

The International Lichenological Newsletter is the official organ of the International Association for Lichenology (IAL). It is published twice yearly in English with selected items in French, German or Spanish. Information and news intended for publication should reach the editor at least one month prior to scheduled production (usually April and October of each year).

IAL membership is open to anyone who has an active interest in the study and use of lichens. Current dues are U.S. \$20.00 for the six year period between successive International Botanical Congresses. Dues should be sent to the treasurer in U.S. CURRENCY with checks made payable to the "International Association for Lichenology (K.J. PUCKETT - Treasurer)."

IAL affairs are directed by a seven person Executive Council elected during the last International Botanical Congress. Council members elected at the 13th Congress (Sydney, Australia, 1981) are listed on the inside back cover of the Newsletter and will serve until the 14th Congress (Berlin, Germany, 1987).

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The opinions expressed by Newsletter contributors are not necessarily those held by the International Association for Lichenology.

Cover Drawing: *Stereocaulon vesuvianum* Pers. Drawing by Bethia Brehmer from *American Arctic Lichens I* by John W. THOMSON (Columbia University Press, 1984). Scale = 1 cm.

international lichenological newsletter

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Editorial

Definition of the term LICHEN

Lichenologists have still not been able to define the term lichen in a way acceptable to themselves or completely understandable to others outside the field of lichenology. If I remember correctly, David Smith first proposed that we settle on a definition during the 2nd International Mycological Congress held in Tampa, Florida, during August of 1977.

Vernon Ahmadjian was appointed chair (at the IAL Business Meeting by then President Ted Ahti) of a rather reluctant Terminology Committee which proposed four possible definitions (see ILN 14(1): 11, 1981) and an acceptance deadline. But no decision was taken at the August 1981 general meeting of the International Association for Lichenology held in Sydney, Australia during the 13th International Botanical Congress. In late 1981, Vernon sent to the entire IAL membership a ballot with five choices for defining a lichen. A disappointing 40 (of 360) members responded, in part because the due date for the ballot was February 15, 1982 and much of the mail did not reach Europe until June or July!

Vernon turned the results over to me to report on. A little over half of the respondents (23 of 40) voted for this definition: "A lichen is an association of a fungus and a photosynthetic symbiont resulting in a stable thallus of a specific structure." Another very similar proposal substitutes "alga or a cyanobacterium" for "photosynthetic symbiont." Nine of 40 respondents voted for an even simpler version: "A lichen is a stable association of a fungus and an alga."

I believe it is the intent of the Terminology Committee that the first definition be adopted as the official IAL position. It is a perfectly acceptable working definition. It is obvious, however, that not all will agree and that the community of lichenologists will continue to see debate. Perhaps a consensus on this issue can be reached at the Berlin 1987 International Botanical Congress?

--- Mason E. HALE

Editor's comment: A dissenting opinion will undoubtedly come from David HAWKSWORTH who discusses this issue in the first chapter of Hawksworth & Hill, The Lichen-Forming Fungi, Blackie (1984) reviewed in this Newsletter. Hawksworth's alternative definition of "a stable self-supporting association of a mycobiont and a photobiont" was adopted in his co-edited 7th edition of the Dictionary of the Fungi, CMI (1983) and recommended for general use (but see ILN 17(1): 13-14, 1984 review). Biont terminology should follow that proposed by Vernon Ahmadjian in ILN 15(2): 19 (1982) and accepted by Dennis Brown for Lichen Physiology and Cell Biology, Plenum Press (1984) also reviewed in this Newsletter.

News and Notes

ASPERGES, Michel (Belgium) is studying the macrolichens of Flanders towards an atlas of the Belgian lichens. That part of the project relating to lichens within small valleys has already been done by Emmanuel Serusiaux and Rene Schumacker.

BEGUINOT, Jean (France) continues work on the phytodynamics and phytosociology of lichen populations. An article in 1st AFL Bulletin 10(2): 18-24, 1985 summarises results on interpreting species interactions among species groups, and the application of such typological analysis to corticolous populations in urban and forested settings.

BROWN, Dennis H. (England) writes that the British Lichen Society Library is updating its computer-based catalog of contents. Some 3,000 books/reprints are currently housed, but acquisition depends upon contributions as little purchasing money is available. Authors are asked to donate both their own and other duplicate works, and may receive a computer printout of any part of the holdings for reference.

CHEN, Xi-ling (China) reports that he and student Shun Liu are studying lichen taxonomy and working on both the Lichens of North-eastern China and compiling the Peltigeraceae for the Lichen Flora of China. They are hoping for literature exchange between themselves and other world lichenologists.

CLERC, Philippe (Switzerland) is compiling a revision of the systematics of Usnea in Europe. He reports that U. wirthii sp. nov. is now known from four stations in France (Aude, Correze, Corse, and Loire Atlantique) and should be found in the forests of Fontainebleau (Seine & Marne).

DANIELS, Frederikus J. A. (Netherlands) is studying the ecology and phytosociology of Cladonia portentosa in Belgium and the Netherlands. A study is also being made of heavy metal contents for this species, and the community patterns and processes within its terricolous habitat.

DIBBEN, Martyn J. (U.S.A.) reports that Dianne Foster has now finished her EM studies of selected Pertusariae and that two other students (Kristine Ciombor and Daniel Schlitz), are working, respectively, on "soil surface ascomycete" and "graveyard lichen pollution monitoring" projects. On returning to England following his car accident, Dibben visited the ICSEB III July meetings at the University of Sussex (Brighton) to find few lichenologists in attendance (see later report).

ELIX, Jack (Australia) spent ten days in the Flinders Ranges pursuing rare Xanthoparmeliae. He and Jen Johnson are now putting finishing touches to their magnum opus on "Australasian Xanthoparmelias." This will incorporate 117 species from Australia, 45 from New Zealand, 3 from Papua New Guinea, and 1 each from Fiji and Norfolk Island.

FIFE, Alan and Bryony MacMILLAN (New Zealand) organised a March lichen workshop to honor John Child and coincide with the publication of David Galloway's "Lichen Flora of New Zealand." Some 38 people attended including amateur and professional lichenologists, ecologists, chemists, and interested botanists. The venue was DSIR-Lincoln, where 19 papers were presented over two days interrupted by a foray to mountain and coastal areas. Jack Elix and Aino Henssen were special guests, and proceedings were reported in a special issue of the Botany Division Newsletter (Supplement No. 2, May 7, 1985).

FILSON, Rex (Australia) reports on the visit of Hannes Hertel and Helmut Mayrhofer. Two days were spent looking at Buellia and Lecidea specimens in the herbarium before a field trip to alpine areas on the Bogong High Plains. Material was collected from basalts on Basalt Hill and granites on Mt. Cope before going down the Omeo road to limestones at Limestone Creek. An early morning chairlift at Thredbo allowed them to walk to Mt. Kosciuszko and spend a long time on the summit. Next day they drove to Perisher and from there visited Charlottes Pass, the Blue Lake area, and the ring road around Guthega. A final day back at Melbourne enabled in excess of 100 kg of rock lichens to be mailed to Europe.

HALE, Jr., Mason E. (U.S.A.) will travel to Pune, India in November of 1985 to participate in the Indian Mycological Society meetings. He will present the annual Agharkar Memorial Lecture at MACS. In January-February of 1986 he will conduct field studies on the Parmeliaceae of South Africa as part of the Flora of Southern Africa project.

