

mers of dimers were unstable until insertion of the fifth member which effectively locked the structure in the stable cyclic decamer form.

Subunit structure is the basis of one class of isozymes (enzymes of similar function but different composition). C. R. Shaw demonstrated how genetic analysis could be used to predict and verify the subunit composition of isozymes. A single mutation, for example, increases the number of isozymes of lactic dehydrogenase to 15. Lactic dehydrogenase normally exists in five forms composed of all possible tetrameric combinations of two different subunits. N. O. Kaplan proposed that the subunit composition of lactic dehydrogenase was related to cellular requirements for aerobic or anerobic metabolism. He has found that the forms of the isozymes composed of identical chains are differently adapted to these two functions.

From the reports of C. Frieden, J. C. Gerhart, and J.-P. Changeux, the subunit structure of enzymes appears to be intimately related to the control of their activity in cellular metabolism. Gerhart has succeeded in dissociating into subunits an enzyme, aspartate transcarbamylase, which is subject to feed-back inhibition.

He is now analyzing the properties of the subunits with regard to binding of substrate and inhibitor. Such allosteric effects in general, in which a metabolite is specifically bound and enhances or impedes the activity of an enzyme, appear to involve, in all cases, a protein composed of subunits. Changeux put forward a theory for this phenomenon based on a shifting of the equilibrium between loose and compact states of the protein by the metabolite exerting the allosteric effect. One of the states could bind substrate less readily so that, depending on the shift in equilibrium, activation or inhibition would result.

One class of proteins of which the function of their subunit structure is readily apparent is antibodies. A dimeric structure composed of identical subunits would provide the specific bivalency needed for precipitate formation. In a review of antibody structure, A. Nisonoff presented evidence for an ABBA configuration reminiscent of that found for hemoglobin. From his own work it is clear that a single binding site is present on each AB subunit of a specific antibody. He was able to form only univalent antibody by reassociating such fragments with

AB fragments of normal gamma globulin.

A panel discussion, chaired by R. D. Hotchkiss, provided an opportunity for speculation about the significance of subunit structure. Clearly, the occurrence of allelic complementation in diploid organisms would allow an increased variability and plasticity of the genetic makeup. Similarly, the quaternary structure of proteins offers a new dimension for the control of cellular processes.

The proceedings of the conference will be published as volume 17 of the *Brookhaven Symposia in Biology*.

S. LACKS

Brookhaven National Laboratory,
Upton, New York

Forthcoming Events

October

29-31. Society for the Scientific Study of Religion, Washington, D.C. (S. Z. Klausner, SSSR, 1424 16th St., NW, Washington, D.C.)

30-31. Nuclear Medicine Clinical Applications, symp., Shaker Heights, Ohio. (Cleveland Nuclear Medicine Symp., P.O. Box 7084, Cleveland, Ohio 44128)

30-1. Meteoritical Soc., 27th meeting,

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Arizona State Univ., Tempe. (C. B. Moore, Dept. of Geochemistry, Arizona State Univ., Tempe)

November

1-7. **Plant Scientists** of Latin America, 6th meeting, Lima, Peru. (M. Paulette, Universidad Agraria, Apartado 456, Lima)

2-4. **Society of Engineering Science**, 2nd technical meeting, Michigan State Univ., East Lansing. (A. C. Eringen, School of Aeronautical and Engineering Sciences, Purdue Univ., West Lafayette, Ind. 47907)

2-6. **United Nations, Drug Supervisory Body**, 62nd session, Geneva, Switzerland. (UN, Palais des Nations, Geneva)

2-9. **Natural Gas in Production of Petrochemicals**, seminar, Teheran. (U.N. Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Av., Bangkok, Thailand)

3-5. **Liquification in Mine Chambers**, conf., Ostrava, Czechoslovakia. (Mrs. E. Vergeinerova, Czechoslovak Scientific and Technical Soc., Siroka 5, Prague 1)

4-6. **Diffraction**, 22nd Pittsburgh conf., Pittsburgh, Pa. (W. M. Biagas, Pittsburgh Diffraction Conf., Crucible Steel Co., P.O. Box 7257, Pittsburgh 15213)

4-6. **Design of Experiments**, 10th conf., (by invitation only), Washington, D.C. (F. G. Dressel, Army Research Office-Durham, Box CM, Duke Station, Durham, N.C.)

4-6. **Northeast Electronics Research and Engineering** meeting (NEREM), Boston, Mass. (J. E. Storer, Inst. of Electrical

and Electronics Engineers, 313 Washington St., Newton 58, Mass.)

