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BRITISH LICHEN SOCIETY

President: P. W. James, B.Sc., F.L.S.

BULLETIN 28 April 1971

Society oppose Plymouth power station

The British Lichen Society is giving evidence against the Central Electricity Generating Board's plans to build an oil-fired power station on the Cornish banks of the River Tamar, opposite Plymouth. The Society is concerned that sulphur dioxide from the station will affect the epiphytic flora of Dartmoor, including three sites of international importance for lichens. The President, Mr. P. W. James will outline the Society's case. Supporting evidence is given by the Nature Conservancy, who also draw attention to the risk of oil spillage. There are about fifty objectors, including Devon County Council, Plymouth City Council and the Tamar Protection Society. The proposed station is at Inwork Point, Millbrook, on a 158 acre site. Two million tons of oil would be burnt in a year, with no provision made for sulphur removal, and the resulting sulphur dioxide would be discharged through a chimney 200 m tall. The enquiry opened at Plymouth on 9 February 1971.

Literature guide for sale

Interleaved copies of Dr. D. L. Hawksworth's "Guide to the literature for the identification of British lichens" (reprinted from the Bulletin of the British Mycological Society) are available from the Society's Treasurer, Mr. S. A. Manning, 28 Gilmerton Court, Long Road, Cambridge, CB2 2HQ, price £0.20 plus postage £0.03. The guide includes lists of introductory works, British works and lists, standard works, publications on phytosociology and ecology, and a special part. The last, which forms the major section of the publication, lists the generic names of British lichens for which monographs or other extensive treatments are available and gives citations of pertinent works. In all some 378 references are given. The work is interleaved to allow users to add additional references to publications as they appear (e.g. from the Society's Bulletin).

Vice-county maps published

The Ray Society have now issued their publication Watsonian Vice-Counties of Great Britain. The publication consists of a map (in two parts) of the vice-counties of Great Britain, on a scale of about ten miles to one inch, and a commentary by J. E. Dandy. It is available from Johnson Reprint & Co. Ltd., Berkeley Square House, Berkeley Square, London, W1X 5LB, price £1.00 (maps flat) or £1.50 (maps folded; in box).

Day excursion to Kent

The annual excursion with the Kent Field Club led by Mr. F. H. Brightman and Mr. J. R. Laundon will be held on Sunday 9 May 1971 with the object of studying saxicolous lichens in the Maidstone area. Meet outside Maidstone East Station at 11.00. Bring packed lunch. Train leaves Victoria Station, London, at 9.49 arriving at Maidstone East at 10.45.

Summer field meeting at Hereford, 1971

The summer field meeting will be centred on Hereford from Wednesday evening 4 August 1971 to Wednesday morning 11 August, under the leadership of Mr. R. H. Bailey. The Castle Pool Hotel, Castle Street, will be the headquarters accommodation and members should meet outside here at 9.30 on Thursday 5 August. Members must book their own accommodation and return the enclosed form to Mr. Bailey. Packed lunch will be required each day. Laboratory facilities will be arranged.

Accommodation in Hereford is listed below.

- Booth Hall Hotel, High Town. (Telephone: Hereford 2898) 9 rooms.  
Bed and breakfast £1.88.
- Castle Pool Hotel, Castle Street. (Telephone: 3609) 26 rooms.  
Dinner, bed and breakfast £16.28 per week. Bed and breakfast  
£1.88. Headquarters for the meeting.
- City Arms Hotel, Broad Street (Telephone: 3701) 43 rooms  
Bed and breakfast from £2.40.
- Green Dragon Hotel, Broad Street (Telephone: 2506) 76 rooms.  
Bed and breakfast from £2.55.

There are in addition a large number of private hotels, guest houses, etc., but it has not been possible to obtain details of their terms owing to the postal dispute. A number of such addresses are given below and a full list is published in Hereford - where to stay in City and County, together with terms and facilities. This is available from the Information Bureau, Town Hall, Hereford (Telephone: 3021).

- Ferncroft Hotel, Ledbury Road.  
Oaklands Hotel, Bodenham Road.  
Somerville Hotel, Bodenham Road.  
White Lodge Hotel, 50 Ledbury Road.  
Miss C. H. Carpenter, 88 Park Road.  
Mrs. S. M. Gillanders, Heskett Lodge, 28 Ledbury Road.  
Mr. H. Ward, Tenby Guest Hotel, St. Nicholas Street.

#### First International Mycological Congress: pre-congress lichen field excursion

In connection with the First International Mycological Congress, a pre-congress lichen field excursion is to be based on Ilfracombe, north Devonshire, from Tuesday evening 31 August 1971 to Monday morning 6 September. This field meeting is open to all members of the British Lichen Society whether they will be attending the Exeter Congress or not. It is being organised by Mr. P. W. James and Dr. D. L. Hawksworth.

Devonshire is probably the richest county in England for lichens with about 550 species. The field excursion is being arranged to include visits to many different habitats so that visitors may learn many species in a short time. Excursions will be arranged to Tors Walk, Ilfracombe (1 September) for saxicolous maritime vegetation, Clovelly (2 September) for woodland, Exmoor (3 September) for moorland and upland lichens, Braunton Burrows (4 September) for sand-dune and maritime lichens, and Dartmoor (5 September) for moorland, upland woodland and granite lichens.

The fee for the excursion is £2.50 which includes the cost of transport by coach during the meeting and probably a pamphlet to provide an introduction to the region. This fee should be sent with the form at the end of the Bulletin to Dr. D. L. Hawksworth. Accommodation is limited by the number of seats on the coach so early booking by sending this fee is essential. The fee should certainly be sent before 30 June 1971. Members wishing to use their own cars will also be liable for the whole excursion fee.

Members should meet outside the Grosvenor Hotel (headquarters) at 9.30 on the morning of each excursion except Sunday 5 September, when the time of meeting will be 10.00. Packed lunches should be brought, and it is hoped to make stops on the longer outings at places where refreshment can be obtained. As Ilfracombe is a popular coastal holiday resort members should book their own accommodation as soon as possible from the hotels listed below. Further lists of accommodation are available in the Official Guide to Ilfracombe, obtainable from the Information and Publicity Officer, Ilfracombe Joint Advertising Committee, Department O.G., West Promenade, Ilfracombe, Devonshire, price £0.05. Bed, breakfast and evening meal for six nights will be required.

Berkeley, Wilder Road (Telephone: Ilfracombe 2196) 38 rooms. AA approved.  
£11.55 - £16.80 per week.  
Cecil, Wilder Road (Telephone: 2121) 30 rooms. AA two star. £13.13 for  
six nights for dinner, bed and breakfast.  
Clifton, Fore Street (Telephone: 2598). From £8.53 per week.  
Collingwood, Wilder Road (Telephone: 3621) 85 rooms. AA two star.  
£15.75 - £18.90 per week.  
Dilkhusa Grand, Wilder Road (Telephone: 3505/6). 119 rooms. AA three star.  
From £17.50 per week.  
The Gilbert, Wilder Road (Telephone: 2144). £10.50 - £14.70 per week.  
Grosvenor, Wilder Road (Telephone: 3426). 61 rooms. AA two star.  
£18.90 per week for dinner, bed and breakfast.