HAWKSWORTH, David L. (England) having returned to CMI as Director, has been appointed Visiting Professor to both the University of Reading (U.K.) and the University of Assiut (Egypt). He continues work on the classification of lichen-forming fungi and their integration into a general Ascomycotina system. "The Lichen-Forming Fungi," a student textbook (with D. J. Hill), is published; "Outline of the Ascomycetes - 1985" (with O. Ericksson) is due for publication; and a new U.K. checklist and illustrated account of orders and families of Ascomycotina is imminent.

INOUE, Masakane (Japan) leaves mid-November 1985 for an extended stay in Antarctica, where he will study the ecology and taxonomy of lichens from ice-free areas. He will be based along the Soya Coast (38-40 E; 68-70 S) as a member of the 27th Japanese Antarctic Research Expedition. The party will depart on the Ice Breaker Ship "Shirase" and stay through March of 1987.

JORGENSEN, Per M. (Norway) reports he has found time for lichenology again now he is back at the University. After brief visits to London and Goteborg, he is trying to finish further Pannariaceae monographs: Leioderma with David Galloway and Erioderma with Lars Arvidsson. A student working on hairy Leptogium species has left before finishing fine work on the spores. But the Norwegian Research Council has granted monies for a three year project on Norwegian crustose lichens with Hildur Krog.

KANTVILAS, Gintaras (Australia) reports that Tasmania has seen its share of visitors this year; in particular the HALE's, and then Hannes HERTEL and Helmut MAYRHOFER. A desire for "subantarctic sites" was satisfied by torrential rains for both parties. Car failures added to the excitement of the hunt, but forays were made to Hartz Peak, Freycinet Peninsula, the Needles, and Mt. Rufus. Tasmanian curiosities included Conotremopsis, Megalospora lopadioides, and Ramonia spp. along with close encounters with echidnas and wallabies.

LALLEMANT, Richard (France) is studying the assimilation of nitrogen by Nostoc within Peltigera in collaboration with student P. Champion-Arnaud, the lichen flora of the coast of Brittany (IFREMER program), the accumulation of fluoride in lichen thalli and the central temperature dependant role of carbon (EDF program), the prevention of algal and mycelial growth on tiles, and the morphogenesis of the vegetative structure of lichens.

LEROND, Michel (France) continues to map the air pollution of Haute Normandie using lichens in collaboration with the REMAPPA and l'ONF programs. In particular, he is studying interesting lichen preservation sites in the Perseigne Forest (Orne) and the flora of large beech trees Fagus sylvatica in the Enfer valley. The latter bear the montane species Menegazzia terebrata more often found in the forests of Ardennes and the Argonne.

LETROUIT-GALINOU, Marie-Agnes (France) reports she has travelled to Algeria with C. Van Haluwyn at the invitation of Dr. Ammar Semadi to study lichens in polluted regions of Annaba. She also went to Spain with S. Deruelle at the invitation of Prof. N. Hladun to discuss franco-spanish liaisons. With A. Bellemere she has written a chapter on "Sexual Reproduction" (in lichens) for a treatise to be edited by M. Galun.

MAYRHOFER, Helmut (Austria) is now working on a worldwide revision of the lichen genus Microglauca sensu Zahlbr. He is interested in the loan of all material of this particular genus so labelled in national herbaria.

NASH III, Thomas H. (U.S.A.) will be on sabbatical leave from Arizona State University from June 1985 to August 1986 as follows: Kiel (West Germany) with L. Kappen from June to August, 1985; Canberra (Australia) with J. Elix from October 1985 to March 1986; and Wurzburg (West Germany) with O. Lange from April to August, 1986. Please do not request exchange materials during this time.

NOBLE, Mark (U.S.A.) of the Rocky Mountain Research Station announces 1985's slate of summer field courses (see YELLOW insert). Lichenologists are welcome to visit or use this alpine location for their own or their students' field studies.

PEREIRA, Eugenia C. (Brazil) works in the Pharmaceutical Technology Laboratory of the Federal University of Paraiba with Dr. Lauro Xavier Filho. She reports that last summer both of them were in Antarctica, studying ecology of lichens and bryophytes during the Second Antarctic Brazilian Expedition.

ROGERS, Rod (Australia) reports on the labors of his first "Introduction to Lichenology" mini-course given at the University of Queensland. A total of 14 people from diverse backgrounds took the course as part of a Continuing Education Section series. Jen Johnson provided TLC expertise, while Rod introduced terminology, literature, and specimens. Most profitable were the rewrites, made after watching people struggle with the original "Genera of Australian Lichen" keys.

SERUSIAUX, Emmanuel (Belgium) continues to work on the systematics of the desert lichens of Namibia (SW Africa) and the foliicolous lichens of SW France. The latter form the subject of his paper for the 1986 Munster Symposium to be run by Prof. Elisabeth Peveling. Some eighteen species have been found to date, the most interesting French sites being deep gorges or undisturbed riverine Buxus sempervirens thickets. The flora is very similar to that described by Anton Vezda for the Caucasus.

STREIMANN, Heinar (Australia) and Jack Elix visited Norfolk and Philip Islands to collect mosses and lichens and assess future conservation needs. Norfolk proved to have a rich flora, corticolous lichen species being particularly abundant on Araucaria, Eleadendron, and Citron. Philip was depauperate due to lack of suitable habitats and substrates, but old "white oak" proved available for Pyxine and Dirinaria while oddities included Teloschistes flavicans and Xanthoria parietina growing on consolidated soil.

THROWER, Stella L. (Hong Kong) retires August 1, 1985 from the Biology Department, Chinese University of Hong Kong. Although still working on finishing her book "Hong Kong Lichens" for the Urban Services series on natural history, she will be returning to the British Isles, as of October 1, to live with her husband in Ballasalla (Malew), Isle of Man.

VAN HALUWYN, Chantal (France) is analyzing the associations and subgroupings of the Parmelion saxatilis unit in collaboration with R. Schumacker. He is also mapping the air-quality of northern France with M. Lerond as part of a MER contract. The program includes perfection of a new method and new scale for correlating lichen distribution with pollutants.

WETMORE, Clifford M. (U.S.A.) is considering beginning a long term study of the North American Caloplaca. Over the years he has come to recognize many distinctive species, but identification suffers from the lack of a modern monograph. Obviously many of the non-North American taxa will have to be considered, but he is interested in corresponding with anyone else interested in the same subject. Please respond!

WRIGHT, Anthony (New Zealand) will give a November 1985 workshop on lichens at the University of Auckland Institute and Museum. The course is designed to introduce participants to lichens, with basic instruction in techniques, field trips, and subsequent identification of specimens. The laboratory exercises will use David Galloway's new text "Flora of New Zealand Lichens."

Meetings

IV Congresso Latinoamericano de Botanica, 1986

The first Latinoamericano Lichenological Meeting will be held during the IV Latinoamericano Botanical Congress from June 29-July 5, 1986 in Medellin, Colombia (see enclosed flyer). Of twelve congress technical sessions, lichens will be part of Systematics and Evolution along with algae, fungi, bryophytes, pteridophytes, and spermatophytes. Those interested in, or contributing to, the program should write to Prof. Dr. Lauro XAVIER Filho, Laboratorio de Tecnologia Farmaceutica, Universidade Federal da Paraiba, Cidade Universitaria, 58.000 Joao Pessoa, Brazil for further information.