4-6. **Manned Space Flight**, 3rd, American Inst. of Aeronautics and Astronautics, NASA Manned Spacecraft Center, Houston, Tex. (AIAA, 141 E. 44 St., New York 17)

4-7. **American Physical Soc., Plasma Physics Div.**, New York, N.Y. (S. J. Buchsbaum, Bell Telephone Laboratories, Murray Hill, N.J.)

4-7. **American Soc. of Tropical Medicine and Hygiene**, New York, N.Y. (G. M. Jeffrey, Box 295, Kensington, Md.)

4-7. **French Soc. of Orthopedics and Traumatology**, 39th congr., Paris. (Secretariat, Pavillon Ollier, Hôpital Cochin, 27, rue du Faubourg Saint-Jacques, Paris 14^e)

5-6. **U.S. Army Materiel Command, Inst. of Environmental Sciences**, joint meeting, Aberdeen Proving Ground, Md. (A. Armstrong, 104 Bliss Lane, Glen Burnie, Md.)

5-7. **Nutrition Hygiene Conf.**, Brno, Czechoslovakia. (K. Halacka, Hygiene Section, Czechoslovak Medical Soc., Sokolska 31, Prague 2)

6-7. **Biochemistry**, 7th annual West Central States conf., State Univ. of Iowa, Iowa City. (G. F. Lata, Dept. of Biochemistry, State Univ. of Iowa, Iowa City)

6-7. **Experimental Methodology and Applied Immunology in Allergy Research**, symp., Erfurt, East Germany. (H. D. Faulhaber, Gesellschaft für Experimentelle Medizin der D.D.R., Littenstr. 78, Berlin C.2, East Germany)

6-7. **Central Soc. for Clinical Research**,

Chicago, Ill. (J. F. Hammarsten, Ancker Hospital, St. Paul 1, Minn.)

7. **International Acad. of Oral Pathology**, 2nd conf., San Francisco, Calif. (J. L. Bernier, Dental School, Georgetown Univ., Washington, D.C. 20007)

7-14. **International Dental Federation**, 52nd meeting, San Francisco, Calif. (G. H. Leatherman, 35 Devonshire Pl., London, W.1)

8-14. **Switching Circuit Theory and Logical Design**, 5th annual symp., Princeton Univ., Princeton, N.J. (T. H. Crowley, Bell Telephone Laboratories, Murray Hill, N.J.)

9-11. **Flexural Mechanics of Reinforced Concrete**, intern. symp., Miami, Fla. (H. A. Sawyer, Dept. of Civil Engineering, Univ. of Florida, Gainesville)

9-12. **American Dental Assoc.**, San Francisco, Calif. (H. Hillenbrand, 222 E. Superior St., Chicago, Ill.)

9-13. **Institute of Neurosurgery**, 25th anniversary, Santiago, Chile. (C. Villavicencio, Casilla 70-D, Santiago)

9-13. **Mathematical Education**, seminar Dalat, South Vietnam. (Assoc. of Southeast Asian Insts. of Higher Learning, Rattasatra Bldg., Chulalongkorn Univ., Race Course Rd., Bangkok, Thailand)

10. **American College of Dentists**, San Francisco, Calif. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo.)

10-11. **Quality Control**, seminar, Cleveland, Ohio. (R. C. Schultz, American Soc. of Tool and Manufacturing Engineers, 10700 Puritan Ave., Detroit 38, Mich.)

11-12. **Use of Plastics in Machine Construction**, conf., Hungary. (Hungarian Soc.

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11-13. Eastern Analytical symp., New York, N.Y. (M. Margoshes, Room 3, Chemistry Bldg., Natl. Bureau of Standards, Washington, D.C. 20234)

11-13. American Soc. for Cell Biology, Cleveland, Ohio. (D. E. Green, Inst. for Enzyme Research, 1710 University Ave., Madison 6, Wis.)

11-13. American Concrete Inst., fall meeting, Miami, Fla. (W. T. Eefting, 3332 Pan American Dr., Miami)

11-14. American Acad. of Neurological Surgery, Miami, Fla. (E. W. Davis, 806 S.W. Broadway, Portland, Ore.)