#### HEADQUARTERS.

Imperial, Wilder Road (Telephone: 2536) 98 rooms. AA two star.  
£18.90 - £23.10 per week.  
Montebello, Fore Street (Telephone: 2040) 50 rooms. AA one star.  
£12.60 - £18.90 per week.  
Queen's Court, Wilder Road (Telephone: 3764). From £8.40 per week.

Travel to Ilfracombe from London is by train from Paddington Station to Barnstaple Junction. An hourly Western National bus service connects the Station Approach, Barnstaple, with Ilfracombe. The 21 km journey takes 45 minutes. Travel to Ilfracombe from London Airport (Heathrow) is by coach to Reading General Station, train to Barnstaple, and bus to Ilfracombe.

#### First International Mycological Congress

The First International Mycological Congress is being held at Exeter, Devonshire, from Tuesday 7 September until Thursday 16 September 1971. The British Lichen Society is being represented, and many papers on lichens will be given. There will also be exhibits dealing with lichens. Full details may be obtained from the Secretary, of the Congress, Professor J. Webster, Department of Biological Sciences, The University, Prince of Wales Road, Exeter, EX4 4PS, Devonshire.

#### Autumn meeting at Portsmouth 1971: speakers required

The autumn meeting at Portsmouth will combine a field excursion on Saturday 30 October 1971 with an indoor meeting on Sunday 31 October, under the leadership of Mr. D. I. Morgan-Huws. Lectures are required for the Sunday and any member who would like to be kind enough to address the meeting on any aspect of lichenology should complete the form at the end of the Bulletin. Forms should be sent to Mr. Morgan-Huws before 31 July. The full programme of speakers will be issued in a later Bulletin. The meeting will be held at the Department of Biological Sciences, Portsmouth Polytechnic, Hampshire Terrace, Portsmouth.

#### Meetings 1972

Provisional arrangements for meetings in 1972 include the Annual General, lecture and exhibition meeting at Imperial College, London, on 8 January, spring field meeting in north Cornwall, and summer field meeting in the Wexford area of Ireland. Full details of the 1972 meetings will appear in later numbers of the Bulletin.

#### Literature bequests

Members might like to remember the Society when drawing up their wills, by leaving their lichen books and reprints to the Society's library, c/o Dr. D.H. Brown, Department of Botany, The University, Bristol, BS8 1UG. In this way members can be assured that their literature will be put to good use in the future.

## Lichen courses 1971

DEVONSHIRE. Slapton Ley Field Centre, Slapton, Kingsbridge. 18 - 25 August.  
Lichens and fungi. Directed by Dr. D. L. Hawksworth.

PERTSHIRE. Kindrogan Field Centre, Enochdhu, Blairgowrie. 15 - 22 September.  
Autumn bryophytes and common lichens. Directed by Dr. Ursula K. Duncan.

SOMERSET. Leonard Wills Field Centre, Nettlecombe Court, Williton, Taunton.  
22 - 29 September. Lichens and fungi. Directed by Mr. P.W. James.

The centres will supply further details and information regarding bursaries and grants available for those who attend.

## Mr. Manning elected Treasurer

At the Annual General Meeting on 2 January 1971 Mr. S. A. Manning, 28 Gilmerton Court, Long Road, Cambridge, CB2 2HQ, was elected Honorary Treasurer and Publications Officer. Annual subscriptions and orders for the Society's publications should therefore be sent to Mr. Manning, and not to Dr. Brown as in the past. The subscription remains at £2.00 for ordinary members, £1.00 for junior members and £0.25 for family members. An order form for publications appears at the end of this Bulletin.

Dr. D. H. Brown had to resign as Treasurer because of other commitments, and is gratefully thanked for all the hard work which he has put into this extremely onerous office, since he took it over in 1966. Fortunately the Council will not be losing Dr. Brown's services, as he is continuing as Librarian and Reading Circle Secretary.

## New honorary members elected

At the Annual General Meeting on 2 January 1971 three persons were elected to honorary membership of the Society. These were Professor Y. Asahina of Tokyo, Mr. F. A. Sowter of Leicester, and Mr. A. E. Wade of Cardiff. Professor Asahina had been nominated by the Council because of his outstanding work on lichen chemistry, which is of major international importance, whilst Mr. Sowter and Mr. Wade were nominated for their vital work in keeping British lichenology alive when it was at its lowest ebb between the active years of Dr. Lamb and Dr. Watson, and the foundation of the Society.

Prior to 1971 there were only three honorary members of the Society. These were Professor H. des Abbayes, Mme V. Allorge and Dr. W. Watson, who were all elected shortly after the formation of the Society. Dr. Watson of Taunton died in 1960, but Professor des Abbayes and Mme Allorge are well and living in France.

## Slapton lichens

Dr. D. L. Hawksworth, Commonwealth Mycological Institute, Ferry Lane, Kew, Richmond, Surrey, is preparing an account of the lichens of Slapton Ley Nature Reserve, near Kingsbridge, Devonshire, for publication in 1972. He would be pleased to receive species lists made by students on courses at the neighbouring Field Centre, and any other lists made in the area. The account will include maps of the British distribution of Gyalectina carneolutea, Lithographa dendrographa, Microthelia micula, Parmelia borrieri s.str., P. carporrhizans, Phaeographis lyellii, Phlyctis agelaea, Physcia tribacioides, and Usnea subpectinata, and would therefore welcome records of these from anywhere in the British Isles, preferably accompanied by herbarium specimens. Records should be sent in before 31 July 1971, as later submissions cannot be incorporated.

## 1. Introduction

Lichens produce about sixty-five identified chemicals unknown in other groups of plants. Most of these are weak phenolic acids derived from orcinol and B-orcinol, are produced on the surface of the hyphae, and may occur in the cortex, medulla, or thecium (= hymenium). Different acids frequently occur in different tissues; many lichen genera have atranorin (e.g. Pseudevernia) or usnic acid (e.g. Ramalina, Usnea) in the cortex and different acids in the medulla. It is known that the chemical present does not depend on the age of the thallus, how long ago it was collected, or how the material was dried for the herbarium. Most species produce identical lichen acids throughout their range and because of the inherent morphological variability of many lichens, identifications of the chemicals present often provides a reliable aid to the determination of difficult or fragmentary specimens. Techniques have been devised which enable the commonly occurring acids to be identified in small thallus fragments by simple procedures not requiring elaborate or expensive apparatus (3 - 6). Notes on some more sophisticated techniques, primarily of interest to the specialist with access to more elaborate equipment, are also briefly mentioned (7 - 10). It must be borne in mind that whilst the positive identification of a substance is conclusive, great caution must be used in judging a particular substance to be absent. Cases are known where (a) the amount of a substance present varies so that it may be overlooked by simple tests, and (b) substances occur only in parts of a thallus. Where several substances are present, interference in microchemical tests may occur so other methods should be employed. Ideally several techniques should be used and the resulting data compared.

## 2. Catalogues

In using microchemical tests for the identification of taxa, the substances to test for have first to be ascertained. For this the following catalogues are valuable:

### (a) Standard works

CULBERSON, C. F. 1969. Chemical and Botanical Guide to Lichen Products. Chapel Hill, U.S.A.

