greater or lesser degree, in that the physiological role of the gene or protein is not identified.

The study of cell differentiation has long been the anarchic field par excellence. Perhaps now we are coming out of the era of technique-oriented research on cell problems, in which newly popular techniques have been applied to every available system with little regard to whether they provide significant insight. It appears that many members of the La Jolla group have set their sights on the large biological problems, toward whose solution any relevant technique can be brought to bear.

The meeting was organized by S. Brody and W. F. Loomis, Jr., and was supported by a grant from the National Science Foundation to the University of California, San Diego.

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Bryozoology II

The second international conference on bryozoology was held in Durham, England, from 6 to 16 September 1971. It was attended by 68 scientists from 14 countries, about a third of the membership of the International Bryozoology Association (IBA). The IBA includes those chiefly concerned with any aspect of the biology and paleobiology of the approximately 3,500 extant and 15,000 extinct species of bryozoa (ectoprocts and endoprocts). The conference had as its dominant theme the necessity of first understanding the life processes of living forms before trying to unravel the significance of fossil forms.

The old question of why does species A live in place X rather than in place Y is still being asked, but with a new frame of reference. Although much of the evidence remains anecdotal, some facts useful for a deductive theory are beginning to emerge. The rate of budding of new individuals appears to differ widely from one species to the next. New discoveries of larvae that initially become three to nine individuals—rather than the single individual commonly assumed—show that certain species obtain a flying start on preempting space on which to grow (F. J. S. Maturo, University of Florida; P. L. Cook, British Museum; G. Eitan, Hebrew University). In some forms, the capacity for retaining space is aug-

mented by extensive budding on the frontal surface, the occurrence of which in several species was emphasized for the first time (W. C. Banta, American University; D. Soule, University of Southern California). Other species appear capable of breeding after only a few zooids form. Thus even within as "uniform" a group as the ectoprocts, one can in all probability separate out species specialized for habitat utilization and those specialized for reproduction.

Other ecologists stressed the autecology of encrusting forms. Unlike other fouling organisms (for instance, barnacles and polychaets), encrusting ectoprocts do not space themselves out during settlement, although they do show gregariousness (J. S. Ryland and P. J. Hayward, University of Swansea). Colonies of the same species never overgrow each other but may in fact merge to form a single large colony (A. R. D. Stebbing, Plymouth). Colonies of different genotypes within a species fuse; in contrast, colonies of different species overgrow each other. Perhaps ectoprocts would be excellent material for studying immunological responses in natural populations. With regard to predation on ectoprocts, the stalking and lunging behavior of feeding pycnogonids was described in detail for the first time (P. E. King and D. Wyer, University of Swansea). The rare association of ectoprocts growing on sea snakes was discussed in the light of the proposed sea-level canal in Central America (R. J. Cuffey, Pennsylvania State University).

Studies on the growth and formation of colonies elicited the most interest and argument at Durham. The address by O. M. B. Bullman on growth in graptolites illustrated the several points of comparison that apparently are typical of growth in many colonial animals. The skeletons of many ectoprocts also appear to form in the same general manner as do the brachiopods, even to the point of equivalent structures for attachment of the walls of the coelom (A. Williams and R. Tavener-Smith, University of Belfast). Accordingly, the simplification and unification of terminology (periostracum; primary, secondary, and tertiary calcified layers; and so forth) was considered.

Since skeletal wall (or shell) structure is regarded as a key complex of taxonomic characters for cheilostomes, an understanding of the many modes of skeletal wall formation is obviously necessary. With the use of the scanning electron microscope, several new basic

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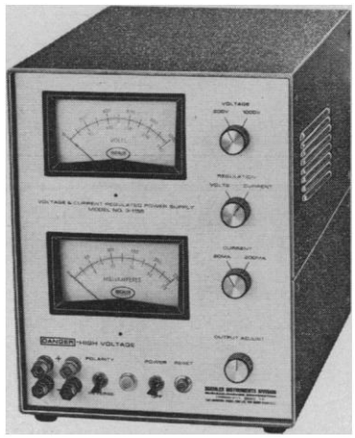
patterns of ultrastructure have been discovered (P. A. Sandberg, University of Illinois). This evidence, together with detailed histological studies of the relation of mineralized to unmineralized tissue, yielded several models of skeletal growth (W. Banta; R. Tavener-Smith; E. Håkensson, University of Copenhagen).

For tubular ectoprocts, the emphasis is on describing the basic morphological features of the skeletons and deducing the mode of growth in both living and fossil species. Analysis of the remains of organic material discovered in colonies of several Paleozoic ages permitted the further interpretation necessary for growth models (R. S. Boardman, Smithsonian Institution). These reports reaffirmed that the conceptual basis for understanding the growth of tubular ectoprocts resides in the studies of F. Borg, published chiefly in the first third of this century.

The teratological yet widespread occurrence of two polypides in various degrees of fusion and functional integrity living together in the same skeletal chamber was discussed (S. Oda and R. Mano-Nakamura, St. Paul's University, Tokyo, for freshwater species; D. Jebram, Zoological Institute, Kiel, for several cheilostome species).

A surprise of the Durham conference was the increased research on other aspects of the biology of bryozoans. The routine outbreeding of ectoproct species was indicated by the Hardy-Weinberg distribution of gene frequencies; genotypes were recognized from enzyme variants, which were determined by electrophoresis (T. J. M. Schopf, University of Chicago).