11-14. Models for the Perception of Speech and Visual Forms, symp., Boston, Mass. (Symp. Committee, Data Sciences Laboratory, Air Force Cambridge Research Laboratory, Bedford, Mass. 01731)

12-13. American Soc. of Cytology, 12th annual, Pittsburgh, Pa. (W. R. Lang, 1012 Walnut St., Philadelphia, Pa. 19107)

12-13. Nerve as a Tissue, conf., Lankenau Hospital, Philadelphia, Pa. (K. Rodahl, Lankenau Hospital, Philadelphia 51)

12-13. Netherlands Nuclear Forum, intern. congr., Amsterdam. (Nederlands Atoomforum, Scheveningseweg 112, The Hague, Netherlands)

12-14. Paleomagnetism, 2nd U.S.-Japan seminar, U.S.-Japan Cooperative Science Program, Univ. of California, Berkeley. (J. Verhoogen, Dept. of Geology and Geophysics, Univ. of California, Berkeley 4)

13-15. Association of Clinical Scientists, 26th meeting, Washington, D.C. (F. W.

Sunderman, Jr., Univ. of Florida, College of Medicine, Gainesville 32603)

14-19. American Acad. of Ophthalmology and Otolaryngology, Chicago, Ill. (W. L. Benedict, 15 Second St., SW, Rochester, Minn. 55901)

14-21. Pan American Medical Women's Alliance, 9th congr., Los Angeles, Calif. (E. M. Hohl, 1234 N. Vermont Ave., Hollywood, Calif.)

15-17. Water in the Arid Zones of the Old World, symp., Halle an der Saale, East Germany. (Deutsche Akademie der Naturforscher Leopoldina, August-Bebel Str. 50 a, Halle an der Saale)

15-19. American Soc. of Agronomy, Crop Science Soc. of America, Soil Science Soc. of America, annual, Kansas City, Mo. (L. A. Richards, American Soc. of Agronomy, 677 S. Segoe Rd., Madison 11, Wis.)

15-19. Society of Exploration Geophysicists, Los Angeles, Calif. (C. G. Ferris, E. V. McCollum & Co., 515 Thompson Bldg., Tulsa, Okla.)

16-17. Basic Sciences, 3rd annual conf., New York, N.Y. (A. Gelbart, Yeshiva Univ., Amsterdam Ave. and 186th St., New York)

16-19. Gulf and Caribbean Fisheries Inst., conf., Ocho Rios, Jamaica. (Executive Secretary, Gulf and Caribbean Fisheries Inst., 1 Rickenbacker Causeway, Miami, Fla. 33149)

16-19. Magnetism and Magnetic Materials, Minneapolis, Minn. (J. B. Goodenough, Lincoln Laboratory C182, Lexington, Mass. 02173)

16-20. Interagency Chemical Rocket

Propulsion Group, Mechanical Behavior Working Group, 3rd annual, Redstone Arsenal, Ala. (T. H. Duerr, AMSMI-RKP, Redstone Arsenal, Ala. 35809)

16-20. Soil Science Soc. of America, annual, Kansas City, Mo. (W. E. Jeske, 7515 N.E. Ankeny Rd., Ankeny, Iowa)

17-18. Allied Air Force Medical Conf., 10th annual, Fontainebleau, France. (Officier Administratif, Division Médicale d'Aircent, Camp Guynemer, Fontainebleau)

18-20. Northeastern States Navy Research and Development Clinic, Philadelphia, Pa. (N. R. Droulard, Franklin Inst. Laboratories, 20th and Parkway, Philadelphia, Pa. 19103)

18-21. Neurological Surgeons, Bal Harbour, Fla. (J. R. Russell, 1815 N. Capitol Ave., Indianapolis, Ind. 46202)

19-21. Geological Soc. of America, Miami Beach, Fla. (J. W. Peoples, 10 Wesleyan Place, Middletown, Conn.)

19-21. Paleontological Soc., Miami Beach, Fla. (R. L. Langenheim, Jr., Dept. of Geology, Univ. of Illinois, Urbana)

19-21. National Council of Teachers of Mathematics, Atlanta, Ga. (J. D. Gates, 1201 16th St., NW, Washington, D.C.)

19-22. American Anthropological Assoc., 63rd annual, Detroit, Mich. (E. R. Service, Dept. of Anthropology, Univ. of Michigan, Ann Arbor)

21-22. American Geological Inst., Miami Beach, Fla. (L. Hoover, 1444 N St., NW, Washington, D.C. 20005)

21-24. American Speech and Hearing Assoc., San Francisco, Calif. (K. O. Johnson, 1001 Connecticut Ave., NW, Washington, D.C.)

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