CYANONEWS

Volume 6 Number 2 July 1990

CYANONEWS - a newsletter intended to provide cyanobacteriologists with a forum for rapid informal communication, unavailable through journals. Everything you read in this newsletter is contributed by readers like yourself. Published occasionally (about three times per year).

SUBSCRIPTIONS - $8 U.S. (or equivalent). See last page.

CONTRIBUTIONS - Expected every couple of years: a new result, an upcoming meeting or a summary of a past meeting, a post-doctoral opening, a new publication, a request for strains, a change of life... something.

HOW TO FIND OUT MORE ABOUT SOMETHING YOU READ HERE - Contact the person who contributed the news item (note capitalized name). A Directory of Cyanobacteriologists is distributed every two years to everyone on the mailing list. If you need one, write to Jeff Elhai (see last page).

INSTRUCTIONS TO AUTHORS - Send news.

INSIDE:

With this issue, CyanoNews changes in a few respects:

(1) The list of publications at the end of the newsletter now includes RECENT JOURNAL REFERENCES pertaining to cyanobacteria, obtained by a computerized search of the literature. The list of journals scanned is large but by no means complete, and titles that do not include words related to "cyanobacteria" or "blue-green algae" or common genera of cyanobacteria may be missed. For this reason, consider sending in titles for your articles if you fear they may not be included, and certainly do not be discouraged from giving us notice of your articles before publication!

(2) The increase in the size of the newsletter (and, one would hope, its utility) unfortunately necessitates the institution of a SUBSCRIPTION CHARGE of $8 U.S. (or equivalent) per year, which covers the costs of printing and mailing. Payment may be made in any convertible currency by any convenient means. Pay for as many years as you like -- your address label will remind you of the date on which your subscription expires. If you find it difficult to send out convertible currency, send a letter instead, especially one filled with news. All who read copies of this newsletter are strongly encouraged to contribute, regardless of whether they subscribe.

(3) A special section called TRANSITIONS has been added to the Bulletin Board that chronicles the comings and goings of our number. While such news may be of intrinsic interest, it serves a practical purpose as well. You may be surprised to read that a fellow cyanobacteriologist is planning a visit to your continent -- what better excuse to send out an invitation for a talk at your institution?

(4) One major respect in which the newsletter has not changed is that YOU SUPPLY THE NEWS! All the news items you read here were sent in by other cyanobacteriologists who would like to hear what you have to say as well. It is expected that every reader is also a contributer every couple of years or so: an interesting result, an upcoming meeting -- you decide.

The VII INTERNATIONAL SYMPOSIUM ON PHOTOSYNTHETIC PROKARYOTES will be held July 23-27, 1991 at the University of Massachusetts, Amherst, MA, U.S.A. The total cost of the meeting will be around $400 to $600 U.S., depending on the choice of accomodations. For more information contact Clint Fuller, Department of Biochemistry, University of Massachussetts, Amerst, MA 01003 U.S.A.

The GORDON RESEARCH CONFERENCE ON MYCOTOXINS AND PHYCOTOXINS will be held June 23-28, 1991 in Plymouth, New Hampshire. Topics will include current research advances on toxic cyanobacteria. For more information contact Wayne W. Carmichael, Department of Biological Sciences, Wright State University, Dayton, Ohio 45435. (Tel) 513-873-3173. (Fax) 513-873-3301. (EMail) WCARMICHAEL%DESIRE @ WSU.Bitnet.

The JOURNAL OF APPLIED PHYCOLOGY would especially welcome papers on potential or actual COMMERCIAL ASPECTS OF CYANOBACTERIA. There has been a large response to the new journal by authors of seaweed papers, but, in spite of the blue-green cover, so far only half a dozen papers on cyanobacteria.

BRIAN WHITTON mentions that he holds a substantial COLLECTION OF OFFPRINTS (approaching ten thousand) on topics concerning cyanobacteria and many more concerning other microalgae. The collection results from donations of several collections, from friends, and all the generous people who respond to request cards. Although it is impossible to send photocopies or loan papers, anyone is welcome to make a visit to use the collection (though please phone a few days in advance: 091-374-2427). The papers are boxed according to topic and year but, regrettably, not catalogued.

