from Japan, 6 from Canada, 6 from England, and scientists from 17 other countries.

Several new antimicrobial agents were described at the meeting. Weinstein *et al.* (Schering Corporation) reported on gentamicin, a new antibiotic which contains deoxystreptamine, is very effective against cultures of *Pseudomonas* and *Proteus*, and is produced by a species of *Micromonospora*. Clinical reports showed the efficacy of gentamicin in urinary infections and in other areas where *Pseudomonas* and *Proteus* were the infectious organisms.

In discussing antibiotic MSD-235, Stapley *et al.* (Merck Sharp & Dohme Research Laboratories) described it as an antibiotic complex which inhibits Gram-negative organisms in vivo and in vitro. One member of the complex is a compound of small molecular weight (MSD-235S) and the other is a protein of large molecular weight (MSD-235L). MSD-235S is active in chemically defined media and inhibits biotin synthesis by Gram-negative organisms. MSD-235L forms biologically inactive complexes with biotin. A combination of the two compounds (MSD-235L given parenterally and MSD-235S given orally) controlled Gram-negative infections in mice.

J. T. Sheehan *et al.* (Squibb Institute) described doricin as a derivative of vernamycin B. The structures of vernamycins B_α, B_β, B_γ, and B_δ were announced by Ondetti and Bodanszky (Squibb Institute) who found them closely related to the previously described ostreogrycin, PA 114, mikamycin, staphylomycin, and streptogramin.

Three cytotoxic agents from streptomycetes noted as extremely active against tumors are BA-17039-A, -B, and BA-90912 (Rao *et al.*, John L. Smith Memorial Laboratory). These antibiotics inhibit growth of tumors in animals and in mammalian cells in tissue culture, and are quite toxic (LD_{50} of 0.5 mg/kg).

Additional discussions included descriptions of (i) antibiotic LL-AE705W, a neutral macrolide antibiotic effective, when it is given orally, in controlling infections associated with Gram-positive microorganisms (Lefemine *et al.*, Lederle Laboratories); (ii) antibiotic LL-AM684B, shown to be a microbiologically produced derivative of tylosin (Whaley *et al.*, Lederle Laboratories); (iii) anthracidins A and B, effective in vitro only against *Bacillus anthracis* (Yoshida and Katagiri, Shionogi and Co., Ltd., Osaka, Japan); (iv) septacidin, a cytotoxic agent yielding on hydrolysis adenine, a 7-carbon amino sugar, a C_{16} branched and straight chain fatty acid, and glycine (Dutcher *et al.*, Squibb Institute).

Clinical reports were presented on the effectiveness of a number of antibiotics, including gentamicin, lincomycin, aminosidin, cephalothin, nafcillin, methicillin, cloxacillin, ampicillin, and oxacillin. (The latter five are "new penicillins" prepared chemically from 6-aminopenicillanic acid and are "penicillinase-resistant.") Ampicillin was of special interest because it is one of the first penicillins having significant anti-Gram-negative potency.

A symposium convened by H. F. Dowling discussed side reactions attributed to antimicrobial agents and included the immunochemical basis for penicillin allergy (C. W. Parker), damage to the eighth cranial nerve due to antibiotic therapy (Martha D. Yow), blood dyscrasias due to antibiotics (C. M. Huguly), and procedures to be used in treating infections with nephrotoxic antibiotics (C. M. Kunin). Although all of these side effects were shown to be common, the value of the antibiotic therapy has been such that it has been necessary to use the antibiotic in spite of the dangers.

Other papers included discussions on the methods of identifying antibiotics by a variety of procedures. Of special interest was a discussion by J. N. Porter (Lederle Laboratories) in which he reported that streptomycetes producing more than 50 known antibiotics were isolated from a single soil sample from a grassy plot near his laboratory. S. A. Waksman (Rutgers University) discussed problems of antibiotic nomenclature and the conference went on record as requesting that the American Society for Microbiology form a group to consider this problem.

This conference, sponsored by the American Society for Microbiology, had a registered attendance of 825, a much larger group than that attending the 2nd interscience conference in Chicago in November 1962. Most of the papers presented at this year's conference will appear in *Antimicrobial Agents and Chemotherapy–1963*, which will be published by the American Society for Microbiology in April 1964. The book will be distributed to all registrants at the meeting and will be available from the Society headquarters in Ann Arbor, Michigan.

Plans for the 1964 interscience conference are already under way. The meeting will be held 26–28 October 1964 in the New Yorker Hotel, New York City. The program will include symposiums on antitumor antibiotics from microorganisms, synthetic antimicrobials, "new" penicillins, and antibiotics effective against infections associated with Gram-negative microorganisms.

D. PERLMAN
Squibb Institute,
New Brunswick, New Jersey

Vertebrate Hard Tissues

The nature of the diverse hard tissues that are unique to vertebrates was discussed at a special symposium of the Section of Vertebrate Morphology of the American Society of Zoologists, held on 28 December during the AAAS meeting. The origin of bone, the development and relations of dental tissues, the ultrastructure of bone, and its place in the homeostatic mechanism were four main topics of discussion. The papers emphasized the essential duality of vertebrate calcifications and their function both as structural materials and in the homeostatic mechanism.

