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CYANONEWS

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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 - $10 or equivalent/year for hard copy. E-mail version is free.

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. See last page for addresses you can send news to.

HOW TO FIND OUT MORE ABOUT SOMETHING YOU READ HERE - Look at the end of a news item for a contact person. Also, a Directory of Cyanobacteriologists is distributed every two years or on request.

INSTRUCTIONS TO AUTHORS - Send news.

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****** MEETINGS, PROCEEDINGS, AND MISCELLANY ******

The Fifth International PHYCOLOGICAL CONGRESS is to be held in Qingdao, P.R. China, 26 June to 2 July 1994. The congress will feature workshops on algal molecular biology, biodiversity, biogeography of freshwater algae, culture methodologies, and phycology and coastal management.

CONTACT: The Secretariat, EMBL, Institute of Oceanology, Chinese Academy of Sciences, 7 Nanhai Road, Qingdao, P.R. CHINA 266071

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A satellite workshop in Wuhan, P.R. China, 6-7 July will discuss the latest developments in MICROALGAL BIOLOGY AND BIOTECHNOLOGY and will be dedicated to the memory of the late Li Shanghao. The workshop immediately follows the Phycological Congress in Qingdao.

CONTACT: LIU Yong-Ding, Institute of Hydrobiology, The Chinese Academy of Sciences, Wuhan 430072, Hubei, P.R. CHINA. (Fax) 86-27-725132.

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A month of Chinese meetings will finish up with the Sixth International SYMPOSIUM ON SALINE LAKES, 14-19 July 1994, in Beijing, P.R. China. The

meeting will cover a wide range of topics, from geochemistry and mineralization to mineral effects on lake ecosystems and the impact of human activities on saline lake areas.

CONTACT: ZHENG Mianping or ZHANG Fasheng, Organizing Committee of 6th ISSL, Chinese Academy of Geological Sciences, Baiwanzhuang Road 26, Beijing 100037, P.R. CHINA. (Fax) 0086-1-8310894.

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The Tenth International Conference on PHOTOCHEMICAL CONVERSION AND STORAGE OF SOLAR ENERGY will be held 24-29 July 1994 in Interlaken, Switzerland. This IPS conference will cover photosynthesis in biological and biomimetic systems as well as a variety of topics in photochemistry. The deadline for registration is March 31 and for abstracts February 28.

CONTACT: The IPS-10 Secretariat, Institute of Inorganic and Physical Chemistry, University of Berne, Freiestrasse 3, CH-3000 Berne 9, SWITZERLAND. (Tel) +41 31 631 42 36, (Fax) +41 31 631 39 94

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To honor Philip Thornber on his retirement, there will be a conference entitled "STRUCTURE, FUNCTION AND BIOGENESIS OF CHLOROPHYLL-PROTEIN COMPLEXES", planned for 3-6 August 1994. The conference will be held at the University of California at Los Angeles and will focus on recent developments in the structural biology of chlorophyll-protein complexes from plants and bacteria as well as future research directions.

CONTACT: Richard Malkin, Department of Plant Biology, 111 Koshland Hall, University of California, Berkeley, CA 94720. (Tel) 510-642-5959, (Fax) 510-642-4995, (Email) DickM@Nature.Berkeley.Edu

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Cyanobacteriologists world-wide will descend upon Urbino, Italy, 10-15 September 1994 for the VIII INTERNATIONAL SYMPOSIUM ON PHOTOTROPHIC PROKARYOTES. They (and, to be fair, purple- and green-afficionados as well) will focus on five themes: Biogenesis and regulation of the photosynthetic

apparatus, reaction centers and antenna, metabolism, ecology and taxonomy, and biochemical processes. In addition, a round table discussion is scheduled on the topic of "Basic and Applied Biotechnological Processes". A limited number of grants will be available for younger researchers and for students. Applications will for support will be considered only by those presenting an abstract.

CONTACT: Organizing Secretariat of the VIII ISPP, S.Ventura, CNR-CSMA, p.le delle Cascine 27, I-50144 Firenze, ITALY. (Tel) +39-55-350542 or -352051, (Fax) +39-55-330431, (E-mail) Ventura@csma.fi.cnr.it

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The Sixth Conference of the AFRICAN ASSOCIATION FOR BIOLOGICAL NITROGEN FIXATION is scheduled for 12-17 September 1994 in Harare, Zimbabwe, focusing on the theme of agronomic, socio-economic, and environmental benefits of biological nitrogen-fixing systems in Africa. Registration is US$150. Financial assistance may be available for participants.