If 10,000 offprints are not enough, then you might be interested in a collection of titles of publications related to cyanobacteria (328 in number) gleaned mostly from a computer search of the 1989 literature. If interested, send a computer diskette (3½" or 5¼") formatted under MS-DOS or PC-DOS to Jeff Elhai, MSU-DOE Plant Research Laboratory, Michigan State University, East Lansing, MI 48824 U.S.A., or send a message to (EMail) 21417BBS @ MSU.Bitnet.

JAN SCHOUTEN offers a pair of Dutch wooden shoes for the person who provides him the strain SPIRULINA PLATENSIS, SUBSPECIES SIAMESE. This strain, isolated from a salt lake in Ethiopia, is mentioned in some old literature. It should contain restriction endonuclease SplI. Contact Jan Schouten, Microbiology Research Centre Holland, Hudsonstraat 68, 1057 SN Amsterdam, The Netherlands. (Tel) 851807 / 5486231. (Fax) 891149.

BORIS GROMOV sends in a plea for strains of TOXIGENIC CYANOBACTERIA. His town, Leningrad, obtains water only from the Neva River, which comes from Ladoga Lake, 70 km away. Eutrophication of the lake and warm weather makes the development of cyanobacteria a distinct possibility. Blooms of toxigenic species could be catastrophic. He needs different sera and other probes in order to detect dangerous organisms, and for that purpose he would greatly appreciate receiving toxigenic strains. He cannot offer convertible currency, but some exchange might be possible. Contact: Boris Gromov, Biological Institute of Leningrad University, Oranienbaumskoye sch.2, Stary Peterhof, Leningrad 198904 U.S.S.R.

POSITION AVAILABLE

CONTACT: John Smith, Division of Biological Sciences, Lancaster University, Bailrigg, Lancaster LA1 4YQ, U.K. (Tel) +44-524-65201 ext. 3515. (Fax) +44-524-382212.

RESEARCH: Analysis of genes expressed during heterocyst differentiation, including gene sequencing and in vivo and in vitro transcription studies. The aim of the work is to identify mechanisms regulating the expression of these genes during differentiation.

REQUIREMENTS: Ph.D. Experience in recombinant DNA techniques preferred but not essential.

SITE: Lancaster University has a country setting close to the historic city of Lancaster, the lake district, and the Lancashire Dales in the north of England. Comprehensive sport and social amenities are available.

SALARY: 11,000 - 13,000 ($19,000 - $21,000 U.S.), depending on age and experience.

START: As soon as possible.

BILL ZIMMERMAN has taken a faculty position at the University of Michigan-Dearborn, U.S.A., after several years at Washington State University. He is bringing with him an abiding interest in Azolla and symbiotic cyanobacteria.

PETER FAY has moved from University College to Queen Mary & Westfield College -- back to where he started in 1961!

M.F. FILLAT has just completed a postdoctoral stay in the laboratory of Peter Weisbeek and has returned to University of Zaragoza, Spain to continue his work on cyanobacterial gene expression.

NATHANEAL GROBBELAAR has retired from the University of Pretoria after serving many years as Head of the Department of Botany. His work has spanned a variety of subjects, starting with studies from his graduate days at Cornell University on novel amino- and imino-acids and their biosynthesis in plants. For the past twenty years, however, much of his interest has been devoted to nitrogen fixation by bacteria in association with plants. In particular, he has expanded our knowledge of cyanobacterial associations with cyacads of the genus Encephalartos, focusing on the morphological and ultrastructural characterization of their cyanobacterial symbionts. While he can look forward to years of contemplative peace atop the nitrogenous root of a spreading cycad, for the next nine months he will have one last fling in the laboratory of Tan-Chi Huang, continuing their collaborative study on the endogenous nitrogenase rhythm of Synechococcus RF-1.

