(A. Cheetham, U.S. National Museum). This group is perhaps the most conspicuous and abundant of the lineages which developed asymmetrical, polymorphic zoids. The gradual increase in asymmetry forced changes in the arrangement and number of avicularia, position and type of brood chamber, and pattern of budding. Only a dynamic approach toward comparative morphology could have shown the way in which different character states were interrelated.

The understanding of the evolution and taxonomic diversity of the class Phylactolaemata, all of whose 12 genera are freshwater, seems to have reached a plateau. Much current work seems directed toward distinguishing true species from ecological varieties of a single species (J. Bushnell, University of Colorado) and toward understanding the evolutionary development and taxonomic importance of different types of statoblasts (F. Wiebach, Plön).

Category (ii). The first fossil finds were reported of five genera whose Recent (and fossil) representatives are exceedingly delicate (R. Lagaaij, Royal Dutch Shell). Genera that many zoologists would consider a priori too fragile can and do persist. Moreover, in all cases where the Recent representatives have a circumtropical distribution, the fossil specimens (from the Miocene and earlier) also had a circumtropical distribution. This was suggested to have been due to the connections between the Atlantic and Pacific oceans and the Mediterranean with the Indian Ocean during the Miocene. It is unnecessary to postulate widespread distribution by ships in explanation of the present distribution of these and probably other genera as is commonly done.

The tropical biogeographic zone, which is narrow on the east side of the Atlantic, broadens on the west and was considered to extend as far north as Cape Hatteras on the American coast (F. Maturo, University of Florida). Moreover, about 20 percent of the 246 species found between Florida and the Hudson Canyon were undescribed, indicating that significant new discoveries in continental shelf bryozoan faunas are still being made. Most high arctic species were interrupted in an otherwise circum-Arctic distribution by the Chukchi and Bering seas, for reasons not understood (N. Powell, National Museum of Canada). Probably enough data exist at the present time for someone to attempt a world view of continental shelf biogeographic provinces based on bryozoans, but such has not yet been done.

In deeper water, from 200 to 6000 m, the number of species per station decreases from a maximum of about 60 on the upper continental slope to about 10 by 1000 m and 5 by 2000 m and deeper (T. Schopf, Lehigh University). Bryozoa occur in about 25 percent of available collections, independent of depth and location, from the fine, deep-sea sediments. Bryozoa seem to be a consistent element of the deep-sea fauna.

Category (iii). A few papers dealt with matters of concern to all those who study bryozoans. The terminology of the group has been recognized for many years to be "large and fantastic . . . much of it dating from a period when the structure of the animals was not understood" [L. H. Hyman, *Invertebrates* (McGraw-Hill, New York, 1959), vol. 5]. The need to master this complicated vocabulary, in order to make sense out of the literature, seems to have hindered work on Bryozoa. The use of terms that are both precise and easily comprehensible is a problem that must be resolved by every teacher and researcher. Recognizing the importance of this, a terminology committee was established under the chairmanship of J. S. Ryland (University of Wales) to consider the original intent, history, and current meaning of words commonly used to describe parts of bryozoans. Those with terminological problems in bryozoans are invited to call such matters to the attention of the committee.

Bryozoans have many morphological features that can be measured and evaluated statistically. The presentation of at least the mean, standard deviation, and number of measurements was strongly recommended (T. Perry and R. Anstey, University of Indiana) and was supported in several papers by other workers. A small but increasing body of data is accumulating on the degree of variation within and between colonies. Given enough time, one should be able to adequately characterize variability in bryozoans.

Finally, Wiebach, citing a letter from Ernst Marcus, continued the long tradition of placing both the Entoprocta and Ectoprocta in the same phylum (Bryozoa), but this view seemed definitely to be that of a very small minority.

If all areas in which current work is being carried out had been represented at Milan, some important areas of the biology and paleobiology would still have been omitted. In addition to the problems mentioned previously, no work presently in progress seems primarily concerned with embryology, interzoidal communications, the origin of higher categories, and several aspects of physiology, especially nitrogen excretion.