CULBERSON, C. F. 1970. Supplement to 'Chemical and botanical guide to lichen products'. Bryologist 73: 177 - 377.

### (b) Other works

ASAHINA, Y. & SHIBATA, S. 1954. Chemistry of Lichen Substances. Tokyo.

BRLEGGER, W. 1923. Flechtenstoffe. Handb. biol. Arb Meth. 1 (10): 205 - 438.

SHIBATA, S. 1958. Especial compounds of lichens. Handb. PflPhysiol. 10: 560-623.

ZOPF, W. 1907. Die Flechtenstoffe in chemischer, botanischer, pharmakologischer und technischer Beziehung. Jena.

## 3. Thallus tests

The colour should be noted immediately on application of the reagent (the colours with C and KC may disappear rapidly) and also after about five minutes (PD may take this time to react). They should be examined with a lens (at least x 10) or binocular microscope. Reagents are most appropriately applied with a small paint brush, match-stick, or thin glass rod. When testing the medulla it should be exposed by removing the cortex with a razor blade. In dark thalli the colour changes are best seen by taking them up on filter paper. It is best to test reagents on material of known chemical constitution to check that they are working satisfactorily. Suggested species for this are indicated.

C: Use freshly prepared bleaching powder or a commercial bleaching agent (e.g. Parozone). Gives red, rose or green as positive reactions. Test on e.g. Ochrolechia tartarea (red).

K: Potassium hydroxide solution (aqueous). A 35 per cent solution is recommended. Often reacts with the formation of crystals in squash preparations. Keeps well. Gives yellow, yellow changing to red, or brownish as positive reactions. Test on e.g. medulla of Parmelia saxatilis or P. sulcata (yellow changing to red).

KC: Application of K quickly followed by C. Often best demonstrated by applying K and taking it up on filter-paper and then adding an adjacent spot of C so that a colour may form at the interface. Gives red or rose colours as positive reactions. Test on e.g. medulla of Hypogymnia physodes (rose-red).

PD: Two or three crystals of p-phenylenediamine moistened with alcohol in a small watch-glass are best for isolated tests. If using the reagent frequently 'Steiner's Stable PD Solution' is more convenient (1 g p-phenylenediamine: 10 g sodium sulphite: c. 0.5 ml detergent: 100 ml water), remade at three monthly intervals to ensure reliable results. Gives red, or yellow changing to orange or red as positive reactions. Test on e.g. Haematomma ventosum, Thamnia subuliformis (orange-red), medulla of Parmelia saxatilis or P. sulcata (yellow to red). SEE 11 BELOW.

#### 4: Microchemical tests

Microchemical tests provide a rapid means of identifying lichen acids and are extremely sensitive. They are becoming essential for all serious taxonomic studies and provide invaluable aids in the identification of numerous species. Tests are made on the substance extracted from the thallus, usually with acetone, but occasionally with benzene. Extracts may be prepared in one of two ways:

(a) Crumble fragments of the lichen on to a microscope slide placed on a slide warming plate at 50 - 70°C (a radiator top of this temperature will suffice). Acetone is added in drops from a pipette, each drop being allowed to evaporate before the next is added. A residue containing the lichen substances, which may be white, yellowish, green, reddish or like varnish in appearance, will then form around the fragments. When a reasonable amount of residue has been obtained the slide should be allowed to dry and the lichen fragments brushed off with a fine paint brush.

(b) Place fragments in a specially designed test-tube ('Asahina's Microchemical Extractor'), add the solvent and boil gently over a spirit-lamp for two to three minutes. Let the solution drop out from the side-arm of the tube on to a warm slide on a warming plate so that a residue is formed. This method is useful when benzene and acetone fractions are required separately (e.g. large amounts of usnic acid or atranorin may be removed by extraction with benzene so that there is no interference with the crystal formation of other substances; SEE 11 BELOW).

The slides with the dry residue are then removed from the warming plate, cover slips placed over the residue, and the reagent added. The best crystals are formed if the concentration of the substance in the reagent is high. In order to facilitate this the minimum amount of reagent should be added and the cover slip not floated. If the residue is small it may be scraped together with a razor blade and/or a broken portion of a cover slip used. Fragments of cover slips may be placed over different parts of a residue and several tests performed simultaneously on a single slide. After the addition of the reagent the slides are warmed gently over a spirit-lamp until the greater part of the residue has dissolved; they are then allowed to cool to room temperature. Many crystals appear within five minutes but some take longer so that slides should be examined at five minute, one hour and four hour intervals. It is not essential to warm slides with some reagents (e.g. KK) but heat generally leads to the production of better crystals. Slides should be discarded after use.

The most useful reagents, their composition by volume, and some of the substances they are used to test for, are given below. They are made up by simply mixing their components together.

G.E. (glycerol 1: glacial acetic acid 3) Test for many substances including atranorin, divaricatic, usnic and psoromic acids and zeorin. This and G.A.W. are the most commonly used reagents.

G.A.W. (glycerol 1: ethanol 1: water 1) Test for many substances including lecanoric, oliveteric, physodic and gyrophoric acids.

G.A.o-T. (glycerol 2: ethanol 2: o-toluidine 1) Test for many substances including stictic, norstictic and salazinic acids and atranorin. Make fresh supply at intervals of about two months. SEE 11 BELOW.

G.A.An. (glycerol 2: ethanol 2: aniline 1) Particularly useful for thamnolic and fumarprotocetraric acids. SEE 11 BELOW.

K.K. (five per cent potassium hydroxide, 1: twenty per cent potassium carbonate 1) Particularly useful for norstictic and salazinic acids.

Other solutions are less frequently used - see Shibata (1963). The crystals may be preserved for several months by ringing the cover slips with two coats of nail varnish. Crystals must be examined microscopically and polarising apparatus is advantageous but not essential. There is no comprehensive work containing all known crystal photographs and the literature cited here is only a brief selection; papers containing details are included in Culberson (1969) (SEE 2). Practice is essential on material containing known chemicals before reliable interpretation of results is possible because many crystals are extremely variable in form even in a single reagent (e.g. usnic acid in G.E.) This variation means that care must be used in matching the results with published photographs.

Literature containing useful photographs includes:

ASAHINA, Y. 1936 - 1940. Mikrochemischer Nachweis der Flechtenstoffe.

J. Jap. Bot. 12: 516 - 525, 859 - 872; 13: 529 - 536, 855 - 861; 14: 39 - 44, 244 - 250, 318 - 323, 650 - 659, 767 - 773; 15: 465 - 472; 16: 185 - 193.

HALE, M. E. 1967. The Biology of Lichens. London.

SHIBATA, S. 1963. Lichen substances. In LINSKENS, H. F. & TRACEY, M. V. (editors) Modern Methods of Plant Analysis 6: 155 - 193. Berlin.

THOMSON, J. W. 1968. The Lichen Genus Cladonia in North America. Toronto.

## 5. Ultraviolet (UV) light

Many lichen substances fluoresce in ultraviolet light (254 - 366 nm) and in some instances this can be seen directly by simply exposing the specimen under a suitable lamp (e.g. Thamnolia subuliformis (bluish - white), T. vermicularis (dark)). Fluorescence is particularly important as an aid to the identification of spots in chromatography when yellow, violet, greenish, orange, blue, and other colours are seen. IN USING ULTRAVIOLET LAMPS DARK OR OTHER GLASSES SHOULD BE WORN TO PROTECT THE EYES. For colours of substances see literature under 6. See also 8.