CONTACT: The Secretary, AABNF 6TH Conference, Department of Soil Science, University of Zimbabwe, Box MP 167, Mount Pleasant, Harare, Zimbabwe. (Tel) 263-4-303211 ext. 1412, (Telex) 26580 UNIVZ ZW, (Telegrams) UNIVERSITY, (Fax) 263-4-333407 or -335249 (E-mail) SMoyo@zimbix.uz.zw

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The PROCEEDINGS OF THE NATIONAL SEMINAR ON CYANOBACTERIAL RESEARCH - INDIAN SCENE, a collection of reports on the cyanobacterial research of laboratories throughout India, is available without charge.

CONTACT: G. Subramanian, National Facility for Marine Cyanobacteria, Bharathidasan niversity, Palkalaiperur, Tiruchirapalli 620 024, INDIA. (Tel) 0431-896-352, (Fax) 0431-96245, (Telex) 0455-253 BARD.

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CYANOBACTERIA have recently been seen center stage IN THE POPULAR MEDIA. In

the January 1994 issue of Scientific American [270(1):78-86], Wayne Carmichael presents for public inspection a review of toxic cyanobacteria, including a beautiful picture of a Microcystis bloom set against a garden in Beijing. In the same issue there is a special advertising section in which the Thai government puts its best scientific foot forward. Part of their best foot is a photograph, captioned "Cloning genes for biopesticides", that displays a table full of petri plates covered with (it appears) cyanobacteria.

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ENRIQUE FLORES points out that there is a conflict between the next European and American Cyanobacterial Workshops, both scheduled for about the same dates (May/June, 1995). The European Workshop is to be held in Sevilla, Spain, and the American Workshop in Asilomar, California. To avoid such conflicts now and in the future, Enrique proposes that each of the two workshops be held once every three years, to fit in between the Photosynthetic Prokaryote meetings. In concrete terms:

    1991: Photosynthetic Prokarotes, Amherst
    1992: European Workshop, Bristol
    1993: American Workshop, Asilomar
    1994: Photosynthetic Prokaryotes, Urbino
    1995: Euroopean Workshop, Sevilla
      or American Workshop, Asilomar
    1996: American Workshop, Asilomar
      or European Workshop, Sevilla
    1997: Photosynthetic Prokaryotes, ??

It is by no means too early to think about such things. Enrique would appreciate opinions on this proposal along with preferences as to which years would be most convenient for which meetings.

    CONTACT: Enrique Flores, Instituto de Bioquï¿½mica Vegetal y Fotosï¿½ntesis,
    Universidad de Sevilla-CSIC, Apartado 1113,

41080 Sevilla SPAIN. (Tel) 954-61-70-11, (Fax) 34-5-462-0154,
(E-mail) Flores@Cica.Es

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Copies of the 1993 CYANOBACTERIA WORKSHOP ABSTRACT BOOKLET are available for the asking.

CONTACT: Jane Edwards, Carnegie Institution of Washington, 290 Panama Street, Stanford, CA 94305 U.S.A. (Tel) 415-325-1521 ext. 204, (Fax) 415-325-6857, (E-mail) jane@carnegie.stanford.edu

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The Norwegian Institute for Water Research has made available a monograph entitled TAXONOMY OF TOXIC CYANOPHYCEAE (Cyanobacteria), by OM Skulberg, WW Carmichael, GA Codd, and R Skulberg, that surveys the toxic species and provides a practical guide for their identification.

CONTACT: Olav Skulberg, Norwegian Institute for Water Research, P.O.Box 69 Korsvall, N-0808 Oslo 8 NORWAY

****** POSITIONS OFFERED AND SOUGHT ******

POSITION OFFERED: Post-Doc

CONTACT: Michael Seibert, National Renewable Energy Laboratory, Golden, CO 80401-3393, U.S.A. (Tel) 303-384-6279, (Fax) 303-384-6150, (E-mail) Seibert@seri.nrel.gov

RESEARCH: Oxygen-evolution, electron donation, and photoactivation processes in PSII, using biochemical, spectroscopic, and electrochemical approaches with membrane/submembrane fractions obtained from plants and cyanobacterial mutants.