XIV International Botanical Congress, 1987

This July 24-August 1 Berlin (West Germany) meeting's second circular has now been released. It contains critical information relating to program activities and should be retained until attendees are in Berlin. A three-part form (A-C: EACH WITH THE DEADLINE OF JUNE 30, 1986) enables booking of congress excursions, notification of address and program wishes, and the offer of your scientific contributions. A third and final circular will be mailed in the autumn of 1986 clarifying payment of fees (February 15, 1987), submission of abstract (May 31, 1987), and late payment of fees (June 30, 1987).

The Congress's general theme is "Forests of the World" to which several of the major lectures and symposia are directed. Applied Botany and Biotechnology are given their due as well as EDP (electronic data processing) and novel research techniques. Twenty-four General Lectures support the symposium and round-table conferences. Moreover, a large and diverse choice of pre- and post-Congress excursions are established across Europe to satisfy international flavor and bring botanists together as one large family, regardless of religion, sex, nationality, race, or geographical origin.

Of six program committee areas, two are most relevant to lichenologists: Systematic and Evolutionary Botany - representative Josef POELT and Environmental Botany - representative Otto LANGE. Convenors for topics given under fungal systematics include T. Ahti, J. Elix, O. Eriksson, J. Hafellner, A. Henssen, and S. Huneck. Those for topics under biotic environments involve E. Friedmann, L. Kappen, and T. Nash. Lichen-oriented field trips are numbers 25 (The phanerogamic and cryptogamic flora and vegetation of NE Poland - 8 days pre-congress, July 15-24, leader Maria Lawrynowicz), 38 (Epiphytic, terricolous, and saxicolous lichens of Spain - 15 days post-congress, August 2-17, leader Anna M. Crespo de las Casas) and 49 (The lichen flora of Sardinia, Italy) - 8 days pre-congress, July 13-22, leaders P. L. Nimis & J. Poelt).

For additional information on any aspect of these meetings write to Prof. Dr. W. Greuter, Secretary, XIV International Botanical Congress, Konigin-Luise-Strasse 6-8, D-1000 Berlin (West) 33, Germany.

Reports

AETFAT Congress at MBG

The Eleventh Congress of the Association pour l'Etude Taxonomique de la Flore d'Afrique Tropicale was held June 11-14, 1985 at the Missouri Botanical Garden. The central theme was Modern Systematic Studies in African Botany. Contributed papers on ecology, floristics, and plant taxonomy were given, along with several special interest symposia on Ethnobotany/Ethnomedicine, Biology of Madagascar, African Bryology, and African Lichenology. Organizer of the latter program was Dirk WESSELS, but only four lichenologists were able to be in attendance: Ove Almborn, Mason E. Hale, Ingvar Karnefelt, and Dirk Wessels. Final plans for the 1985/86 IAL Foray within southern Africa were discussed.

American Bryological & Lichenological Society

The 1985 ABLS annual meeting took place August 11-15 under the auspices of the American Institute of Biological Sciences at the University of Florida campus at Gainesville. Program chairman Norton MILLER and local representative Dana GRIFFIN were both bryologists, but an appropriate lichen program developed for retiring President Clifford M. WETMORE.

A pre-meeting foray August 10-11 to the Ocala National Forest and Highlands Hammock State Park studied whitesand scrub, spring, subtropical hardwood swamp, and subtropical mesic hammock communities. An ABLS breakfast on August 12 was followed by the first of several Bryological Index meetings and a poster session at which Hans TRASS, T. RANDLANE, and Taimi PIIN (Estonia) discussed the chemistry of Asahinea.

The morning of August 13 was devoted to a symposium on Natural-Product Chemistry in the Systematics of the Lichen Fungi arranged by W. L. CULBERSON. Papers were given by Irwin BRODO, Bob EGAN, James LAWREY, and the CULBERSON's. The afternoon was devoted to ten contributed bryological papers. The morning of August 14 saw J. LAWREY chair lichenology papers contributed by Elizabeth KNEIPER & Martha SHERWOOD-PIKE (Boston's metropolitan lichen flora), Sharon EVERSMAN (Epiphytic lichens of Yellowstone National Park), Clifford SMITH (Hawaiian Umbilicariae), and Tom GOLOJUCH & James LAWREY (Quantitative analysis of lichen acids in Cetraria pinastri). The afternoon was again devoted to nine contributed bryological papers.

The meetings concluded August 14 with an evening mixer held jointly with the American Bryological and Lichenological Section of the Botanical Society of America.

ICSEB III, Sussex, Brighton, England

The 3rd International Congress of Systematic and Evolutionary Biology was held July 4-10 at the University of Sussex, Brighton, U.K. Of some thirty-two fascinating symposia held on major world issues at this meeting, only three were of direct interest to lichenologists. Symbiosis in Evolution convened on July 7 by K. PIROZYNSKI of the National Museums of Canada, Codes of Nomenclature convened July 9 by R. MELVILLE of the International Commission on Zoological Nomenclature, and Co-evolution of Plants with Fungi and Animals on July 10 - again convened by K. Pirozynski. A single symposium on Bryophyte Phylogeny chaired by R. LONGTON of the University of Reading was also held the last day.

Only four lichenologists attended these meetings: Martyn DIBBEN (U.S.A.), David GALLOWAY (New Zealand), David HAWKSWORTH (U.K.), and Emmanuel SERUSTIAUX (Belgium).

Herbaria

Auckland Institute and Museum Herbarium (AK)

Of some 4,000-plus lichen specimens in AK about 600 are foreign and the rest native. The collections basis was an 1878 initial exchange of lichens between T. F. Cheeseman and Prof. J. Muller (Mull. Arg.) in Geneva. Some 350 of Muller's specimens reside in AK but frequently lack field data. In 1899, Cheeseman received the first of several batches of exchange material from Prof. von Wettstein of Vienna University. Although correspondence shows that several hundred specimens labelled "Flora Exsiccatae Austro-Hungarica" were sent, only 65 remain in the herbarium today. Most of the remaining overseas lichens were obtained from Tuckerman's Herbarium (H) in the USA in the late 1930's. Of 120 packets present, 15 are labelled "type collection."

Despite the fact Cheeseman was sending out lichen specimens, he retained very few (circa 20) for his own herbarium. Successive museum botanists and helpers have added small collections. Lucy Cranwell sent material to Dr. H. H. Allen who provided some 65 named specimens as a reference collection. Betty Molesworth collected on Little Barrier Island and Ron Lloyd in the Northland kauri forests. But the bulk of today's lichen holdings comprise the herbarium of Bruce and Glenys Hayward. Some 2,500 specimens gathered mainly from Northland and the northern offshore islands provide the best available coverage of the lichen flora of this part of New Zealand.

This collection has been curated to a good standard and is now being well used by overseas researchers. Loan requests should be directed to: Curator of Botany, Auckland Institute and Museum, Private Bag, Auckland 1, New Zealand.