ALAN CHAPLIN

Alan Chaplin (University College of Swansea) died in October 1989 at the tragically early age of 47. A graduate of Southampton University, Alan's original research interest was in the intermediary metabolism of marine invertebrates, but he was best known to cyanobacteriologists for our work together on N_2 fixation in Gloeothece. Nevertheless, only two years before his death, Alan had left biochemical research in order to become Director of Continuing Education at UC Swansea, a position that admirably suited his enthusiasm both for teaching and organization, as well as his ability to get on well with everyone. As those who met him will know, Alan was always smiling and was a cheerful and urbane companion as well as a talented scientist. We have all lost a good friend as well as a respected colleague.

-- John Gallon

ISOLATED GENE AFFECTS REGULATION OF HETEROCYST DIFFERENTIATION

BILL BUIKEMA sends news of a fascinating mutant he has isolated from Anabaena PCC 7120. From a collection of 140 mutants unable to grow aerobically on media lacking fixed nitrogen he found three that could be complemented by a 9.5 kb fragment. One of these, called strain 216, fails to differentiate heterocysts under any growth condition. Complementation of strain 216 requires DNA carrying a long (897 bp) open reading frame (ORF), which is transcribed at a low level under conditions of nitrogen sufficiency but at a much higher level within 6 hours after the initiation of nitrogen starvation. The presence of the ORF on a plasmid in either strain 216 or wild type Anabaena confers a novel phenotype: fixed nitrogen no longer represses heterocyst formation and heterocyst frequency is increased under conditions of nitrogen starvation, the increase owing mainly to multiple heterocysts. These results suggest that the ORF, which he has named hetR, encodes a product that is involved in the regulation of heterocyst differentiation.

RESTRICTION ENZYMES FROM ANABAENA IDENTIFIED

JAN SCHOUTEN and coworkers offer an update to a previous report [J Gen Microbiol (1985) 131:951-958] on a fourth restriction endonuclease present in Anabaena flos aquae CCAP 1403-13F. They have now shown that this enzyme is an isoschizomer of ScaI. In addition, a second restriction endonuclease present in Anabaena cylindrica CCAP 1403-2 has proven to be an isoschizomer of BamHI.

OPEN READING FRAMES NEAR ATP SYNTHASE GENES IDENTIFIED

Alison Cozens and JOHN WALKER found two undentified reading frames, URF4 and URF3, adjacent to genes encoding the ß and subunits of ATP synthase of Synechococcus PCC 6301 [J Mol Biol (1987) 194:359-383]. M. Vodkin a the University of Illinois at Urbana-Champaign has identified these URFs as homologues of groES and groEL in Escherichia coli. These genes code for heat shock proteins and are chaperonins involved in assembly of multi-subunit complexes.

GLOEOTHECE RELEASES AMINO ACIDS WHILE FIXING NITROGEN

JOHN GALLON, in his studies on the effect of light/dark cycling on nitrogen fixation in Gloeothece, has discovered that the organism releases amino acids during periods of nitrogen fixation and reassimilates them at a later time. The release of amino acids during nitrogen fixation does not appear to be a general property of non-heterocystous cyanobacteria.

STRAIN COLLECTION AIDS STUDY OF PO_4 METABOLISM, METAL RESISTANCE

BRIAN WHITTON has collected several hundred cyanobacterial strains isolated from known environments for the purpose of answering ecological questions and questions concerning phosphate metabolism and tolerance to zinc and cadmium. Every effort was made to minimize the possibility of genetic change during isolation -- axenic clonal isolates were put into liquid nitrogen and/or dried as quickly as possible. So far, every strain screened showed cell-bound phosphomonoesterase activity under conditions of moderate limitation for phosphate, but the strains differed considerably in the activities of other cell-bound phosphatases. Several strains had very high rates of production of extracellular phosphomonoesterase, and it is hoped that one of these may of commercial use. Part of the morphological range shown by the Rivulariaceae (e.g. the various species of Calothrix recognized in Geitler's flora) appears to reflect differing strategies to maximize the uptake of phosphate. Coworkers Amit Gupta and Jim Huckle are working on genes encoding metallothioneins from strains of Synechococcus.