## 6. Paper chromatography

Paper chromatography by both ascending and descending techniques has been widely used in lichens though it is now largely replaced by thin - layer chromatography (see 7 below): a quicker, more sensitive, and more expensive technique. In chromatography difficulty occurs because many lichen substances have rather similar high Rf values (distance from origin to spot centre / distance from origin to solvent front) when certain solvents are used. Papers impregnated with phosphate buffers (e.g. Wachmeister, 1956) and ammoniacal solvents (e.g. Mitsuno 1953) have been used to overcome this difficulty. Satisfactory separations can usually, however, be obtained without the use of buffered papers in developments over large distances (c. 30 cm). A large range of solvents are available but the following appear to be the most satisfactory for general use:

(a) n - butanol 4: ethanol 1: distilled water 5. Mix, place in separating funnel, allow to separate and clear (adding ethanol in drops to clear if necessary). Discard lower phase and use upper phase as the solvent.

(b) n - butanol 4: 0.88 ammonia solution 1. Use only in a fume cupboard with powerful extraction fans when removing the paper.

Solvents must be freshly prepared and the paper allowed to hang after spotting in the chromatography chamber for about thirty minutes before adding the solvent. Spotting is carried out by taking up residues from slide extraction (see 2a) in acetone in capillary pipettes and making a small spot on the paper. Pipettes should only be used once and then discarded. The size of the spot should be kept to a minimum by blowing gently as the extract flows on to the paper. Control spots of known identity must be used as Rf values tend to vary with the experimental conditions. In runs of thirty cm, solvents (a) and (b) take about twelve hours and eight hours respectively. Shorter strips may be used in large test tubes or gas jars but because of the lengths separation is poor. Whatman No. 1 chromatography paper is most suitable. Care must be taken to keep the external temperature constant during the run, preferably in an air-conditioned constant-temperature room at about 20°C. After development the chromatograms should be dried quickly in an oven at 40 - 60°C and then immediately examined under ultraviolet light and the colours and spots ringed in pencil. Reactions of the spots with PD (made up as Steiner's Stable PD solution (see 3) and filtered) and/or BD should be noted. Colours with BD must be noted immediately on application. BD (bis-diazotised benzidine) is freshly prepared in a fume cupboard by mixing equal volumes of solution I (5 g benzidine: 14 ml concentrated hydrochloric acid: 1,000 ml distilled water) and solution II (10 per cent aqueous sodium nitrate) immediately before use and waiting until the solution clears. Use only in a fume cupboard (SEE 11 BELOW). K, C, and KC tests may also be made on paper chromatograms but whilst positive tests are valuable aids in identification, negative ones may be merely indicative of low concentration of the substances. Rf values may be conveniently measured by using a piece of good quality elastic calibrated in units 0.1 (x 0.05) to 1.0 shorter than the length of the run (e.g. 25 cm elastic for a 30 cm run). Identification of spots is by a combination of reaction, colours in UV, Rf; and comparison with known substances on the same chromatogram. When chromatograms have been sprayed with either PD or BD they must be discarded as they discolour rapidly and may emit harmful vapours (BD). Whenever possible chromatograms should be run in duplicate or triplicate, this in any case being necessary if more than one spray is to be used.

The most udeful papers on the paper chromatography of lichen substances are given below. As mentioned above, too much significance should not be given to minor differences in Rf values in the same solvent.

HESS, D. 1958. Über die Papierchromatographie von Flechtenstoffen. Planta 52: 65 - 76.

MITSUNO, M. 1953. Paper chromatography of lichen substances. I. Pharm. Bull., Tokyo 1: 170 - 173.

WACHTEMEISTER, C. A. 1956. Identification of lichen acids by paper chromatography. Bot. Notiser 109: 313 - 324.

WACHTEMEISTER, C. A. 1959. IX. Flechtensäuren. In LINSKENS, H. F. (editor) Papierchromatographie in der Botanik: 135 - 141. Berlin.

### 7. Thin-layer chromatography (TLC)

For students with the necessary apparatus this technique, in conjunction with microchemical tests, provides the most satisfactory method of the determination of lichen products. A large range of solvents and plate coats have now been used. Merck Silica Gel F254 pre-coated plates are the most satisfactory, but recently many workers have been using coated plastic films which may be cut to desired sizes and consequently prove more economical. Plates may be hand-coated as required but results are likely to be less reproducible. The most satisfactory solvent for general use is benzene 90: dioxan 25: acetic acid 4 (SEE 11 BELOW) which should be used only in a fume cupboard. As in the case of paper chromatography, control substances should always be run on the chromatograms. Spots are detected by UV light and spraying with ten per cent sulphuric acid (heating at 110°C until colours develop).



See:

- CULBERSON, C. F. & KRISTINSSON, H.-D. 1970. A standardized method for the identification of lichen products. J. Chromat. 46: 85 - 93.  
SANTESSON, J. 1967. Chemical studies on lichens. 4. Thin layer chromatography of lichen substances. Acta chen. scand. 21: 1162 - 1172.

#### 8. UV - Spectra

UV - Spectra are prepared by making a solution of the substrate in absolute ethanol and placing the samples with a control in a UV - spectrophotometer which produces graphs (e.g. Unicam SP 800). This method is particularly useful in determining whether a particular compound is a depside or a depsidone. Depsides give two peaks (one in the range 211 - 270  $\mu$  and the other in the range 300 - 330  $\mu$ ) whilst depsidones give one (in the range 239 - 318  $\mu$ ). This technique can be used on solutions made from extracts on slides (see 4a) where only one substance is present; where several substances occur they must first be separated by elution from chromatograms.

See:

- HUNECK, S. 1968. Lichen substances. Prog. Phytochem. 1: 223 - 346.

#### 9. IR - Spectra

Infra - red (IR) spectra are produced by pressing samples of the substance into KBr (potassium bromide) discs, or in Nujol, and examining them with an IR - spectrophotometer (e.g. Unicam SP 200). The resulting spectra, resembling finger - prints, are valuable in comparing an extracted pure substance with a known pure sample in order to confirm its identity. Sufficient material for IR - spectra can be obtained from slide extractions (see 4a); if more than one compound is present they must first be carefully purified by elution from chromatograms.

#### 10. NMR - Spectra

These spectra require more material but give an immense amount of data on the precise chemical structure of the molecules and are a valuable step in the proof of the identity of a particular compound.

See:

- HUNECK, S. & LINSCHIED, P. 1968. 45. Mitteilung über Flechteninhaltsstoffe. NMR - Spektroskopie einiger Depside und Depsidone. Z. Naturf. 23b: 717 - 732.

#### 11. Warnings on use of toxic compounds

Aniline does not appear to be carcinogenic (cancer inducing), but exposure can lead to methaemoglobinaemia and consequently it should be used with great care in a well - ventilated room or fume cupboard.

Benzene is known to cause chromosome abnormalities, aplastic anaemia and leukaemia; it should be used only in a well - ventilated room or fume cupboard.