--- Anthony WRIGHT

National Museum of Wales, Cardiff (NMW)

The lichen herbarium of NMW has been expanded over the years from its foundation in 1911 initiated by the purchase of 181 W. A. Leighton specimens from the widow of Dr. Plowright. Several additional purchases were subsequently made (A. R. Horwood, J. A. Wheldon, D. A. Jones), but most material has been donated (e.g., H. H. Knight's 1944 collection of 1,700 specimens). The present size of the herbarium (some 19,000 lichens) is due primarily to the work of A. E. Wade. He joined the staff in 1920, became Assistant Keeper in 1943, and retired in 1960 after depositing some 6,000 collections.

The herbarium has recently been reorganized with the help of a team sponsored by the Manpower Services Commission. All lichen genera and species are now arranged alphabetically according to the "H, J, and C Checklist" and subsequent changes. Specimens are arranged geographically within each species according to the Watsonian vice-county system. Where specimens are re-identified, a cross-reference card is placed in the herbarium at the original name location to allow for tracking of cited materials.

The herbarium contains mainly British (especially Welsh) materials, but there are representative specimens from most European countries, some oceanic islands, Africa, Asia, North and South America, Russia, and Australasia. The oldest collections are those of the Rev. Hugh Davies collected in Wales in the 1790's. He published the first county flora for Wales in 1813. "Welsh Botany" covers the flora of the Isle of Anglesey in which he recorded 240 lichen species under the generic names Lichen, Opegrapha, and Tremella.

The earliest foreign collections are those gathered by Dr. J. Richardson from North America. One collection is dated 1821 from the Hudson Bay area; the other 1826 from the Rocky Mountains. Also of note are a bound collection of 41 Scandinavian specimens collected by J. E. Zetterstedt between 1868 and 1870 and purchased from Dr. M. Patterson in 1945. So far twenty "types" have been located amongst the holdings, and these were recently listed in the BLS Bulletin (56: 28-29, 1985).

Modern active exchange has occurred only with the Lund Botanical Museum and the University of Colorado. The museum would welcome further activities in this area, by researchers, and in the donation of named Welsh lichens. For more information contact the Curator, National Museum of Wales, Cardiff CF1 3NP, Wales, Great Britain.

--- K. J. KAY

Journals

The Lichenologist

The Lichenologist will start publishing four issues per year of about 100 pages each as of January 1986, with subsequent issues to appear in April, July, and October. This will enable the British Lichen Society to provide an improved service for contributors, decreasing both acceptance/production delay and rejection of lengthy articles.

Papers for consideration of inclusion on any aspect of lichenology are always welcome from around the world. Acceptance is on the basis of independent reports by at least two referees. The journal is becoming increasingly international in its content, as is shown by a study of recent author affiliations. With an expanding circulation now exceeding 800, the journal is obviously reaching more individual lichenologists than any other similarly specialized botanical periodical.

As Editor, I am grateful for the continuing support of my associates and the staff of Academic Press for the confidence they all have shown in the publication over the years.

--- David L. HAWKSWORTH

SYMBIOSIS: An International Journal

Volume 1, Number 1 of this new international journal was published in July of this year by Balaban Publishers (Philadelphia, U.S.A.) and distributed by their subsidiary International Science Services (Rehovot, Israel and Zeist, The Netherlands). SYMBIOSIS's editor-in-chief is lichenologist Margalith GALUN and she is aided by an impressive 26-person international editorial board.

The opening issue contains papers that cover unicellular symbiotic organisms, symbiotic bacteria, VAM mycorrhizal studies, and molecular studies of vascular plant hosts and lichen phycobiont cell walls. SYMBIOSIS intends to disseminate research information on symbiotic interactions at the molecular, cellular, and organismic levels, and to introduce new or unknown symbioses for studies in symbiology. Acting as a central information point for this growing subfield, the journal hopes to enhance interaction among researchers in its various sectors. SYMBIOSIS will publish articles which are accounts of original studies, review articles, book reviews, and a calendar of relevant upcoming events.

Further information about orders and a call for papers is included on the enclosed BLUE flyer.

Theses and Dissertations

FARKAS, Edit (Hungary) spent two weeks in late 1984 studying the foliicolous and other lichen holdings of Dr. A. Vezda at Brno. She is now working on the epiphyllous lichen flora of the Tanzanian Mountains, as collected by Dr. T. Pocs during the Usambara Rain Forest Project (a Swedish-Hungarian-Tanzanian cooperation).

FOSTER, Dianne (U.S.A.) has completed her master's degree under Martyn Dibben at the University of Wisconsin-Milwaukee. Her thesis entitled "Morphological investigation of the lichen genus *Pertusaria*" dealt with scanning and transmission EM studies of the fruits, asci, and spores of selected North American species.

HAWKSWORTH, David L. (England) reports on four Ph.D. students currently being supervised at CMI: Miss B. Aguirre is studying *Leptorhaphis sensu lato*; Mr. R. Ashwell is analysing *Diplotomma*; Mrs. R. Lowen is investigating *Nectriella*; and, Mrs. V. Winchester is pursuing lichenometry.

STEVENS, G. Nell (Australia) has recently completed her Ph.D. program at the University of Queensland under Rod Rogers. Her thesis was entitled "The lichen genus *Ramalina* in Australia." Her next project, together with Rod Rogers, will be a revision of the lichen genus *Usnea* in Australia.

Miscellaneous

L'Association Francaise de Lichenologie

Reports on the 1984 Limousin Excursion (with detailed listing of taxa collected at 20 localities) and the Limoges General Assembly are given in the Bulletin d'informations de l'AFL 9(1-2): 5-15 & 17-19. The same newsletter carries reports by J. BEGUINOT on "Différences d'affinités chorologiques et écologiques entre chemotaxons de *Cetrelia* sp. olivetorum pour la partie centrale de la France" and "Recueil de Figures de Microcristallisation d'Acides Licheniques - Fascicule I (1983)."

An addendum to both the sites and list of lichen species collected during the AFL 1984 Limousin Excursion is given in AFL Bulletin 10(1): 6-7, 1985. This publication also contains a useful key by Anne GODEFROY to the yellow species of *Rhizocarpon* found in the forests of Fontainebleau.

The next twice-yearly AFL excursion will take place in the canton of Valais, Switzerland from May 8-11, 1986. The AFL General Assembly will be held there in the town of Sion on the evening of May 8. Foray participants should rendezvous at 5:30 PM on May 7 at the Sion railway station. Bookings and pre-arrangements to share chalets should be made by April 11. Organiser is Philippe CLERC, Institut de Geobotanique Systematique, Universite de Berne, Altenbergrain 21-3013, Berne, Switzerland.

British Lichen Society

BLS Bulletin No. 56 contains an excellent article by Francis Rose on The old forests of Western Europe and their epiphytic lichens. This summary of relict sites not only lists significant taxa, but discusses the history and climatic influences effecting today's surviving communities.

The same issue summarises the Lecture Meeting "Travels with a Lichenologist" that accompanied the 1985 AGM in which the BLS went foreign. Jack Laundon chaired a series of papers on lichens from abroad by Ivan DEY (China), Tony FLETCHER (Brazil), Mark SEAWARD (Poland), Kery DALBY (Norway), and David HAWKSWORTH (Saudi Arabia).