PERTINENT ARTICLES: Biochem (1991) 30:9615 and 30:9625; Research in Photosynthesis (1992), Murata N, ed., Vol II, p.357; Photosyn Res (1993) December issue.

SUPPORT: Salary highly competitive, for one year with possibility of extension.

SUBMIT: CV with list of publications; cover letter with statement of research interests; names, addresses, and telephone numbers of three professional references.

START: Immediately

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POSITION SOUGHT: Postdoc in metal-toxicity or in nitrogen-fixation

APPLICANT: Srinivas Denduluri, Dept. of Biology, Memorial University, St. John's,
Newfoundland, A1B 3X9 CANADA. (E-mail) DSrinivas@kean.ucs.mun.ca

EDUCATION and EXPERIENCE:

M.Sc. in cytogenetics

M.Phil. in microbiology ("Toxicity of lead and its interaction with chelating agents on some vegetable crops grown in sewage-irrigated soil")

Ph.D. (1st) in plant physiology and biochemistry ("Effects of lead, manganese, and chelating agents on some vegetable crops grown in sewage irrigated soil").

Ph.D. (2nd, thesis recently submitted) at Memorial University ("Role of lipid bodies in nitrogen-fixing nodules of Sesbania"). Experience also in nutrient cycling and related techniques, such as HPLC, gas chromatography, and isotopic methods.

PUBLICATIONS (selected; more available on request):

Srinivas D. (1993). Reduction of lead accumulation by ethylenediamine tetraacetic acid and nitrilo triacetic acid in okra grown in sewage irrigated soil. Bull Environ Cont Toxicol 51:40-45.

Bal AK, Srinivas D (1993). Catalase activity and biogenesis of microbodies in nitrogen-fixing root nodules of beach pea. Cell Biol Interntl (in

press).

Srinivas, D (1991) Dioecism in flowering plants: Causes and Evolution. Biol

Edu 2:93-100.

****** FIND STRAINS FAST... IN THE MICROBIAL GERMPLASM DATABASE ******

Microbial germplasm maintained in research-oriented laboratories in universities and experiment stations is a vast undocumented resource, one that is difficult to tap. The Microbial Germplasm Database (MGD) is designed to help you navigate through many of these collections in order to find what you want and how to obtain it. Microorganisms and genetic constructs covered by MGD include bacteria, viruses, fungi, various reproducible genetic elements, and nematodes. The germplasm documented in MGD is primarily used in research (botanical, biochemical, genetic, or agricultural) that is related to plants.

You can access MGD from your computer through the MGD Gopher, a menu-driven
information port. If your local internet host is running Gopher software, simply type "gopher". Choose the "Other Gopher Servers" menu item, and then progressively home in on MGD by choosing: North America, United States, Oregon, and, finally, Microbial Germplasm Database. Alternatively, you can connect to MGD through the TELNET command, using the address bcc.orst.edu (the ip number is 128.193.86.4). Type mgd at the login prompt, and press the Enter key when asked for a password.

Besides putting the MGD database at your fingertips, the MGD Gopher also provides access to literature covering biodiversity, germplasm preservation, nitrogen fixation, biocontrol, and sustainable agriculture. The references can be searched by keyword, author, and title. Several other useful tools are

available, including a large collection of electronic phonebooks (some including E-mail addresses) for universities and organizations throughout the world.

The menus are pretty self-explanatory, and help files are available to guide you through them. MGD puts out a newsletter (hardcopy free) that describes the service and new features as they arise.