DIFFERENTIAL INDUCTION AND PHOSPHORYLATION OF PROTEINS

NOEL CARR and coworkers Helen Chadd and Dave Scanlan are investigating the control of nutrient uptake in the oceanic strain of Synechococcus DC2. They are looking for specific proteins of the outer envelope that are induced when the availability of certain nutrients, such as iron, is limiting. The presence or absence of such proteins in cells from natural populations could provide valuable information on the nutrient status of these organisms. Nick Mann, another coworker, has collaborated with Michael Herdmann and Rosi Rippka at the Pasteur Institute (Paris) to study protein kinase activity in Anabaena PCC 7120. They have detected phosphorylation of over 25 polypeptides in cell-free extracts to which γ-^{32}P ATP has been added. The phosphorylation of one particular protein is inhibited in the presence of glucose-6-phosphate, ribulose-5-phosphate, or $NADP^+$. Other low molecular weight metabolites inhibit the phosphorylation of other polypeptides. A calmodulin antagonist enhances phosphorylation of certain polypeptides and inhibits a number of others.

GAS VESICLES: GENE SEQUENCES COMPARED, QUANTITATIVE MODEL TESTED

PAUL HAYES has continued sequencing the gvp operon from Anabaena flos-aquae. There is one copy of gvpC, which codes for the hydrophilic protein on the outside of the gas vesicle, and at least three copies of gvpA, which codes for the small hydrophobic protein (GVPa) that forms the ribs of the structure. Expression of these genes in E. coli is lethal when they are carried on a high copy number vector. TONY WALSBY and PAUL HAYES have recently published a review on gas vesicle proteins [Biochem J 264:313-322].

Anne Griffiths and TONY WALSBY have compared the N-terminal amino acid sequences of the outer, hydrophilic gas vesicle proteins (GVPc) from various cyanobacteria and these proteins show less homology than GVPa proteins from the same organisms. Gas vesicles from the halophilic cyanobacterium Dactylococcopsis has two outer hydrophilic proteins that have an identical sequence for the first 24-residues and are thereafter quite different. They have very low homology with GVPc of other cyanobacteria.

A collaboration between Luuc Mur's and Tony Walsby's groups was directed towards an understanding of vertical migration and stratification by cyanobacteria in lakes. JACCO KROMKAMP and TONY WALSBY have developed computer models that make predictions of movements based on the light exposure, speed of the response, size of the cyanobacteria, etc. Bas Iberlings and LUUC MUR have matched these predictions to observations made in Dutch lakes. Microcystis colonies increase their density in response to the average light exposure received during the day.

GLUCOSE TRANSPORTER TRANSFORMS SYNECHOCOCCUS R2 TO PHOTOHETEROTROPHY

FRANCOISE JOSET and coworkers have succeeded in transforming Synechococcus R2 with DNA including the recently described gene encoding a glucose transport protein. The resulting strain grows on DCMU + glucose but very slowly, too slowly to consider trying for chemoheterotrophic growth. The success of the selection indicates first that substrate transport is the limiting step for photoheterotrophic growth by this obligate phototroph and second that the glucose transport protein is sufficient to promote transport.

GENE ENCODING 9kDA PHOTOSYSTEM II PROTEIN SEQUENCED

CHRIS HOWE and his colleagues have recently isolated and sequenced a gene for the 9kDa protein component of Photosystem II from Phormidium laminosum. Comparison of the N-terminal amino acid sequence of the protein with the sequence of the structural gene indicates that the 9 kDa polypeptide is initially synthesized with the N-terminal leader sequence of 44 amino acids. This leader sequence contains a positively charged N-terminal region, a long hydrophobic reagion, and a typical cleavage site. It directs the protein across the thylakoid membrane. [Mol Gen Genet (1989) 216:334-339].

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