The BLS 1985 Autumn Meeting will not be at the Gower Peninsula but in West Suffolk under the leadership of P. W. JAMES and C. J. B. HITCH. A poorly known area, it is likely to have interesting corticolous and churchyard floras and be wetter and without the coastal influences of the eastern part. Details for this November 1-3 foray can be obtained from CJBH c/o The Whin, Snape, Saxmundham, Suffolk IP17 1QY, England.

The Botanical Society of Edinburgh will run two lichen trips this fall. Glenstrathfarrar Cryptogam Survey will be based at the Aigas Field Center and run September 24-28. Lichens and Fungi of Alva Glen cut into the face of the Ochil Hills will be on October 20. Contact Brian COPPINS for information on these and other BSE fungal forays to be given this fall.

The January 1986 BLS AGM will have as its lecture theme "Lichens As Environmental Indicators" with papers by O. L. Gilbert, P. W. James, M. C. F. Proctor, and O. W. Purvis. The 1986 calendar of field meetings includes The Lizard, Cornwall (Spring: April 17-24), The Channel Islands: Guernsey & Sark (Summer: August 18-29), a Bristol workshop on Lichens on Gravestones and in Calcareous Habitats (March 21-23), a New Forest workshop on Crustose Corticolous Lichens (September 5-8), and Field Center courses at Juniper Hall, Slapton Ley, Kindrogen, Orielton, Preston Montford, Malham Tarn, and The Draper's (Betws-y-coed) spread across the year. Sadly - the annual Kent Wall Tour comes to an end after many stirring years with no plans to continue.

Lichenes Exsiccati Colorado

Recent disbursement of Nos. 601-640 of this exsiccati to ten correspondents resulted in one packet containing numbers 632-635 remaining at COL0. Contact with recipients indicated all sets complete, but Pretoria later wrote to say they were missing numbers 636-640. This must mean that one receiving institution unknowingly has two copies of 636-640, and still lacks 632-635. Please check your sets again. If you are the guilty party your excess 636-640 run will gladly be switched by us for a 632-635 one.

--- William A. WEBER

Memorial Plaque to Alexander Zahlbruckner

On the 30th of May, 1985, the very day of the 125th anniversary of Dr. Alexander Zahlbruckner's birth, a memorial plaque was placed on his native home at Jur Pri, Bratislava (St. Georgen) in Slovakia. At the same time, a meeting of Czechoslovak lichenologists and an exhibition dedicated to Zahlbruckner's work and life also took place. The meeting participants took time to visit the local cemetery and lay flowers on the grave of Zahlbruckner's parents.



Author of the illustrating photograph is Dr. Pavel Lizon of the Slovak National Museum, Vajanskeho Nabr. 2, 814 36 Bratislava, C.S.S.R. Academic sculptor Jan Korkos, designer of the commemorative plate, used the lichen Cetraria cuculata as his decorative inspiration. Perhaps this is the first time this motif has appeared on a memorial plaque in Central Europe!

--- Anna LACKOVICOVA

Deaths

Ursula K. DUNCAN (Scotland): 1910-1985

Ursula Duncan was in fact a broadly informed amateur botanist, but is known to the world of lichenology for her Scottish reports and her T. Buncle publications: A Guide to the Study of Lichens - 1959; Lichen Illustrations - 1963; and Introduction to British Lichens (with Peter James) - 1970 - the latter being the nearest thing the U.K. currently has to a modern flora. As Scottish as the hills in which she was born and raised, Ursula exhibited reserve when outside her native borders. But she could be charming, light-hearted, and cheerful to those she chose to let know her. Among such friends are many that are now leading voices in the British Lichen Society.

Her Arbroath home "Parkhill" served double duty as both a farmland office and botanical center with a well-stocked library and extensive herbarium. The property itself was a lichen haven and the grounds possessed both a wild garden and walled alpine garden in addition to the typical Scotts countryhouse garden. A gardener to properly maintain these areas was most likely Ms. Duncan's one and only extravagance.

Her death is a great loss to both BLS and other lichenological colleagues. Kind, generous, and unfailingly helpful to those struggling to first learn lichens, she knew her British material well. Always ready with information or advice, she was equally generous with specimens which frequently came with special interest notes, chemical reactions, and drawings of spores or other microscopic details. During her later years she often regretted that few lived near to whom she could pass on her knowledge. Surely she must have realised that in guiding those now running BLS just what a legacy she has left her country!

Jozef MOTYKA (Poland): 1900-1984

The IAL notes with regret the passing of Profesor Dr. Józef Motyka at the age of 84. Born in Kacłowa, Poland at the turn of the century, his botanical career was broad and long and perhaps best known lichenologically for his efforts at resolving Usnea. Other studies included Alectoria, Ramalina, aspects of central African lichenology, and studies of Porosty (Lichenes) for the "Flora Polska". A more detailed and worthy obituary on his life has been prepared by Jan Bystrek and appeared in Wiadomości Botaniczne 29: 279-283 during 1985.

Books

Beiträge zur Lichenologie: Festschrift J. Poelt. Edited by H. Hertel & F. Oberwinkler. J. Cramer, Vaduz [Nova Hedwigia Beiheft 79]. Numerous figures and tables. 900 pp. ISBN 3-7682-5479-8. 1984. Price: DM 250.

This 'festschrift' is a sixtieth birthday tribute to a remarkable man by his friends and colleagues. Professor Dr. Josef Poelt is a world renowned cryptogamist who has long published on mosses and rusts and, in particular, the systematics and evolution of lichen fungi. His activities over the last 20 years have produced a slew of quality Ph.D. graduates, some of whom are now themselves internationally known lichenologists and contributors to this book.

Eighteen articles are included (some long, some short) that cover chemistry, morphology, and systematics; but all have import for the future of lichenology. Mason Hale reviews the concept of genus among lichens with an emphasis on macrolichens and thallus characters. His principles applied to microlichens would have to be tested against the mycological practice of using only reproductive features in characterizing allied non-lichenized fungi. Ted Ahti rehashes the debate over segregating thirty-two species of Cladina from Cladonia. Although this European offers data to support such practice he does so with reservation, leaving many colleagues to regret Nylander's earlier revision of the one lichen name most familiar to non-lichenologists. Ernie Brodo provides a lengthy 122-page account of the Lecanora subfusca group in North America. This long-awaited monograph treats 38 species in depth and should prove of value to all struggling with this globally difficult group. Clauzade and Roux dedicate new species of Lecanora and Verrucaria to Poelt (the latter lichenicolous on Caloplaca aurantia), and only a "resumo" comes in Esperanto in this predominantly French text. Peter Dobbeler provides a biosystematic revision of the ascomycete Epigloea which invades gelatinous algal covers growing over organic debris. He accepts 10 species and argues their lichen-like nature in terms of highly adapted algal parasites.

Josef Hafellner provides a 130-page masterpiece with his revision of family and generic concepts among Lecanoraceae and Lecideaceae (s.l.). Thirty-five new families, eight new genera, and many other nomenclatural changes (including lectotypification) are described. The key features for this treatment are ascus structure and reaction, and much debate will surely result over some of the decisions made. Lecanora remains large while Lecidea is reduced in size. Parts of Parmeliaceae and Physciaceae may require transfer to Lecanoraceae, while some traditional genera (e.g., Haematomma, Lecania, Solenospora) may require removal. Certain generic pairs long thought related in fact show distinct ascus construction (e.g., Aspicillia-Agrestia, Bacidia-Mycobilimbia, Lecidea-Catillaria, Lecanora-Squamarina) indicating a polyphyletic origin for derived foliose and fruticose lichens. Dr. Hafellner deserves our praise for attempting to resolve the superficial heterogeneity on which these families have been based in the past.