Benzidine is exceptionally toxic and may cause damage to epithelial linings. Bis-diazotised benzidine is even more toxic. These reagents should be used only in a fume cupboard.

O-toluidine is not known to be carcinogenic but should be handled with care. Note that o-tolidine (not used in lichenology) is regarded as having carcinogenic potential.

P - phenylenediamine (PD) should be used with care, immediately washed off the skin if it comes into contact with it, and precautions taken to avoid inhaling fine particles. It can cause blindness, brain damage, violent inflammation of the skin, and possibly cancer. It also causes unsightly stains on paper.

See: British Lichen Society Bulletin 26: 5 - 6 (May 1970).

Letters to the editor

Metric conversion

Sir, - Your table for converting feet to metres is a useful reminder that we should now always express altitude in these units. But a table is not in fact needed, because the conversion can be done by simple mental arithmetic.

You multiply the feet by three and drop the last digit. Thus, 1200 ft. equals 360 m (your table gives 370 m). Even at the top end of the scale the error remains negligible: 3 x 8000 ft = 2400 m (your table gives 2440 m).

There can be few occasions on which the degree of precision offered by this simple procedure is too low.

Yours faithfully,

T. D. V. Swinscow

London Road, Knebworth, Hertfordshire.

Lichenologist published

Part four of volume four of The Lichenologist was published on 30 December 1970. Although many members will not have received copies until early January 1971, publication in 1970 was effected by posting advance copies to the British Museum, British Museum (Natural History), Royal Botanic Gardens at Kew and Edinburgh, Linnean Society of London and the Department of Botany at Oxford (as well as to several members of the Council of the Society) so that they arrived on 30 December. The International Code of Botanical Nomenclature (1966: 34) defines the date of publication as "the date on which the printed matter becomes available" to "botanical institutions with libraries accessible to botanists generally", and it is this criterion which is used by the Secretary in accessing the precise date of publication of The Lichenologist. Any member who paid a subscription for 1969 or 1970 and did not receive a copy should inform the Secretary.

The Council of the Society were concerned that the journal was running a year late in its publication. In order to rectify this position they have decided that part four of volume four shall be available free to both 1969 and/or 1970 members, and that in future members will receive the parts published during the year in which a subscription is paid. A minimum of one part will be published each year.

This part marks the end of volume four and includes a title-page and index. The Society can recommend Ex-Libris, 9 Lenthall Place, London S.W.7. (telephone: 01-373 3919), for binding the completed volume, for which they charge about £2.00. The parts should be submitted to the binders with their paper covers intact and with instructions regarding the colour of the buckram required and details of lettering to be put on the spine. An earlier bound volume may be submitted to ensure uniformity.

Individual maps scheme

Dr. Rose has kindly taken over the mapping of a number of species being dealt with by Mr. I. S. C. Campbell, who died last year. The following additions and alterations to the list of individual mappers should therefore be noted:

|  |   |
|--|---|
| <u>Dimerella lutea</u>                       | F. Rose, 36 St. Mary's Road, Liss, Hampshire.   |
| <u>Enterographa crassa</u>                   | F. Rose   |
| <u>Lobaria</u> (excl. <u>L. pulmonaria</u> ) | F. Rose   |
| <u>Normandina</u>                            | F. Rose   |
| <u>Pseudocyphellaria</u>                     | F. Rose   |
| <u>Ramalina calicaris</u>                    | C. R. Prince, Department of Botany, Univ. of Aberdeen, St. Mochar Drive, Aberdeen. AB9 2UD. |
| <u>R. evernioides</u>                        | C. R. Prince  |
| <u>R. fastigiata</u>                         | C. R. Prince  |
| <u>R. fraxinea</u> (both subspecies)         | C. R. Prince  |
| <u>R. pollinaria</u>                         | C. R. Prince  |
| <u>Sphaerophorus melanocarpus</u>            | F. Rose   |

### Lichen conservation research

It is becoming apparent that over large areas of Britain certain of our most interesting and sought after epiphytic lichens are persisting in extremely local populations, often only on four or five trees.

Ironically many of the species appear to be reasonably healthy but their extremely local occurrence and restriction to older trees suggests that for a long time air pollution has depressed their vigour to a point where they are unable to colonise new sites. This means that their persistence in Lowland Britain, where the rate of change in the landscape is enormous, is at risk, and the next few decades will witness the extinction of populations which are most interesting to the plant geographer and which probably represent distinct physiological ecotypes.

In view of this serious state of affairs, it would be useful if the Society started investigations on a small range of species to discover such things as their growth rate, persistence of colonies, method to spread on a tree, colonisation sites preferred, effects of competition from other more vigorous epiphytes, etc. These investigations could be of great conservation value if it was decided to try to artificially perpetuate these relict clones.

The types of investigation needed are very simple:-

1. To collect information on growth rates, rate of turnover of colonies, and competition effects in different parts of the country. All that is needed is to trace the outline of the colony on to clear polythene sheeting and retrace at intervals. I have used this chart quadrat method effectively for the last six years. Photographic methods of recording could also be developed.
2. I would be in favour of starting immediately on transplant experiments. These would involve transplanting small flakes of dead bark carrying young colonies and cementing them on to suitable trees with araldite (Richardson 1967). Care would have to be taken to collect materials from a reasonably local source so that the correct ecotype was used and the new site should be trees of the same species with communities as similar as possible to the parent tree, but in a nature reserve, parkland or other protected site.

The kind of species I have in mind are those on the protected list (Supplement to Bulletin 26) such as Alectoria, Lobaria, Ramalina, Usnea, and perhaps also Umbilicaria and a few Parmelia spp., to be recorded in Lowland and Highland Britain with a tracing about every third year.

Would those members interested in joining in this conversation project get in touch with me; we can then select some convenient species to work with.

O. L. GILBERT  
Department of Landscape Architecture,  
The University,  
Sheffield,  
S10 2TN.

### Book protection

Transparent self-adhesive vinyl for the protection of books and maps used in the field is available from Nadler Limited, Commercial Street, Manchester 15. It is called "Nadclear" and a roll 12 yards in length and 20 inches wide costs £1.75. Alternatively there is "Nadclear-matt" which is thicker and matt to avoid reflection at £1.90 per roll. Packing and postage is £0.30.

### British Standard Time still an issue, says Callaghan

British Standard Time, the introduction of which was welcomed in Bulletin 21: 7 (1967) because it facilitated winter field work, is to lapse on 31 October 1971, when time in the United Kingdom will revert to Greenwich Mean Time. During British Standard Time the clocks are one hour ahead of Greenwich time so that darker winter mornings and lighter afternoons are the rule.

In the House of Commons on 2 December 1970 Mr. R. Maudling, Home Secretary (Barnet, Conservative) moved that the British Standard Time Order 1970 be approved. He said the Government were not taking a position on the order which would be decided by a free vote. He said that a sample survey had indicated that fifty per cent favoured British Standard Time compared with forty-one per cent who wanted to go back to G.M.T. He also remarked that road casualties were reduced under B.S.T., and it was favoured by industry, commerce, tourism and sport. British Standard Time was opposed in Scotland and by the farming community. After several speeches both for and against British Standard Time, Mr. J. Callaghan (Cardiff, S. E., Labour) said he hoped no one casting a vote tonight would think that this would dispose of the issue. If they changed back now, there would be a large number of complaints because they were changing again. He cited evidence that there were 2,700 people who are walking around now who might have been dead or seriously injured but for the change. After more speeches the vote was taken. The order was rejected by 366 votes to 81, a majority against of 285.