The conference facilities and other generous support were provided by the Italian Oil Compay, AGIP. The conference was arranged by Enrico Annoscia (AGIP, Milan) whose untiring efforts on behalf of all participants resulted in an excellent meeting. It was unanimously decided to dedicate the conference to the memory of Ernst Marcus, a student of Bryozoa for more than 40 years, who died 30 June 1968. N. Spjeldnaes (Bergen University) was elected Association president in succession to A. Cheetham; P. L. Cook [British Museum (Natural History), London] was reelected secretary. The proceedings will be edited by Annoscia and published in an early issue of *Atti della Societa Italiana di Scienze Naturali.*

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Fertility and Sterility

The many problems concerning reproduction in man were discussed at length at the sixth Fertility and Sterility World Congress (Tel-Aviv, Israel, 20 to 27 May 1968). About 400 papers were presented on topics including genetic and eugenic factors of human reproduction, immunological aspects of reproduction, neurogenic and encephalic factors in reproduction, effects of long-term use of antifertility agents on reproduction, paragenetic factors in fetal loss, seminal fluid and accessory glands, recent advances in sterility, and female genital tuberculosis.

The cervix in women acts as a sperm reservoir. It is possible that cervical mucus plays a major role in sperm capacitation. Pathological changes in the cervix may inhibit sperm capacitation and cause infertility. The proteinogram of the mucus is a useful diagnostic aid in cases of cervical pathology, such as ectopia-cervicitis-endocervicitis. Kremer and Van Bruggen described the purified mucoid and unpurified bovine cervical mucus as very long, filamentous structures, 20 to 80 Å thick, often randomly

aggregated into complicated networks. Cervical mucus contains an iron-binding protein "lactoferrin" which is present in many external secretions and seminal plasma, but absent in blood serum, concentrated follicular fluid, amniotic fluid, and the placenta. Lactoferrin seems to protect the mucosa against damage by heavy metals and bacterial infections and perhaps plays a role in sperm capacitation.

The diagnosis of zygosity of offspring is based on sex, structure of placental membranes, and the enzyme systems of the blood and placenta. A monochorial placenta may be considered certain proof of monozygosity. Of particular interest are the relatively great number of cardiac malformations and the hemodynamic aspects of different types of placental anastomosis.

The intrauterine device may cause distention of the uterine lumen and impair the tonicity of the myometrium; this interferes with implantation of the blastocyst. The incorporation of a progestin, melengestrol acetate, in silastic intrauterine devices causes prolonged retention of the devices in the uteri of rats and rabbits, which usually expel identical devices without added progestin. The development of a hormone-releasing device which acts mainly on the uterus, can be retained longer, and suppresses bleeding might broaden the usefulness of this contraceptive method in man.

The condom and the spermicidal vaginal contraceptive methods still used in several countries lessen sexual pleasure and may leak or rupture during intercourse. In Japan a soluble condom containing the spermicidal compound is kept in aluminum foil to prevent drying and is applied to the glans penis before intercourse.

An effort must be made to define the impact of contraceptives on general health and metabolic and endocrine functions. Current methods of data collection have failed to provide an adequate basis for statistical evaluation. Epidemiological surveillance is important, but to be valid the reporting of adverse reactions must be complete and unbiased. Collection and correlation of data is a task for national and international health agencies. Information on fertility and the health of children born to mothers previously treated with oral contraceptives should be collected systematically on an international scale.

Habitual abortion may be due to cervical incompetence, or an underdeveloped or overdeveloped uterus.

Patients treated during pregnancy with long-acting progestins show menstrual disorders which may vary from amenorrhea to menometrorrhagias after delivery. Aging of the ova, which results in embryonic death, may include chronologic aging of ovarian eggs, or intrafollicular or intraoviductal overripeness of eggs. Infants of young fathers suffer high stillbirth rates, but not high rates of childhood mortality.

Several methods are used to make pregnancy possible in cases of oviductal occlusions: implantation of the ovary into uterine cornua, formation of an oviduct from neighboring tissues, implantation of an intact oviduct from another woman, transfer of fertilized ova into the uterine lumen, and insertion of an artificial oviduct.

Several chemical criteria are used to evaluate the condition of human semen: sperm nucleic acid is related to male fertility; acid and alkaline phosphatases are related to prostatic function; fructose is related to the function of the seminal vesicles; and the electrophoretic pattern of normal and pathological seminal proteins is diagnostic. There are other analytical methods for diagnosing ejaculatory disturbances and certain anatomical defects such as absence of vasa deferentia or occlusion of ejaculatory ducts.

