367	"	Gerkra	U.K.1.	
	2368	"	Vada	U.K.1.	
	2369	"	Golden Promise	U.K.2.	
	2370	"	Proctor	U.K.2.	
	Paigstow	2328	4/7	Marris Canon	U.K.1.
		2330	"	Sultan	U.K.1.
		2333	"	Proctor	U.K.1.
2334		"	Pellus	U.K.1.	
2335		"	Inis	U.K.1.	
2336		"	Impala	U.K.1.	
2337		"	Vada	U.K.1.	
2338		"	Gerkra	U.K.1.	
2339		"	Rika	U.K.1.	
2340		"	Imber	U.K.1.	
2510		24/7	Crusader	U.K.1.	
2513		"	Tern	U.K.1.	
Truro		2483	"	Zephyr	U.K.2.
	2484	"	Imber	U.K.1.	
2487	"	Julia	U.K.2.		
<u>Devon</u>					
Barnstaple	2380	11/7	Julia	U.K.1.	
Bickington	2403	16/7	Proctor	U.K.1.	
Exeter	2405	"	Vada	U.K.1.	
	2423	18/7	Zephyr	U.K.1.	
	2427	"	Clermont	U.K.1.	
	2431	"	Berac	U.K.1.	
	2434	"	Marris Canon	U.K.1.	
	2435	"	Proctor	U.K.1.	
	2569	29/7	Delisa	U.K.1.	
	2312	2/7	Deba Abed	U.K.2.	
	2404	16/7	Proctor	U.K.1.	
	2313	16/7	Proctor	U.K.1.	
Kingsbridge	2314	"	Tern	U.K.1.	
	2316	"	Deba Abed	U.K.1.	
	2636	31/7	Proctor	U.K.1.	
	2638	"	Marris Canon	U.K.1.	
	2642	"	Emir	U.K.1.	
	2541	29/7	Akka	U.K.1.	
	2549	"	Mazurka	U.K.1.	
	2551	"	Tern	U.K.1.	
	2341	4/7	Imber	U.K.1.	
	2580	29/7	Emir	U.K.1.	
Roborough	2582	"	Julia	U.K.2.	
	2596	"	Lofa Abed	U.K.2.	
	2381	11/7	Proctor	U.K.1.	
Yealmpton					

Table 41 continued

Location	Reading Code No. 1969	Date of Reception 1969	Variety	Race
Deriset Frampton Marshall	2604	30/7	Maris Canon	U.K.1.
	2605	"	Felda	U.K.2.
	2606	"	Midas	U.K.2.
	2607	"	Abed 4904	U.K.2.
	2609	"	Crusader	U.K.1.
	2610	"	Imber	U.K.2.
Portesham	2620	"	Clermont	U.K.1.
	2621	"	Zephyr	U.K.1.
Wimborne St. Giles	2303	1/7	Vada	U.K.1.
	2304	"	Midas	U.K.1.
Wootton Fitzpaine	2274	20/6	Sultan	U.K.1.
Wiltshire	2482	24/7	Ruby	U.K.1.
	2372	10/7	Lofa Abed	U.K.1.
Boyton	2472	23/7	Felda	U.K.1.
Chitterne	2480	"	Golden Promise	U.K.1.
Codford	2305	1/7	Vada	U.K.1.
	2306	"	Julia	U.K.2.
	2307	"	Gerkra	U.K.1.
	2308	"	Maris Canon	U.K.1.
	2309	"	Akka	U.K.1.
Middle Woodford	2345	8/7	Crusader	U.K.1.
	2346	"	Midas	U.K.1.
	2347	"	Berac	U.K.1.
	2348	"	Clermont	U.K.1.
Wales Anglesey Brynsiencyn	2439	18/7	Sultan	U.K.1.
	2440	"	Proctor	U.K.1.
Cae Isa	2349	9/7	Julia	U.K.1.
	2350	"	Vada	U.K.1.
	2351	"	Zephyr	U.K.1.
	2352	"	Sultan	U.K.1.
	2353	"	Inis	U.K.1.
2354	"	Proctor	U.K.1.	
Denbighshire Trefnant Wrexham	2442	18/7	Unknown	U.K.1.
	2441	"	Deba Abed	U.K.1.
Pembrokeshire Boncath Gumfreston	2399	15/7	Julia	U.K.1.
	2295	27/6	Maris Otter	U.K.1.
	2296	"	Senta	U.K.2.
	2297	"	Malta	U.K.1.
	2298	"	Eckendorf	U.K.1.
2299	"	Pella	U.K.2.	
Radnorshire Glasebury	2278	24/6	Sultan	U.K.1.
	2279	"	Sephyr	U.K.1.
	2280	"	Julia	U.K.1.
	2281	"	Vada	U.K.1.
	2282	"	Impela	U.K.1.
	2283	"	Proctor	U.K.1.
2292	27/6	Deba Abed	U.K.1.	
Scotland Angus Brechin Carnoustie	2383	11/7	Julia	U.K.1.
	2382	"	Akka	U.K.1.
	2712	21/8	Inis	U.K.1.
	2715	"	Vada	U.K.1.
	2716	"	Lofa Abed	U.K.1.
	2719	"	Betina	U.K.1.