David Hawksworth reports on two Austrian lichenicolous hyphomycetes erecting Lichenopuccinia as a new genus of which L. poeltii is the holotype. Henssen & Budel introduce Phyllisciella as a new genus of Lichinaceae from the Southern Hemisphere. Three species are known, respectively, from the North Island of New Zealand, from Patagonia, and from the subantarctic Prince Edward Islands; all occur on volcanic rocks. Hannes Hertel continues his regional studies of lecideoid lichens with a 100-page tome on saxicolous subantarctic species. Eighty-four species (6 new) are accepted and referred to twenty-five genera (10 new) along with valuable information on taxonomy

concepts. Most significantly, *Huilia Zahlbr.* is replaced by *Porpidia* Koerb. and the necessary new combinations made. Jorgensen & Vezda offer *Topelia* as a new mediterranean climate genus with four species. Based on an anagram for Poelt, two of its species occur in Europe and two in the U.S.A. The genus is likely related to *Thelopsis* and belongs in the *Ostropales*. Helmut Mayrhofer provides a survey of *Rinodina* and allied genera from Australian rocks; distinctive spore types are fully illustrated. Based on the author's earlier revisionary studies from elsewhere, twenty-two species are recognized with five new to science. Oberholzenzer & Wirth contribute a revision on *Fuscidea* discussing nine species from the *F. cyathoides* and *F. intercincta* groups. Anatomical features and color reactions are presented along with some excellent illustrations.

Leif Tibell provides a superb reappraisal of the *Caliciales*. His 116-page summary covers history, anatomy and morphology, chemistry, ecology, distribution, systematics, and numerical and cladistic analysis. The order is regarded as a biological (rather than taxonomic) entity with most genera except the non-lichenized exhibiting passive (mazaeal) spore dispersal; eight families (3 new) encompassing twenty-six genera (3 new) are accepted. Of the proposed generic synonyms, that sinking *Coniocybe* under *Chaenotheca* is questionable in light of R. Honegger's recent discovery that *Coniocybe furfuracea* has a hyphomycete anamorph. Nevertheless, this paper is without doubt the 'bible' on the group, will remain so for many years, and should be welcomed across the globe.

Hans Martin Jahns discusses developmental interactions between water relations, morphology, and asexual reproduction in *Parmelia saxatilis*. In this lichen isidia form repeatedly from pseudocyphellae. Under damp conditions they develop as ecorticate "soredia" on a simple thallus and more readily break off to colonize new sites than slower germinating mature isidia. Under dry conditions they develop as corticate lobules that remain on the parent repeating the process to create multi-layered thalli capable of holding up to three times the water content. Open sites therefore produce complex thalli that promote water storage over reproductive ability; shaded sites produce simple thalli that favor diaspore dispersal over water holding capacity. A very informative interpretation of biont interactions among lichen-forming Basidiomycota is delivered next by Franz Oberwinkler, using the full range of microscopic techniques. This paper provides a major understanding of the biological similarities and differences between *Cora*, *Dictyonema*, *Multiclavula*, *Lepidostroma*, and *Omphalina* (including both *Botrydina* and *Coriscium*) and their photobionts. Steiner & Peveling conclude the structural treatments with a critical examination of ascospore septa in three *Caloplaca* species. Thickness changes occur in the herbarium over long storage periods, and protoplasmic poisons change the thin septa of live spores into the thick septa of dead spores. Differential water absorptive properties of wall versus viable/nonviable cytoplasmic materials appear responsible. Use of "septum thickness" by monographers of the *Teloschistaceae* will require more careful examination in the future.

The final chapters concern lichen chemistry. Siegfried Huneck reviews twelve years of progress on clarification of lichen substances subsequent to his 1971 compilation. He surveys procedures, provides formulae for 208 compounds characterized under 26 chemical groups, and offers an extensive bibliographic compilation for this active period. Christian Leuckert concludes the book by critically examining the usefulness of routine chemotaxonomic techniques applied to the identification of lichen products. He recommends a combination of TLC and mass spectrometry as being most reliable for the tentative identification of lichen substances. Absolute confirmation can only be made by comparison with authentic controls, and researchers should proceed with caution. A chart of some 120 diagnostic m/e peaks for lichen compounds is provided, as well as a list of absorption maxima for use with the additional tool of chromatogram spectral photometry.

This carefully edited book also contains a comprehensive index and is a worthy tribute to its mentor. It must be considered an essential text for all lichenological libraries, but its unavoidably high cost will restrict its accessibility. Sadly, the publisher, Dr. J. Cramer, died at the early age of 54 in June of 1985. Scholarly texts like this 'festschrift' and monographs in all areas of plant science owe much to this man's determination to produce such works. All who have contributed to, edited, or used his many botanical publications will always be in his debt.

Biology of Lichenized Fungi. James D. Lawrey. Praeger Scientific Publishers, New York. Numerous figures and tables. 408 pp. ISBN 0-03-060047-2. 1984. Price: US\$39.95.

Despite some 25,000 species representative of the classic concept of symbiosis, the difficult taxonomy and lifestyle of lichens has precluded their role as favored field or laboratory tool for most biologists. Yet as the only "autotrophic" fungi that can survive in habitats occupied by few other organisms and prove, as epiphytes, to be one of nature's best pollution biomonitors, one would expect these coevolved holobionts to be broadly appreciated by the scientific community. But they are not - and Lawrey's book is a valiant effort to restore the lichens' reputation.

In twelve chapters he summarizes the major biological factors known about lichens, covering vegetative and cellular structure, reproduction and dispersal, symbiont culture and thallus synthesis, physiology and growth, secondary components and chemical ecology, community ecology and the endolithic habit, and lichens and pollution. Lawrey's literature survey is impressive; some 900 bibliographical references (many from obscure sources) bring together a large percentage of papers previously excluded from recent lichenological surveys. And the author peppers his work with comparative data sets not frequently compiled before, often forcing us to think about hypothesis and implication by posing unsolved questions in the text or in the form of tables. The book is in effect an invitation or challenge to do research.

Unfortunately, from a production point of view the tome is less than satisfying. Many of the illustrations are poor reproductions of the original source being overexposed and printed on inadequate quality (acid-free) paper. Some are badly placed, and many have captions that overemphasize source at expense of explanation or merely repeat text lines. Indeed, the text itself often suffers from too terse a cover or reference when stating facts, leaving the reader up in the air as to current status of information. Although the author delivers well in some areas (e.g., endolithic lichens or chemical ecology - his speciality), other chapters reflect secondary source information derived from reviews that leads to an imbalanced or incomplete interpretation.

Nevertheless, the book fills a correctly identified knowledge gap. Aimed at a graduate rather than undergraduate clientele, it will certainly provide stimulus to researching lichenologists and their students. But whether it will win over biologists from other fungal disciplines remains to be seen. They may decide their first love was the better choice given the peculiarities of lichens.