The 81 who voted to make B.S.T. permanent consisted of 70 Labour members, 10 Conservatives and 1 Liberal. The 366 voting against the order included 30 members of the Government and several leading members of the Opposition. Mr. Maudling abstained whilst Mr. Callaghan voted in favour of the order. The massive majority rejecting British Standard Time came as a big surprise to political correspondents.

### New members

The following new members joined the Society between September 1970 and March 1971. F.M. = family member, H.M. = honorary member.

- Asahina, Professor Y., 3-123 Totsuka-machi, Shinjuku-ku, TOKYO, Japan. (H.M.)
- Bates, J. W., 49 Hooks Hall Drive, DAGENHAM, Essex.
- Birch, Mrs. M.A., 3 West End Villas, Old Epperstone Road, LOWDHAM, Nottinghamshire.
- Blackwell, Miss M. L., 49 Lea Manor Drive, Penn, WOLVERHAMPTON, Staffordshire.
- Cohen, Mrs. M., 6 Chelsea Studios, 410 Fulham Road, LONDON S.W.6.
- Hartman, F. A., Department of Botany, University of Michigan, ANN ARBOR, Michigan 48104 U.S.A.
- Hornsey, I. S., B.Sc., 100 Caister Park Road, Stratford, LONDON E.15.
- Jamieson, Mrs. D.I., 6 Beaumaris Road, WALLASEY, Cheshire.
- Leegood, R.C., Downage, Dukes Close, GERRARDS CROSS, Buckinghamshire.
- Oliver, Dr. R. W. A. 71 Harboro' Road, SALE, Cheshire.
- Ottley, T. W., 3 Beauchamp Terrace, LONDON, S.W.15.
- Patwardhan, Dr. P.G., Maharashtra Association for the Cultivation of Science, Law College Road, POONA 4, India.
- Rességuier, P., Kissingerstrasse 289, D 8743 BISCHOFSCHEIM/RHOEN, Germany.
- Ridout, B. V., 10 Barons Court Road, West Kensington, LONDON W.14.
- Smith A. C., Flat 10, 14 West Halkin Street, LONDON S.W.1.
- Sowter, Mrs. M.G., 22 Stoughton Lane, Stoughton, LEICESTER. (F.M.)
- Thompson, M. S., 11 Old Fold View, BARNET, Hertfordshire.
- Warren, D. H. E., 145 Parkstone Avenue, Parkstone, POOLE, Dorset. BH14 9LP.
- Withers, A. C., Tyddyn Heilyn, Pentir, BANGOR, Caernarvonshire.

## Report on lecture and exhibition meeting, 1971

The lecture and exhibition meeting, held in conjunction with the Annual General Meeting on 2 January 1971 at the Department of Botany, Imperial College, London S.W.7. was attended by thirty-nine persons. Members were particularly interested to see the stereoscan demonstrated, this being kindly undertaken by Miss J. Filley. In addition the following exhibits were displayed:

- ALVIN, K. L. & PENTECOST, A. The hypothallus of a lichen viewed with the scanning electron microscope.
- BROWN, D.H. Souvenir from The Lizard, Cornwall.
- DUNCAN, URSULA K. Parmeliopsis aleurites and P. hyperopta in Britain.
- GUITERMAN, J. D. Herbarium and Study Group.
- HAWKSWORTH, D.L. British species of Alectoria.
- HAWKSWORTH, D.L. Literature on microchemical techniques, etc.
- HAWKSWORTH, D.L. Examples of microchemical tests of lichen products.
- RICHARDSON, D. H. S. Lichens from Sudbury, Ontario, collected at varying distances from nickel smelters.
- ROSE, F. Some provisional distribution maps.
- SEAWARD, M. R. D. B.L.S. mapping scheme: tentative maps.

In the afternoon Dr. D. L. Hawksworth gave a lecture on the use of microchemical methods for the identification of lichen substances, and their use in taxonomy. Numerous slides were shown. Dr. Hawksworth stressed the taxonomic importance of the replacement of substances within similar morphological populations, and said that each case of the use of chemical characters in taxonomy must be judged on its individual merit, and be related to ecology, distribution, etc. No hard and fast rules could be drawn. Dr. Hawksworth ended with a practical demonstration of microchemical testing.

Following the tea interval Dr. Swinscow addressed the meeting on the subject of "making sense of pyrenocarps." He mentioned the characters which should be examined in a study of this group, including the thallus, its border, the colour and texture, and the size and shape of the perithecia, all of which frequently received too little attention in relation to the microscopical characters. He remarked that it was possible to identify most British species with a hand lens alone. Dr. Swinscow concluded that with thorough examination, the pyrenocarps were not a difficult group to study. Both speakers were warmly thanked for their most interesting and stimulating accounts.

### Tea and sympathy

The Tea Phytologist has the rare distinction of being a serial publication devoted entirely to botany which, apparently, does not appear on the shelves of any scientific library. This is surprising for a journal which presents "a balanced account of vital subjects of the day. Between its covers will be found contributions from as far away as Azerbaijan and Hull; extracts from some modern American papers and many illustrations of current botanical research." The periodical is published by The Botany School, Downing Street, Cambridge, and appears at intervals of every few years. The editor-in-chief, Miss Jacqueline P. Paice of Newnham College, Cambridge, announces that a twenty-eight page number is to be published shortly, subject to a suitable printer being found.

The first number published in 1934, contains an artificial key to members of the staff of the Cambridge Botany School, whilst the 1939 part has a key to the rooms in the School. The contents of the 1954 number are listed as follows:

Interesting Finds in Bikini

Zea hybrids in the Corn Exchange

A note on the Reed by O.Boe

Dating Daphne on the Norfolk Coast

Studies in the Water Relations of the Central Heating Plant

Blue Genes in the Lady's Bedstraw

TATE and LYLE (undated) The Extraction of Cube Roots

D. POLUTIN (1953) Sweeping Pollen from the Polar Air

C. T. and W. The Poachers' Pocket Flora of the British Isles (beer-proof cover)

OLD SARUM The Ups and Downs of British Botany

P. T. GAMES Base Exchange Phenomena

In 1964 the journal reported the following "American plant new to Britain". "It was during 1959 that the first reports were received of the arrival in Holy Loch, near Glasgow of the American Under-water Plant, Polaris hydrophobia. A previous arrival from America, the Canadian Pond-weed, had caused such havoc in our canal system, that immediate steps were taken to control the outbreak. The infestation was attacked with CND, at weekly intervals initially, but subsequently treatment has only been necessary about Easter each year, at the beginning of the growing season. So far this has proved effective and no spread has been observed. Specimens of Polaris from Holy Loch which have been investigated have all been male, so it is clear that if a population explosion were to occur it would have to be as a result from simple fission. Tests on dispersal carried out in the United States show that pollinia are forcibly ejected from pollen-tubes under the water, and then travel considerable distances in the air".