CONTACT: Joe Hanus, Microbial Germplasm Database, Dept. of Botany and Plant
Pathology, Oregon State University,Corvallis, OR 97331-2902, U.S.A.
(Tel) 503-737-5300, (Fax) 503-737-3573, (E-mail) HanusJ@ava.bcc.orst.edu

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JOHN BENEMANN continues his peripatetic ways. He's moved back to California from his previous base in Vero Beach, Florida (U.S.A.). He continues to consult on biotechnological applications of cyanobacteria.
343 Caravelle Drive, Walnut Creek CA 94598, U.S.A. (Tel/Fax) 510-939-5864

IGOR BROWN is temporarily absent from his bench in Odessa, Ukraine to visit the laboratory of Gunter Peschek until March 10, 1994.
c/o Gunter Peschek, Biophysical Chemistry Group, Institut fuer Physikal. Chemie, Universitaet Wien, Wahringer Str. 42, A-1090 Wien, AUSTRIA
(Fax) 011-43-1-3104597

YUPING CAI has left the safe confines of Michigan State University to begin a post-doc in the laboratory of Alex Glazer.

Department of Molecular and Cell Biology, 230 Stanley Hall, University of California, Berkeley CA 94720, U.S.A. (Tel) 510-2643-6302, (Fax) 510-643-9290.

MIROSLAV GANTAR has left Nigel Kirby's lab in Dundee to take a research position with Jeff Elhai.

Dept. of Biological Sciences, Florida International University, University Park, Miami FL 33199 U.S.A. (Tel) 305-348-4030 (Fax) 305-348-1986.

NIGEL KIRBY has also left Nigel Kirby's lab. He's abandoned academia to head research at the Scottish Crop Research Institute.

Mylnefield Research Services Ltd., Scottish Crop Research Institute, Invergrowrie, Dundee DD2 5DA, Scottland, U.K. (Tel) 0382-562731, (Fax) 0382-562426

WOLFGANG LOCKAU has moved operations from Regensburg to his new home in Berlin.

Biochemie der Pflanzen, Fachbereich Biologie, Humboldt-Universitaet, Invalidenstr. 42, 10 115 Berlin, GERMANY

SEAN TURNER has moved from cold to wet, leaving University of Cincinnati for a warm new lab in Louisiana.

Department of Botany, Life Sciences Building, Louisiana State University, Baton Rouge LA 70803-1705, U.S.A. (Tel-lab) 504-388-8771, (Tel-office) 504-388-8494, (E-mail) BtTurn@LsuVax.Sncc.Lsu.Edu

PETER WOLK is visiting the lab of Nicole Tandeau de Marsac, returning to Michigan State University June, 1994.

Physiologie Microbienne, Institut Pasteur, 28 rue du Dr. Roux, 75724

Paris Cedex 15, FRANCE. (Fax) 40.56.01.25, (E-mail) CPWolk@Pasteur.Fr

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****** PORIN ISOLATED FROM CYANO OUTER MEMBRANE ******

ALFRED HANSEL and others in Uwe Jï¿½rgens' lab have isolated and characterized a pore-forming protein (a porin) from the outer membrane of Synechococcus PCC 6301. The protein was purified under native conditions (using LDAO as detergent and anion exchange chromatography) the protein and migrated on SDS-PAGE at about 52 kD. Single channel conductance of 5.5 nS was observed when the protein was incorporated into black lipid bilayer. The protein is blocked at its N-terminus and has Phe-Thr-Phe at its C-terminus. Analysis of its amino acids showed that the protein is rather hydrophilic, which is atypical for membrane proteins, but typical for porins. The work will appear soon in Archives of Microbiology. Alfred is currently trying to clone the gene encoding the pore-forming protein in order to get information about the structure and regulation of porins in cyanobacteria.

Alfred Hansel, Institut fï¿½r Biologie II/Mikrobiologie, Universitï¿½t Frieburg, Schï¿½nzlestraï¿½e 1, D-79104 Freiburg GERMANY.
(Tel) 0761-2034542, (E-mail) Hansel@Sun1.Ruf.Uni-Freiburg.De

****** ZONES OF NITROGENASE EXPRESSION IN TRICHOMES OF TRICHODESMIUM ******

At one time, heterocystous cyanobacteria were thought to be the only cyanobacterial species capable of nitrogen fixation. In the past twenty-five years, however, several strains, both unicellular and filamentous, have been characterized that fix nitrogen without benefit of heterocysts. The question

of how these strains protect nitrogenase against inactivation by oxygen has been intensely studied [Fay P (1992) Microbiol Rev 56:340-373]. Many strains temporally separate the processes of nitrogen fixation and oxygenic photosynthesis. In one such filamentous strain, Oscillatoria limosa, nitrogenase appears to be distributed to all cells in the filament [Stal L & Bergman B (1990) Planta 182:287-291]. Nitrogenase is similarly distributed in Plectonema boryanum [Smoker J & Barnum SR (1990) 1st Eur Workshop Mol Biol Cyanobacteria], a strain that fixes nitrogen only under conditions of very low levels of ambient oxygen.