Alfred S. Romer (Harvard) reevaluated our knowledge of the ossification patterns in the earliest vertebrates. The ostracoderms, known in detail from Stensiö's work on the *Cephalaspis* group, show a highly developed external and internal head skeleton. The ossification is interpreted as membrane and perichondral. Various lines show what is regarded as a progressive reduction of bone with increased specialization, a sequence also demonstrated for more advanced groups. Cartilage then has arisen as an embryonic adaptation, while bone is stated to have originated as an armor protecting against eurypterid predation and not as an anti-osmosis mechanism.

In response to Schaeffer's question, Romer agreed that the cartilaginous skeleton of sharks was probably inherited from their Placoderm ancestors after loss of dermal and perichondral bone.

In summarizing recent work on the evolution of dental tissues, Melvin L. Moss (Columbia) interpreted the formation of teeth, scales, and many com-

pound dermal structures as mesectoderm inductions, derived from a modification of a fundamental structure resembling the present toothbud. Enamel is thus considered a phylogenetically old material rather than a recent invention. Moss elaborated this hypothesis and commented on such implications as the essential homology of the keratinized beak of turtles to the external portions of teeth; both were derived by modifications of the enamel organ. Amino acid analysis was stated to have established the homology of mammalian enamel, shark (denticle) enamel, the elastoidin of dermal fin rays, and the ichthylepidin of teleost scales. All are ectodermal collagens.

The active discussion elicited the comment (by Moss) that conodont fossils should, on morphologic and crystallographic grounds, be considered of nonvertebrate origin.

Robert A. Robinson (Johns Hopkins) discussed the results of studies in the ultrastructure of hard tissues. He showed that the nature of the bone matrix exhibits recognizable quantitative but not qualitative differences between most forms (differing on the family level) yet checked for this point. Analysis suggests that the osteoblasts produce a hydrated collagen fibril matrix that appears to achieve a characteristic ratio of mineral plus residual (that is, bound) matrix water to organic matter when mineralized. Distinctive ratios are obtained from hard tissues deposited on the collagen matrices formed by epiphyseal cartilage cells and odontoblasts. Calculations indicate that mineral exchange in the living animal could occur along the exposed interior surfaces of the marrow canal, the osteocyte spaces, and the canaliculi. This diffuse distribution might satisfy the mineral homeostatic needs of the animal without necessarily requiring exchange at "hot spots." "Hot spots" represent regions of very high water and low mineral content.

The studies confirm the transformation of osteoblasts into osteocytes, but as yet cannot refute the argument that osteoclasts could be alternate modifications of a primitive cell rather than manifestations of the same cell in different phases of metabolic activity.

In discussing aspects of the blood-bone continuum, Marshall R. Urist (U.C.L.A.) interpreted the physiological function of hard tissues to be one of storage. Calcified areas and body fluids then are tied into a single feedback cycle. He supported this with data derived from comparisons of vertebrate groups in general and of related fishes inhabiting marine and freshwater environments in particular. Calcification is believed to have arisen in fresh or brackish waters and to have served both as a storage reservoir that permitted some ionic independence and as a supporting-protecting structure. Any diffuse or localized calcification would serve for ion storage, but distinct mechanical presence of calcification was required for structural functions.

Carl Gans (State University of New York at Buffalo) was chairman of the meeting and Warren F. Walker (Oberlin) organized the symposium. Discussant was Bobb Schaeffer (American Museum of Natural History).

CARL GANS
Department of Biology, State University of New York at Buffalo

Forthcoming Events

April

21–24. American **Geophysical Union**, Washington, D.C. (AGU, 1515 Massachusetts Ave., NW, Washington, D.C.)

22–24. Institute of **Electrical and Electronics Engineers**, 16th annual southwestern conf., Dallas, Tex. (F. E. Brooks, Jr., Military Electronics Div., Ling Temco Vought, P.O. Box 6118, Dallas 75222)

22–24. British Inst. of **Radiology**, 25th congr., London, England. (British Institute of Radiology, 32 Welbeck St., London, W.1)

22–25. National Council of **Teachers of Mathematics**, Miami Beach, Fla. (H. T. Karnes, Dept. of Mathematics, Louisiana State Univ., Baton Rouge 3)

23–25. American **Gastroenterological** Conv., Philadelphia, Pa. (C. E. Nelson, 313 N. First St., Ann Arbor, Mich.)

27–1. **Photographic Science and Engineering**, intern. conf., New York, N.Y. (W. Clark, Eastman Kodak Laboratories, Rochester, N.Y. 14650)

28–1. Dallas-Southwest **Industrial Trade** Fair, Dallas, Tex. (C. L. Wells, P.O. Box 26010, Dallas 26)

29–1. **Acoustical Fatigue**, 2nd intern. conf., Dayton, Ohio. (D. M. Forney, Research and Technology Div., U.S. Air Force Systems Command, Wright-Patterson Air Force Base, Dayton)

29–2. **Peaceful Uses of Space**, 4th natl. conf., Boston, Mass. (G. A. Rogovin, 501 Boylston St., Boston 16)

29–2. American **Thyroid** Assoc., annual, Rochester, Minn. (T. Winship, ATA, 110 Irving St., NW, Washington, D.C. 20010)

30–1. Institute of **Hospital Administrators**, annual, Edinburgh, Scotland. (IHA, 75 Portland Place, London, W.C.1, England)

30–1. **Zonal Centrifugation Systems**, Oak Ridge, Tenn. (F. C. Von der Lage,