References to lichens in The Tea Phytologist are rather sparse, but the following poem is published in the 1934 issue:

"Algae met some fungi,  
They all went a-hiking;  
The fungi were hungri,  
The result was a lichen."

#### Literature on lichens

These lists include references to recent publications which are considered to be of interest to members. Papers in The Lichenologist are excluded. The listing of a publication does not mean that a reprint is available in the Society's library.

AHMADJIAN, V. 1970. Adaptations of Antarctic terrestrial plants. Antarctic Ecology 2: 801 - 811. (Chiefly concerns lichens; unique adaptive mechanisms have not been developed.)

AHMADJIAN, V. 1970. The lichen symbiosis: its origin and evolution. Evolutionary Biology 4: 163 - 184. (Lichen phylogeny in terms of the algal symbiont. Free-living Trebouxia apparently does not exist.)

ANON. 1970. Back to smoke pollution. Br. med. J. 4: 256. (Leading article dealing with the shortage of smokeless fuel and its consequences. The merit of lichen studies to estimate the levels of pollution outside urban areas is mentioned.)

BAILEY, R. H. 1970. Notes on Gloucestershire lichens - 6. N. Glouc. Nat. Soc. J. 21: 174 - 175. (Four species.)

BAILEY, R. H. 1970. Notes on Gloucestershire lichens - 7. N. Glouc. Nat. Soc. J. 21: 223 - 225. (Five species.)

- BAILEY, R. H. 1970. Notes on Gloucestershire lichens - 8. N. Glouc. Nat. Soc. J. 21: 246 - 247. (Eight lichens and one lichenicolous fungus.)
- BAILEY, R. H. 1970. Newtown and Wigpool, F. of D., 8 August. N. Glouc. Nat. Soc. J. 21: 251 - 252. (Report of lichens found on field meeting in the Forest of Dean.)
- BARKMAN, J. J. 1970. Phytosociology and Ecology of Cryptogamic Epiphytes. Ed. 2. Van Gorcum, Assen, Netherlands. (Standard work; facsimile of first edition.)
- BLOOMER, J. L., EDER, W. R. & HOFFMAN, W. F. 1970. Some problems in lichen metabolism: studies with the mycobionts *Cetraria islandica* and *Cladonia papillaria*. Bryologist 73: 586 - 591.
- BOWEN, H. J. M. 1970. Determination of sulphate ion by replacement of iodate in iodine-131 labelled barium iodate. Analyst, Lond. 95: 665 - 667. (Method, with application to some fruticose lichens.)
- BRIGHTMAN, F. H. 1971. Lichens. Bull. Kent Fld Club 16: 7 - 8. (Remarks on the use of indicator species for the estimation of air pollution.)
- BRIGHTMAN, F. H. 1971. 10th May - 'Wall Tour' from Birchington. Bull. Kent Fld Club 16: 20. (Report of field meeting; twelve lichens mentioned.)
- COOKE, W. B. & HAWKSWORTH, D. L. 1970. A preliminary list of the families proposed for fungi (including the lichens). Mycol. Pap. 121. (Includes all known family names of lichens, with reference to their place of publication and types on which they are based.)
- CULBERSON, C. F. 1970. Supplement to "Chemical and botanical guide to lichen products". Bryologist 73: 177 - 377. (Invaluable summary of chemical data on lichens for 1965 - 1969.)
- CULBERSON, W. L. 1970. The typification of the lichen genus *Pilphoron*. Bryologist 73: 630 - 632 (Attack on the European view that the name *Pilophorus* Th. Fr. is correct. *P. acicularis* is selected as the type of "*Pilphoron* (Tuck.) Th. Fr.")
- CULBERSON, W. L. 1970. *Parmelia discordans*, lichen peu connu d'Europe. Revue bryol. lichén. II, 37: 183 - 186. (Account of *Parmelia discordans* Nyl., which resembles *P. omphalodes* but has protocetraric acid instead of salazinic acid. *P. discordans* is recorded as new to Britain.)
- FOLAN, A. C. M. & MITCHELL, M. E. 1970. The lichens and lichen parasites of Derryclare Wood, Co. Meath. Proc. R. Ir. Acad. B, 70: 163 - 170. (List of ninety-eight species with frequency.)
- GALUN, M., PARAN, N. & BEN-SHAUL, Y. 1970. The fungus-alga association in the Lecanoraceae: an ultrastructural study. New Phytol. 69: 599 - 603. (Electron microscopy of symbiont contact.)
- GILBERT, O. L. 1970. Further studies on the effect of sulphur dioxide on lichens and bryophytes. New Phytol. 69: 605 - 627. (Discussion of many aspects, with emphasis on the influences modifying the effects of pollution.)
- GILBERT, O. L. 1970. A biological scale for the estimation of sulphur dioxide pollution. New Phytol. 69: 629 - 634. (Lichen communities and bryophytes on three types of substrata are related to concentrations of sulphur dioxide. The possible use of the scale by foresters, farmers, planners and the sick is discussed.)

- GOLUBKOVA, N. S. & SAVICZ, V. P. 1970. Species familiae Usneaceae in Antarctica orientali. Novit. Syst. Pl. Non Vascularium 1969 (6): 211 - 220. (Includes distribution maps of Alectoria minuscula forma congesta, Neuropogon acromelanus and N. antarcticus in the Antarctic.)
- HALE, M. E. & CULBERSON, W. L. 1970. A fourth checklist of the lichens of the continental United States and Canada. Bryologist 73: 499 - 543. (List of 2735 species, followed by a list of synonyms. Cladina is given generic rank.)
- HAWKSWORTH, D. L. 1970. Guide to the literature for the identification of British lichens. Bull. Br. Licol. Soc. 4: 73 - 95. (Numerous references; the majority arranged under genera.)
- HERTEL, H. 1970. Parasitische lichenisierte Arten der Sammelgattung Lecidea in Europa. Herzogia 1: 405 - 438. (Account of seventeen species of Lecidea and four of Lecidella: all lichenparasites; key.)
- HERTEL, H. & LEUCKERT, C. 1969. Über Flechtenstoffe und Systematik einiger Arten der Gattungen Lecidea, Placopsis und Trapelia: C + rot reagierendem Thallus. Willdenowia 5: 369 - 383. (Restoration of Lecidella; British species include Lecidella carpathica Korb., L. elaeochroma (Ach.) Hazsl. (= Lecidea limitata), L. goniophila (Flörke) Korb., L. pulveracea (Flörke ex Th.Fr.) Sydow, L. scabra (Tayl.) Hert. & Leuck., L. stigmatata (Ach.) Hert. & Leuck., L. subincongrua Nyl.) Hert. & Leuck., L. viridans (Flot.) Korb.)
- FOLLMANN, G. & HUNECK, S. 1969. Mitteilungen über Flechteninhaltsstoffe. LXVIII. Zur Phytochemie und Chemotaxonomie der Sammelgattung Lecanora. Willdenowia 5: 351 - 367.
- HUNECK, S. & FOLLMANN, G. 1970. Notes on lichen substances LXXV. On the phytochemistry and chemotaxonomy of the Buellia spp. Biochem. Physiol. Pflanzen 161: 191 - 214. (Chemistry of Buellia spp. and Rinodina spp.)
- JACOBS, J. B. & AHMADJIAN, V. 1971. The ultrastructure of lichens. IV. Movement of carbon products from alga to fungus as demonstrated by high resolution radioautography. New Phytol. 70: 47 - 50.
- JAHNS, H. M. 1970. Untersuchungen zur Entwicklungsgeschichte der Cladoniaceen. Nova Hedwigia 20: 1 - 177. (Ontogeny of the fruiting bodies of Cladoniaceae, Lecideaceae, Stereocaulaceae, etc.)
- JANEX-FAVRE, M.-C. 1970. Sur le développement et la structure des ascocarpes et la position systématique du mycobionte du lichen pyrénocarpe Arthopyrenia conoidea (Fr.) Zahlbr. Revue bryol. lichén. II, 37: 163 - 182.
- JORGENSEN, M. & RYVARDEN, L. 1970. Contribution to the lichen flora of Norway. Arbok. Univ. Bergen, nat. - naturv. ser., 10. (Critical notes and distribution maps of several species. Cetrelia cetrarioides is regarded as a synonym (chemotype) of C. olivetorum.)
- KALB, K. 1970. Flechengesellschaften der Vorderen Ötztaler Alpen. Dissertationes Botanicae 9. (Sociology).
- LAUNDON, J. R. 1970. London's lichens. Lond. Nat. 49: 20 - 69. (Digest of 1967 Lichenologist account, with additional data on distribution of lichens in London.)