Nitrogen-fixing Trichodesmium, a group of marine planktonic cyanobacteria, is exceptional in a number of respects. Its filaments, though lacking heterocysts, can maintain nitrogen fixation against saturating levels of O2 in seawater. Photosynthetically-produced oxygen is not avoided by temporal separation, since nitrogen fixation is suppressed by darkness or DCMU [Ohki K & Fujita Y (1988) Mar Biol 98:111-114]. Spatial separation of photosynthesis and nitrogen fixation in Trichodesmium was suggested twenty years ago by Carpenter and Price [(1976) Science 191:1278-1280], based on their observation that trichomes passing through the middle of a colony possessed a central zone of lightly pigmented cells that do not incorporate 14CO2. More recent attempts to localize nitrogenase by immunogold staining reported nitrogenase subunits in all cells of the filament [Paerl et al (1989) Appl Environ Microbiol 55:2965-2975; Ohki et al (1991) Proc 5th Symp Internat Prize Biol, eds. Mauchline J & Nemoto T, pp.205-216] or in a limited number of randomly distributed trichomes [Bergman B & Carpenter EJ (1991) J Phycol 27:158-165].

BIRGITTA BERGMAN and coworkers now focus the controversy with recent results from immunogold labeling of longitudinally sectioned trichomes of Trichodesmium contortum. Nitrogenase appeared to be limited to a zone of

consecutive cells central to the trichome. These cells, constituting about 10 to 15% of the total number within the trichome, are about half as long as those cells outside the zone. Although cells with nitrogenase appear paler by light microscopy, they contain immunologically reactive phycorerythrin in the same quantities as do cells outside of the zone. Their previous results [Bergman & Carpenter, op cit.] are not necessarily in conflict since the strain used in that study, T. thiebautii, has trichomes so twisted that it was not possible to cross-section more than a few cells in a row. Interestingly, the nitrogenase-containing cells of T. thiebautii contain a considerably higher than normal level of cytochrome oxidase [Bergman et al. (1993) Appl Environ Microbiol 59:3239-3244].

Does Trichodesmium possess a differentiated cell type similar in function to heterocysts but without the heterocyst's specialized cell envelope? Do different species of Trichodesmium possess different strategies of protecting nitrogenase from oxygen? Do zones of nitrogenase-laden cells appear in Trichodesmium in an analogous fashion as strings of proheterocysts in certain strains of Anabaena [Wilcox et al (1973) J Cell Sci 12:707-725]? Clearly there is no lack of interesting questions to answer!

Birgitta Bergman, Department of Botany, Stockholm University, S-106, Stockholm SWEDEN. (Tel) 46-8-16 37 51, (Fax) 46-8-16 55 25, (E-mail) Botanik@Botan.Su.Se

****** HIGH COPY SHUTTLE VECTOR FOR ANABAENA ******

Those of us who play with genes in E. coli would find it difficult to imagine life without high-copy-number plasmids such as pBR322, pUC18, and derivatives. Those of us who study Anabaena PCC 7120, however, have endured such a life working with our organism, having at our disposal only shuttle vectors (e.g., those based on the cyanobacterial plasmid pDU1) that replicate

in low copy in Anabaena. JIM GOLDEN tells us our suffering is over. His laboratory wanted a high-copy-number shuttle vector to facilitate isolation of shuttle vector plasmid DNA from Anabaena and to permit certain types of genetic manipulations, such as the titration of regulatory factors. Accordingly, they have isolated and sequenced a mutant pDU1 origin of replication that replicates at a higher copy number in Anabanea.

A high-copy-number mutation was obtained in the shuttle vector pCCB110 [Buikema WJ & Haselkorn R (1991). Genes Dev 5:321-330] by selection on neomycin at 100 ug/ml. Colonies containing high-copy-number plasmids were identified by a high yield of plasmid from heat lysis minipreps. The high-copy-number ori was trimmed down to a minimum size that still provided strong selection and stable maintenance in PCC 7120, and the resulting 3761-bp fragment was sequenced (GenBank accession L23221). The sequenced region is available as a SmaI fragment in pUC1819H3 (resulting in pAM1230) or pBluescript (resulting in pAM1231).