Congenital malformations account for a high percentage of child morbidity and mortality. Repair of congenital malformations is spectacular, desirable, and necessary. Planned prevention of malformations is still in its beginning stages, and eugenic prophylactic measures are very limited. Many apparently viable and normal embryos and fetuses die because of adverse maternal or environmental factors and are eliminated by spontaneous abortion. Certain malformations of the cardiovascular system are incompatible with prenatal life, but are well tolerated in postnatal life. On the other hand, many malformations of the brain, eye, and extremities are well tolerated in prenatal life, but become pathogenic after birth. Metabolic disturbances like phenylketonuria and galactosemia are tolerated *in utero*, but become disastrous after birth.

The amniotic fluid is obtained (amniocentesis) for antenatal diagnosis of fetal disorders, such as *Rh* incompatibility. After delivery of congenitally malformed babies, further pregnancies can be examined by amniocentesis and chromosomal analysis of fetal cells. Amniocentesis may play an important role in genetic counseling.

Recent advances in genetics and developmental biology make it possible to influence specific characteristics of the offspring: control of sex, mastery of genetic disease, propagation of specific genotypes, or establishing the biological basis for specialized skills. Knowledge of deoxyribonucleic acid biochemistry has been applied to specific developmental situations.

The diagnosis of fetal sex chromatin may be useful for antenatal care in cases of sex-linked hereditary disorders. Makamo and de Watteville examined the fetal membrane of 8184 infants to determine the nuclear sex. Sex chromosomal anomalies occurred in 0.13 percent of the cases. The incidence of XXY, XXX, and XO in newborns is estimated to be 1/750 in males, 1/1000 in females, and 1/3000 in females, respectively.

At the congress a new organization was formed, the International Federation on Fertility Associations, an outgrowth of the International Fertility Association. P. H. de Watteville (Switzerland) has been elected to head the new federation.

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Fermentation Industries: Promising Future Predicted

A promising future for the fermentation industries was forecast by C. G. Heden (Karolinska Institute, Stockholm) and A. F. Langlykke (Rutgers University) at the Third International Fermentation Symposium held at Rutgers University (2–6 September 1968). The meeting was sponsored by the Division of Microbial Chemistry and Technology of the American Chemical Society, and the Fermentation Industries Section of the Applied Chemistry Division of the International Union of Pure and Applied Chemistry (IUPAC).

The theme of the Symposium "Fermentation Advances in the Light of Recent Theoretical Progress in Microbiology, Biochemistry and Engineering" was examined. Two major benefits derived from this symposium by the 800 participants (representing 20 countries) were the opportunity to hear reports of recent advances in fermentation technology and to hear of prospects for the immediate future of the fermentation industries.

New fermentation products and processes which might reach commercial-scale production in the near future were discussed. These included Monensin, an antibiotic with coccidiostatic properties, which is comparable in potency and has lower toxicity than many of the synthetic organic chemicals now used for this purpose; glucose isomerase, a streptomycete enzyme converting glucose to fructose, which is now used to prepare syrups for the confectionary trade; a new rennin-like enzyme from a fungal source found acceptable to replace the calf-stomach-derived enzyme used in cheese making and now in short supply; a new process for obtaining erythorbic acid (iso-ascorbic) by direct mold fermentation of glucose; a microbial conversion of pentaerythritol to tris (hydroxymethyl) acetic acid; a tartaric acid producing fermentation of glucose; and two new microbial products with insecticidal properties.

The microbial conversion of hydrocarbons to edible, useful protein was discussed in more than a dozen papers with emphasis on technology required for economic production of the microbial cells. The biological value of proteins and the varieties of useful hydrocarbons (including methane) were also discussed in detail. With the world sugar shortage on the horizon, *N*-paraffins were proposed as economically feasible substrates for fermentation processes producing the food supplements glutamic acid and ribonucleic acid.

Three discussion panels considered a diversity of problems which may affect the fermentation industries now and in the future. The possibilities of using enzymes to carry out useful transformations of steroids, antibiotics, and terpenes, as well as the utility of enzymes attached to fixed supports, attracted much attention. The panel discussion on patent protection of fermentation processes emphasized the differences in the various countries in the world and the limitations of preventing infringement. A group of tissue-culture experts presented information on tissue culture as a fermentation process for production of cells, enzymes, protein hormones, and steroid hormones.

The Fourth International Fermentation Symposium will be held in Tokyo, Japan, in 1972 under the sponsorship of the IUPAC and several Japanese fermentation societies. Information concerning this meeting may be obtained from Professor G. Terui, Osaka University, Osaka, Japan.

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