- LEBLANC, F. & SLOOVER, J. DE. 1970. Relation between industrialization and the distribution and growth of epiphytic lichens and mosses in Montreal. Can. J. Bot. 48: 1485 - 1496. (Includes use of epiphytes to express quantitatively an "index of atmospheric purity" (I.A.P.)
- LUNDSTRÖM, H. 1970. Epixyler pa impregnerade trästolpar i Bogesund. Träskyddskommittén Meddelanden Reports 101. (Report on lichen colonisation of timber treated with various preservatives.)
- MELLANBY, K. 1970. Pesticides and Pollution. Ed. 2. Collins, London. (General account and review; the part on lichens is disappointing.)
- MILLBANK, J. W. & KERSHAW, K.A. 1970. Nitrogen metabolism in lichens. III. Nitrogen fixation by internal cephalodia in *Lobaria pulmonaria*. New Phytol. 69: 595 - 597.
- MITCHELL, M. E. & MOLLOY, J. 1970. Contributions to the chemistry of the Collemataceae - I. Lichen substances in some species of *Leptogium*. Bryologist 73: 612 - 616.
- OZENDA, P. & CLAUZADE, G. 1970. Les Lichens. Étude Biologique et Flore Illustrée. Masson, Paris. (Glossy expensive illustrated book (801 pages), including a general biological account and keys to French lichens. The complex lay out of the keys and absence of a page-index are disadvantages.)
- RYDZAK, J. & KRYSIAK, K. 1970. Lichen flora of Tomaszow Mazowiecki. Vegetatio 21: 375 - 397. (Study of the lichen flora of a small industrial town in central Poland; the authors conclude that "lichens are not indicators of air pollution.")
- SCOTT, G. D. 1969. Plant symbiosis. Stud. biol. 16. (Review.)
- SEGAL, S. 1969. Ecological Notes on Wall Vegetation. Junk, Den Haag, Netherlands. (Includes small section on lichen vegetation.)
- SEIBERT, M. A. 1970. Lichen enzyme studies - a preliminary report. Bryologist 73: 597 - 601. ("The possibility of an enzyme in lichens ... is postulated.")
- SOWTER, F. A. & HAWKSWORTH, D. L. 1970. Leicestershire and Rutland cryptogamic notes, I. Trans. Leicester lit. phil. Soc. 64: 89 - 100. (Bryophytes and lichens - many records. Includes list of Bloxam's Gopsall lichen records from the mid nineteenth century.)
- TRASS, H. 1970. (The elements and development of the lichen-flora of Estonia.) Trans. Tartu State University 268: 5 - 233. (Includes distribution maps, photographs and English summary.)
- VEZDA, A. 1970. Neue oder wenig bekannte Flechten in der Tschechoslowakei. I. Folia Geobot. Phytotaxonomica 5: 307 - 337. (Notes on twenty-eight lichens in various genera.)
- WALKER, A.K. 1970. A discomycete parasitic on *Thamnolia vermicularis*. Trans. Proc. bot. Soc. Edinb. 41: 59 - 60. (Nesolechia associata.)
- WEBBER, M. M. & WEBBER, P. J. 1970. Ultrastructure of lichen haustoria: symbiosis in *Parmelia sulcata*. Canadian Journ. Bot. 48: 1521 - 1524. (The fungus is shown to be "harvesting the algal cells.")
- WIRTH, V. 1970. Studien zu den silicolen *Opegrapha* - Arten *O. horistica*, *O. zonata* und *O. gyrocarpa*. Herzogia 1: 469 - 475. (Characters of *Opegrapha gyrocarpa* and *O. horistica*; *O. zonata* is considered to be a nomen confusum.)

### Secretary's report for 1970

The membership of the Society shows a steady increase. At the end of 1970 the number of members was 467, compared with 446 at the end of 1969. This increase in the total membership of twenty-one was identical with the increase from 1968 to 1969. The number of new members joining the Society during 1970 was fifty-three, compared with fifty-one in 1969: an increase of two. It is with great regret that the death of Mr. I. S. C. Campbell is reported.

The year was European Conservation Year and it was fitting that important developments took place in the field of lichen conservation. Recommendations were issued for members engaged in field work, including a list of species which should not be collected. A list of sites of international and national importance for lichens was agreed and issued. The Society is opposing the plans at the public enquiry for the oil-fired power station at Plymouth because of the disastrous effects the resulting sulphur dioxide levels would have on the Dartmoor oak woods.

The meetings during 1970 were a success. The Annual General, lecture and exhibition meeting in January was enjoyed by forty-five persons, who examined thirteen exhibits and listened to five lectures. Over twenty persons attended the Bretagne (Brittany) spring field meeting, which was successful in reducing the number of known British endemics. The day excursion with the Kent Field Club was attended by sixteen persons, the most notable find being a bryophyte new to Europe found by Mr. E. C. Wallace. The summer excursion was divided into two parts, eight members attending the first week in Yorkshire and sixteen the second in Northumberland. An Acarospora new to Britain was found independently both by Dr. Gilbert and Miss Wallace on the second week. The autumn weekend at Oxford was unique in combining field work and lectures, the latter being attended by twenty-three members. The Society is grateful to Mr. Brightman, Mr. Coppins, Mr. Farrar, Dr. Gilbert, Dr. Rose and Mr. Seaward for arranging and leading the field meetings. Two meetings of the Council were held.

Part three of volume four of The Lichenologist was published on 16 April 1970 and part four of volume four on 30 December 1970. The editor Mr. James and Assistant Editor Dr. Hawksworth are thanked for producing two parts of the highest quality. Two numbers of the Bulletin were also issued during the year. All officers and members of the Society are gratefully thanked for their considerable help in the smooth running of the Society.

J. R. LAUNDON  
Honorary Secretary

(This report was presented at the Annual General Meeting, 2 January 1970)

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