Modern methods of histology and determination of ultrastructure were applied to the nervous network of colonies, to tentacles, to brown bodies (degenerated polypides), and to cells occupying the pores of the stalks of entoprocts. Expert silver staining revealed the continuation of nervous strands into the bases of spines as well as through lateral communication pores (G. Lutaud, Faculté des Sciences, Paris). Tentacles were discovered to contain a supporting tube of collagen together with striated muscle and to have on the outside numerous microvilli with mucus (L. W. Smith, University of Swansea). Brown bodies were found to be characterized by large amounts of glycogen, which result from the degeneration of muscle and other tissue (D. P. Gordon, University of Dalhousie). "Chloride cells" for regulating ionic concentration in pores of the stalk



of entoprocts were described for the first time (P. Emschermann, Albert-Ludwigs University).

In perhaps the most compelling presentation, E. Voigt (Geologisches Staatsinstitut) illustrated an exquisite Upper Cretaceous fauna, which was preserved in burrows dug by decapods in the indurated sea bottom. In more than 40 years of collecting, which was twice begun because many collections were destroyed in World War II, nearly 300 species have been excavated; many retain the most delicate of spines and processes perfectly in place. An undoubted cheilostome that definitely dates from the Upper Jurassic period has been described, the oldest representative of this extremely abundant tertiary and recent group (R. Pohowsky, University of Cincinnati); its complexity suggests that an intensive search for yet older Jurassic forms will also be rewarding. An apparent gradual evolutionary change in successive forms was documented in the cheilostomes *Poricellaria* and *Vincularia* by isometric and allometric phylogenetic trends revealed by principal-components analysis (A. Cheetham, Smithsonian Institution).

Finally, a comprehensive study of the life cycles of numerous entoprocts and several ectoprocts led to the conclusion that these groups are closely related (in the same phylum) (C. Nielsen, Marin Biologish Laboratorium, Helsingør). Relevant to the question of the phylogenetic placement of ectoprocts is the nature of the coelom. Surprisingly, the method of coelom formation in the widespread cheilostome species *Bugula neritina* was described as unique in the animal kingdom (R. L. Zimmer, University of Southern California). A new classification of higher taxa of entoproct and ectoproct bryozoans was proposed, and was based upon a numerical analysis of the major characters of these groups as presently known (R. J. Cuffey).

The conference facilities were provided by the University of Durham, and the conference was arranged by G. Larwood. F. J. S. Maturo was elected association president, succeeding N. Spjeldnaes; P. L. Cook was reelected secretary and will answer inquiries about the IBA. The proceedings of the conference will be edited by Larwood and published by Academic Press.

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Forthcoming Events

May

23–26. **Contemporary Views of Learning and Conditioning**, Raleigh, N.C. (D. B. Lumsden, Box 5096, Raleigh 27607)

25–26. **Storage Polyglucosides**, New York Acad. of Sciences, New York, N.Y. (J. F. Frederick, Research Labs., Dodge Chemical Co., Bronx, N.Y. 10469)

25–27. **Mechanisms and Regulation of Craniofacial Morphogenesis**, Nymegen, The Netherlands. (F. Van der Linden, Dept. of Orthodontics, Univ. of Nymegen, "Heyendael," Philips van Leydenlaan 25, Nymegen)

28–2. National Conf. on **Social Welfare**, 99th, Chicago, Ill. (J. R. Hoffer, 22 W. Gay St., Columbus, Ohio 43215)

28–3. International College of **Surgeons**, 18th intern. biennial congr., Rome, Italy. (P. Stefanini, 1516 Lake Shore Dr., Chicago, Ill. 60610)

29–31. American **Ophthalmological** Soc., 108th annual meeting, Hot Springs, Va. (S. D. McPherson, Jr., AOS, 1110 W. Main St., Durham, N.C. 27701)

30–2. International Federation of Associations of **Textile Chemists and Colorists**, 9th congr., Munich, Germany. (Secretariat, 9th FATCC Congr., Rohrbacker Str. 76, D-6900 Heidelberg-1, Germany)

30–4. **Space Simulation**, Inst. of Environmental Sciences, New York, N.Y. (IES, 940 E. Northwest Highway, Mount Prospect, Ill. 60056)

31–2. **Endotoxin** Conf., Warrenton, Va. (EC, Channing Lab., Boston City Hospital, Boston, Mass. 02118)

31–2. American Inst. of **Industrial Engineers**, Anaheim, Calif. (J. F. Jericho, AIIE, 345 E. 47 St., New York 10017)

June

1–2. **Environmental and Water Resources Engineering** Conf., Nashville, Tenn. (E. L. Thackston, Dept. of Environmental and Water Resource Engineering, Vanderbilt Univ., Nashville 37203)

1–2. **Laboratory Animal Considerations in Toxicology and Related Disciplines**, East Brunswick, N.J. (W. H. Mitchell, P.O. Box 130, New Britain, Pa. 18901)

1–3. **Cancer Chemotherapy**, natl. conf., American Cancer Soc. and Natl. Cancer Inst., New York, N.Y. (S. L. Arje, ACS, 219 E. 42 St., New York 10017)

4–8. **Special Libraries** Assoc., Boston, Mass. (F. E. McKenna, SLA, 235 Park Ave. S., New York 10003)

4–8. **Tissue Culture** Assoc., Los Angeles, Calif. (R. H. Kahn, Dept. of Anatomy, Univ. of Michigan, Ann Arbor 48104)

4–9. **Mass Spectroscopy and Allied Topics**, American Soc. for Mass Spectrometry, Dallas, Tex. (F. E. Saalfeld, Naval Research Laboratory, Code 6110, Washington, D.C. 20390)

5–7. Natural **Gas Research and Technology**, 2nd conf., American Gas Assoc., Atlanta, Ga. (L. A. Sarkes, AGA, 1515 Wilson Blvd., Arlington, Va. 22209)

5–7. **Intestinal Microflora**, 2nd intern. symp., Columbia, Mo. (Conference Section, Continuing Medical Education, M-175 Medical Center, Columbia 65201)