The original high-copy-number shuttle vector, pAM832, was trimmed down to produce pAM1011 and finally pAM1280. pAM1280 was modified to contain different multiple cloning sites (MCS) and the lacZ' gene fragment. The resulting plasmids, pAM1278 and pAM1279 (lacZ' MCS from pUC18 in both orientations) and pAM1281 and pAM1282 (lacZ' MCS from pBluescript II SK+ in both orientations), provide blue/white screening for inserts, and they have been tested for efficient transformation of E. coli and conjugation into Anabaena PCC 7120. The plasmids have not been fully characterized nor actually used yet for cloning experiments, but in test conjugations exconjugants could be easily selected for on plates containing neomycin at 50 ug/ml, which is double the concentration Jim's lab uses for other pDU1-based shuttle vectors.

Jim Golden, Department of Biology, Texas A&M University, College Station

TX 77843-3258 U.S.A. (Tel) 409-845-9823, (Fax) 409-845-2891,

(E-mail) JGolden@Bio.Tamu.Edu

****** COMPUTER MODELS ENERGY TRANSFER IN C-PHYCOCYANIN COMPLEXES ******

ANDREY DEMIDOV along with Alexander Borisov report on computer simulations they have performed to assess the ability of different classes of models to reproduce the observed characteristics of energy transfer in C-phycocyanin (C-PC) complexes. They used two computational methods to simulate energy migration in C-PC fragments [Biophys J (1993) 64:1375-1384]. The first relied on a system of three differential equations, each describing the flow of energy amongst chromophores of the three types: alpha-84, beta-84, or beta-155. The second method relied on a Monte Carlo approach to simulate random walks of excitons between the chromophores. These approaches, using structural data from C-PC of Agmenellum quadruplicatum, enabled them to predict rates and channels of energy migration in the case of various C-PC aggregates and to evaluate the sensitivity of migration rates to the screw angle between adjoining trimers. By considering chromophores in random orientations or in the actual orientations found in C-PC, they were able to demonstrate that the actual orientations are nearly optimal for energy migration.

They used similar methods to determine the statistic of exciton jumps, finding that jump statistics can be described by the function:

$$F = C\,(t/)\,\exp(-t/)$$

where C is a constant and t and are, respectively, the exciton localization (jump) time and its averaged value for the three chromophore types. Values of were calculated for various aggregates [Biofizika (1993)

38:133-143].

They are now working on a new theory of calculation of fluorescence polarization degree and absorption anisotropy of molecular complexes with energy transfer. At present, they have examined C-PC beta-subunits and monomers and have derived generally useful formulae that can be used practically to calculate polarization data at steady-state and delta-pulse excitations in the cases of double- and triple-chromophore complexes. The theory considers light absorption and fluorescence by chromophores, energy transfer between them, and their mutual orientations. Chromophores within individual complexes are presumed to be rigidly positioned, and complexes are randomly distributed and oriented in space, with no energy transfer amongst them. The formulae take into account the angles between chromophore transition dipole moments in the individual molecular complex and contain parameters dependent upon chromophore spectroscopic features and rates of energy transfer.

Andrey, a physicist, is eager to receive any advice and help that you may care to proffer. He is particularly interested in raw material from C-PC aggregates of A. quadruplicatum and Mastigocladus laminosus to feed his model. He seeks, specifically: (a) fluorescence and absorption spectra, (b) emission and excitation spectra of polarized fluorescence, (c) absorption anisotropy spectra, (d) fluorescence depolarization and absorption anisotropy kinetics excited by picosecond pulses, and (e) chromophore fluorescence quantum yields.

Andrey Demidov, Physics Department, Moscow State University, 119899
Moscow, RUSSIA. (E-mail) Demidov@Demidov.Phys.Msu.Su

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REFERENCES*REFERENCES*REFERENCES*REFERENCES*REFERENCES*REFERENCES*REFERENCE

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****** TOXINS and NATURAL SUBSTANCES ******

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