The Lichen-Forming Fungi. David L. Hawksworth & David J. Hill. Blackie, Glasgow & London (Chapman & Hall, U.S.A.). With 57 figures and 25 tables. viii + 158 pp. ISBN (Library of Congress) 0-412-00631-6 (hbk); 0-412-00641-3 (pbk). 1984. Price: £16.95 (hbk); £7.95 (pbk).

This text aimed at the British advanced undergraduate forms part of the Tertiary Level Biology series. It is the first English language general book on lichens to be produced in Europe for some time, and compares favorably with the 1983 third edition of Hale's The Biology of Lichens. Some 20% less in pagination, Hawksworth & Hill's work downgrades the emphasis on lichen chemistry, minimises economic uses, identification and taxonomy, and concentrates on the more "modern" problems of lichenology as they relate to biological interpretation.

The first chapter on lichen habit introduces the history and problems of "lichen", discusses the nature and variation among fungus-alga symbioses, and quickly dispenses taxonomic concepts above the species level based on anything other than mycobiont reproductive features. Having 'set the scene', the authors' second chapter then lucidly discusses thallus structure. This logical approach is offset unfortunately by less than perfect illustrations and a minimum of SEM graphics. Chapter 3 is restricted to reproduction with the fourth chapter covering dispersal, establishment, and growth. The former has more detailed and up-to-date terminology than Hale, while the latter (though giving credence to the problems of growth) is skimpy and neglects thallus synthesis.

Chapter 5 on metabolism and physiology and the sixth chapter on ecology and sociology are longer pieces. Both are well presented, sensibly organised, and cover a range of topics. More modern in treatment than Hale they present data that reflects European attitudes and research but is mostly regional or local in application. Chapter 7 on biogeography is most welcome as it updates concepts dealt with earlier by Hale in his pioneering Smithsonian Lichen Handbook. Chapter 8 provides a conservative treatment of the biosynthesis, detection, and role of secondary metabolites but successfully integrates the subject into lichen biology. The final ninth chapter provides a short summation of environmental monitoring. As might be expected this is well handled by these authors.

After almost two decades of being the leading English language university primer on lichens, Hale's text finally has a challenge. Hawksworth & Hill have produced a worthy competitor. This book is well written, has minimum errors, and does what it was intended to do - offer lichenology for integration into the mainstream of biology teaching. The authors are to be thanked for producing a scholarly but readable text at an affordable price.

The lichen genus Usnea subgenus Neuropogon. F. Joy Walker. British Museum (Natural History), London [Bulletin of the British Museum (Natural History), Botany 13(1)]. With 39 figures and 5 tables. 130 pp. ISBN 0-565-08004-0. 1985. Price: £19.00.

The Neuropogon group of Usnea whilst well recognized has been allotted from 15 (Lamb) to 30 (Dodge) species and was in need of revision. This critical work chooses to restrict Neuropogon to subgeneric rank and accommodate only 15 species; three are newly described, two newly included, and three represent new combinations. The most significant group features are the brown pigmentation and pruinosity of the apothecial disc, both of

which can also be found in other Usnea groups. In the absence of significant difference between the products of the ascomata and conidiomata of the involved mycobionts, and the lack of well-marked discontinuities between other unrelated features, this conservative taxonomy seems appropriate.

The introductory part of the work surveys the morphology, chemistry, and biogeography of the subgenus. Neither cortical SEM microphotography nor range of ascospore size was found to yield taxonomically important data. However, exciple structure was not examined by SEM nor statistical analysis applied to measurements. Particular attention was paid to chemical analysis with up to three chemotypes (numeric races) being recognized for some species. And only one bipolar species (U. sphacelata) is now accepted, with the other taxa having either antarctic or subantarctic-alpine distributions.

Most text is devoted to full accounts of the taxonomic units including synonymies, nomenclatural notes, descriptions, distinguishing features, distributions, chemistries, variations, species concept, and lists of specimens examined. In fact, it is this area's attention to detail that makes Walker's study of lasting value as the information will be of immense use to future specialists and those struggling to identify aberrant or poorly developed collections. The treatment concludes with accounts of allied and excluded species, cited references, and a comprehensive index. The author has produced a first rate study.

Lichen Physiology and Cell Biology. Edited by Dennis H. Brown. Plenum Press, New York and London. Numerous figures and tables. vii + 362 pp. ISBN 0-306-42200-X. 1985. Price: \$59.50.

These proceedings of the First International Conference on Recent Advances in Lichen Physiology, held April 16-18, 1984, in Bristol, England cover 23 chapters and are authored by 40 contributors. Subject matter runs the gamut of detection from acetylene reduction through antigens to controlled environment, delayed neutron counting, diffusion porometry, element toxicity, EDTA, energy-dispersive X-ray analysis, HPLC, image analysis technique, IRGA, lectin location, minicuvette usage, multivariate gas exchange, nitrogen fixation, oxygen electrode measurement, photoacoustic spectroscopy, protein and rocket immunoelectrophoresis, SEM, symbiont contact, and TEM. Thirteen chapters cover cation uptake and photosynthetic concerns, the remaining ten accommodating carbohydrate transfer, isozymes, nitrogen metabolism, symbiont recognition, and ultrastructure.

Aspects of carbohydrate metabolism are considered in relationship to photosynthetic parameters, methods for field measurements, water relations, gas exchange, and the ecological significance of photosynthetic capacity. Major authors include T.G.A. Green, Kappen, Kershaw, Malkin et al., O.L. Lange, and Nash while Diane Fahselt discusses multiple enzyme forms in lichens. One general insight is that oxygen diffusion paths in lichens may be up to four times greater than in a typical leaf. Nitrogen fixation and loss in diazotrophic lichens is updated by Millbank and Stewart et al. The confirmation of a large pool of apparently free ammonium in cyanobionts is interesting in light of the ability of NH_4 to uncouple photosynthesis. Heavy metal uptake under a variety of circumstances is considered by Lemaistre, Nieboer et al., Pakarinen, and Puckett.

As defined by Brown & Beckett, the role of the cell wall during cation uptake supports a widespread attempt to relate function and structure within lichens. Dessicated lichen ultrastructure is discussed by C. Ascaso et al., while the architecture of symbiont

Peveling et al. Rosemarie Honegger gives a fine report on the structure-function story associated with different types of symbiotic interface in lichens. Anatomical manifestations of changes in photobiont dimension and number during co-development of symbionts in various foliose lichen lobes are considered by David Hill. The book's final two chapters concern symbiotic partner recognition. Galun et al. discuss the properties and significance of an algal binding protein (ABP) while Lallemand & Savoye review the role of lectins in lichen morphogenesis.

Physiology of lichens has come a long way! But this summative text also earmarks those areas of research receiving less attention. Lichen photosynthesis debate concentrates on gas exchange but rarely involves questions of light harvesting, electron transport, or photophosphorylation. Respiration rates of many organisms are dependent upon rates of processes that consume respiratory energy - but none have been investigated in lichens. Discussions on lichen water relations rarely consider the thermodynamics of water potentials created by solute and water pressures. Localization of major metabolic components must correlate with processes if physiological systems are to be truly effective, thus improved knowledge of subcellular biochemical compartmentalization within lichen partners should be attempted.