Table 41 continued

Location	Reading Code No. 1969	Date of Reception 1969	Variety	Race
Caitness Thurdistoft	2655	31/7	Sultan	U.K.1.
Fife Dunfermline	2693 2695	15/8 "	Hassan Tern	U.K.1. U.K.1.
Kinross-shire	2690 2691	" "	Ymer Julia	U.K.1. U.K.1.
Peebles-shire Broughton	2689	14/8	Akka	U.K.1.
Perthshire Auchterarder	2698 2700 2701 2702 2703 2704 2707 2708	15/8 " " " " " " "	Inis Sulivan Vada Lofa Abed Maris Canon Hassan Tern Akka	U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1.
Blairgowrie	2724 2726 2727 2728 2729 2733 2735	27/8 " " " " " "	Proctor Inis Julia Sultan Vada Betina Tern	U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1.
Northern Ireland Co. Armagh	2457 2458	23/7 "	Hybrid "	U.K.1. U.K.1.
Loughgall	2412 2413 2414 2416 2418 2420 2443 2448 2449	18/7 " " " " " 21/7 " "	Golden Promise Tellus Julia Sultan Banba Mosane Ymer Lofa Abed Deba Abed	U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1.
Co. Down Castlereagh	2373 2374 2375 2376 2377 2378 2379	10/7 " " " " " "	Zephyr Sultan Deba Abed Dronto Midias Mosane Lofa Abed Zephyr	U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1. U.K.1.
Hillsborough	2650	31/7	Zephyr	U.K.1.
Eire Co. Kildare Leixlip	2523 2524	28/7 "	Tern Sultan	U.K.1. U.K.1.

24 isolates were identified as race U.K.2 and the remaining 222 isolates as race U.K.1. One sample yielded both races.

Two isolates were obtained from varieties with the RH4 major gene for resistance to Rhynchosporium; both proved to be race U.K.1. and it is assumed that the samples came from off-type plants.

Of the 24 race U.K.2 isolates, 5 were from varieties believed to carry the RH3 gene for resistance (Senta, Herts, Kent and Pems.; Astrix, Cambridge and Hudson, Worcs.) The remaining 19 race U.K.2 isolates came from varieties with no major genes for resistance and of these, 16 were from the south west (Cornwall, Devon, Dorset, Wilts.) and one each from Pems., Worcs., and Bucks.

## Final Summary

1. 1741 samples of diseased material were collected in 1969 and sent to the four centres for race identification. This is the highest number of samples for the three years that surveys have been conducted

2. Of the wheat yellow rust races identified Race 3/55 was most frequently identified, being present in 63% of the samples tested. Three different types of race 3/55 were identified, two of them, 3/55 Cleo and 3/55D, for the first time and were present in relatively few samples. Race 3/55D is important because of its ability to infect Cama and Maris Beacon amongst other varieties and race 3/55 Cleo is able to infect Cama. The remaining type of race 3/55 is widely distributed over the British Isles and is the major cause of infection on varieties such as Cappelle-Desprez, Champlein and Hybrid 46, Race 60 has again decreased in frequency and has not been obtained from a field crop. Race 58c still appears to be restricted to S.E. Scotland and N.E. England. After a break of 1 year race 2B has again been identified from several widely spaced locations in the British Isles. Seven samples of the new race, race 1B, have been identified from widely scattered locations. This race is important because of its ability to infect Maris Ranger. No other races were identified.

3. Only one sample of barley yellow rust was identified as race 23 in 1969, the remaining samples were identified as race 24. Most commercial barley varieties are susceptible to race 24 and resistant to race 23 which probably accounts for the increased frequency of race 24.

4. Eight race groups of barley brown rust were identified. Three of these have not been identified previously in Britain. These races are widely spread throughout the British Isles though most samples of the group F races were obtained from Scotland. A number of major gene sources of resistance are overcome by the races. None of the resistances is present in commercial barley grown in Britain and consequently all varieties are susceptible to brown rust.

5. Eleven races of oat crown rust were identified. Many of the races were new to Britain but they only represented minor changes within an existing race group and are not considered important. However two races, race 265 and the Victoria race, both obtained from samples collected in Devon, are important because of their ability to infect several varieties which have previously been resistant.

6. Races 3, 13 and 26 were the most frequently occurring of the 17 races of wheat mildew which had been identified. These races are widely distributed over the British Isles. New races of mildew have been found which are able to infect the resistant varieties, Kolibri, Zorba, Mildress and Maris Dove. Race 23 was identified for the first time and was able to infect Cardinal.

7. Of the barley mildew races identified the number of Impaia virulent races has again declined slightly, but there has been an increase in the number of Sultan infecting races, 16 of a total of 28 races identified. The Sultan infecting races are widespread over the British Isles. Several samples were collected from other resistant varieties, but the majority failed to establish.

8. Oat mildew race 2 was again most frequently identified and was present in most parts of Britain. However two new races, race 4 and race 5, were identified for the first time from samples collected in the field. These samples were collected from the W.P.B.S. oat mildew nursery and so far these races, which can infect the resistant variety Mostyn, have not been obtained from field crops.

9. Two races of Rhynchosporium were again identified, race U.K.1 and race U.K.2. Race U.K.1 was the most widespread race, and could infect the majority of spring barley varieties. Race U.K.2 was mainly identified from the South-West and is also able to infect winter barley varieties.

10. I would like to thank the centres which have contributed the results contained in this report, and we would like to thank participants for contributing samples of disease material throughout the 1969 season.

3rd June, 1970

N.H. Chamberlain