Despite these drawbacks and the unfortunate peak of interest in esoteric lichen physiology at a time when expensive equipment needs are being met by decreased funds for pure research, Dennis Brown is to be congratulated on arranging both a stimulating meeting and a well indexed publication of these papers.

Physiological Ecology of Lichens. Kenneth A. Kershaw. Cambridge University Press, England. With 174 figures and 7 tables. 293 pp. ISBN 0-521-23925-7. 1985. Price: \$59.50.

This member of the Cambridge Studies in Ecology series has been long awaited, being the culmination of many years of research by the prophet, students, and colleagues of the "Kershaw school" of lichen ecophysiology. Lichen environmental influences and photosynthetic patterns form the core of the book with nitrogen metabolism, respiratory function, and a speculative discussion of populational variance rounding out the story. But the book has a boreal slant; considering how significant desert lichens are in respect to soil moisture, nitrogen turnover, and temperature response they receive disappointingly short treatment. And air pollution effects are summarily dismissed although one of the more significant applied fields in lichenology.

The first three chapters discuss the lichen's physical environment concentrating on temperature, moisture, and ionic criteria. Just what are field temperatures for lichens even in the arctic? How may surface temperature, albedo, shading, or the immediate boundary layer effect the operating environment of a lichen? Can a basically poikilohydric organism make morphological adjustments to control water uptake and loss in its microenvironment? What do we know about anion (as opposed to cation) acquisition? Is allelopathy actually an ineffective ecological factor in controlling environmental influences? Throughout the chapters Kershaw stresses the difficulty we still have in rigorously controlling interaction among environmental factors when conducting field experiments.

Chapter 4 offers a critical summary of the work Kershaw's group has done on nitrogen fixation. This includes a survey of the various techniques applied and the experimental pitfalls encountered. Responses to variation in water content, light, and temperature by 'nitrogenase' indicate activity is a complex affair. Indeed, for this reason, Kershaw is skeptical of those who wish to devise nitrogen budgets for whole ecosystems. The next three chapters interpret lichen photosynthesis -- the most studied process in lichen ecophysiology. Chapter 5 summarizes techniques for measurement of gas exchange and the current role of closed-loop systems for low-level replicate measurements of gas concentration via IRGA determinations of withdrawn samples. Particular attention is paid to multivariate experimental design, diffusive resistance of thalli, and the interaction of latent water content, wetting and drying cycles, and remoistening dry-state recovery upon gas exchange.

Chapter 6 rehashes mostly published data concerned with seasonal photosynthetic capacity changes in lichens. Kershaw's "rediscovery" of this phenomenon and its subsequent investigation by his colleagues is a significant achievement. Interaction between net photosynthesis, light, and temperature can now be explored via a response-matrix approach which provides evidence for both seasonal changes and temperature acclimation of photosynthesis. Capacity changes can be large and may be induced in air-dried thalli -- stored air-dried thalli should therefore be frozen. Especially interesting is the discussion of photosynthetic-illumination curves expressed in terms of structural/functional change of components in the photosynthetic unit. Reinterpretation of previously confusing data should now be possible with predictions enabling mechanistic exploration at the cellular level. Chapter 7 discusses net photosynthetic optima and thermal limits, and reiterates the theme that lichen operating environments need not match general climatic conditions measured during metabolic activity. The fallacy of contrasting photosynthetic temperature optima in arctic and tropical lichens highlights the point that it is microclimate that counts. Correlations between lichen photosynthetic patterns and latitude are not often seen. Rather, thermal stress proves greater in hydrated thalli with the order of sensitivity being nitrogen fixation : photosynthesis : respiration.

Chapter 8 covers respiration and growth and focuses not on the processes *per se* but the environmental controls. Since we still know so little about either, Kershaw remains skeptical of growth predictions that involve assumptions about respiratory patterns. Consideration of resaturation respiration and the effects of water content, thallus age, and temperature on active respiration lead Kershaw to conclude that growth modeling requires knowledge of the interaction between seasonal operating environment and seasonal physiological change of a lichen. And then one should also include terms for ionic control, presence of competitors, etc. -- a somewhat discouraging task!

The final chapter discusses phenotypic plasticity in the physiological responses of lichens. Kershaw provides a model for interpreting alternative photosynthetic strategies, pointing out that "success" is not necessarily a function of carbon gained but of adequate growth and reproduction. Variations become adaptive when environmental influences fluctuate predictably, but plasticity is essential for survival under non-uniform conditions. The use of different strategies allows lichens to adjust their physical state and thallus physiological characteristics as behavioral modifications. Admittedly the discussion here is speculative, but Kershaw's ideas will likely encourage further research.

The text is remarkably free of typographical errors although an occasional misquoted figure number is noticeable. Some illustrations could have been reproduced better had nicer quality paper been used. And the cost seems overly high considering how long the book was in press (preface dated 1983). Of nearly 400 references cited only about 1/6th are Kershaw's own papers indicating a broad literature has been surveyed. Even so some comparative data is lacking such as non-biological surface phenomena, more reference to other poikilothermic organism research, a discussion of water potentials linking moisture to temperature and irradiance on a thermodynamic level, clearer assessment and understanding of the ionic needs of lichens, a better expression of temperature optima/time relationships for nitrogenase activity, clarification on lichen CO₂ compensation and photorespiration, and a chance to review major differences in IRGA techniques. Nevertheless, this is a great book and cannot fail to stimulate others to work on lichen ecophysiology in biomes other than the boreal. Kershaw has provided an authoritative and valuable reference for this unique and challenging research area.

Surface Physiology of Lichens. Edited by Carlos Vincente, Dennis H. Brown, & Maria E. Legaz. Universidad Complutense, Madrid. 154 pp. ISBN 84-7491-157-5. 1985. Price: \$6.00.

This softback text summarizes the proceedings of the May 1983 symposium held at U.C.-Madrid under the guidance of Carlos Vincente (ILN 16(2): 6-7). The Spanish group's research on these naturally collected poikilohydric symbiotes seems untroubled by the many technical problems previously encountered by foreign lichenologists. The intent of the meeting was to bring together physiologists of like-interest who currently were separated by a language barrier.

The book contains seven papers with the opening summary being Vincente's The Surface Physiology of Lichens: Facts and Concepts. The Madrid group has done much to update our knowledge of lichen enzymes and enzymic activity. The reports by Blanca Cifuentes and Estrella Legaz on "urease activity and biosynthesis" emphasize this and provide an overview of the departmental research thrust at U.C.

Overseas papers are those by David Richardson who reviews symbiotic interactions with an emphasis on "biont recognition and carbohydrate transfer" within lichens, and Dennis Brown & Richard Beckett who summarize "acquisition, localization, and the effects of cation minerals" within lichens. Spanish work on the adherence of lichen thalli to rock and bark concludes the reports with papers by Carmen Ascaso on "structural aspects of lichens invading their substrates" and Pilar Estevez on the "synthesis of plant cell-wall-degrading enzymes by lichens."

Since (with the exception of the Prologo) the entire book is printed in English, it is prone to a considerable number of typographical errors and issued a year-or-more behind schedule. But it is a very valuable resource for non-Spanish reading lichenologists. Dr. Vincente, his research team, and the Universidad Complutense are to be thanked for releasing this volume and at such a low price.

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