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CONTENTS AND INDEX

NEW SERIES. VOL. LXXXIX—JANUARY TO JUNE, 1939

THE NAMES OF CONTRIBUTORS ARE PRINTED IN SMALL CAPITALS

- ABRAHAMSON, E. M., Warm Stage, 420
Academy, of Arts and Sciences, 4, 456; of Science, Tennessee, 14; Indiana, 15; Soviet Union, 52; Washington, 241; Pennsylvania, 366; Oklahoma, 367; National, 395, 397, 407, 408, 437; Kansas, 510; Virginia, 538; Kentucky, 539; Illinois, 605; New Hampshire, 606
Acids, Alepic and Alepylic, H. I. COLE and H. T. CARDOSO, 200
Adhesive Tape, Luminescence of, E. N. HARVEY, 460
Adrenal, Sodium Factor of, F. A. HARTMAN, H. J. SPOOR and L. A. LEWIS, 204
ALEXANDER, J., Science in the Old South, 12
ALLARD, H. A., Marsh Gas in Peat-bogs, 533
ALLEE, W. C., and T. PARK, Ecological Principles, 166
Allen, Glover Morrill, In Honor of, 480
ALLEN, R. I., Science versus Unemployment, 474
ALLEN, W. E., Micro-copepoda in Marine Phytoplankton Catches, 532
American Association for the Advancement of Science: Richmond Meeting, *Addresses*: W. C. MITCHELL, 1; R. C. ARCHIBALD, 19, 46; E. W. SINNOTT, 41; K. F. MATHER, 65; W. D. CAIRNS, 113; R. GREGORY, 163; J. R. SWANTON, 253; W. J. ROBBINS, 303; E. C. AUCHTER, 421; Officers, 6; Account of the Meeting, F. R. MOULTON, 89; Walter B. Cannon, President-Elect, 92; Association Prize Award, 93; Resolutions, 93; Secretaries' Conference, 95; *Scientific Sessions*: Mathematics, 95; Physics and the American Meteorological Society, 96; Chemistry, 96; Astronomy, 97; Geology and Geography, 98; Zoological Sciences, 99; Botanical Sciences, 101; Zoological and Botanical Sciences, 105; Anthropology, 107; Psychology, 107; Social and Economic Sciences, 107; Historical and Philological Sciences, 108; Engineering, 108; Medical Sciences, 109; Agriculture, 111; Education, 112; American Nature Study Society and Other Organizations, 112; Financial Reports, 201; Grants for Research, 405. Southwestern Division, V. C. KIECH, 73; Pacific Division, 263, J. M. LUCK, 504; Milwaukee Meeting, F. R. MOULTON, 469; and the National Education Association, 147; American Chemical Society and the University of Wisconsin, 463
Amino Acids in the Proteins of Normal Animals, R. SCHOENHEIMER, S. RATNER and D. RITTENBERG, 272
Amphibian Gametes, R. RUGH, 302
ANDERSON, E., Classification of Weeds, 364; Hypophysectomized Rats and Radiation, 588
Ant, the Sting of, *Paraponera clavata*, N. A. WEBER, 127
Antarctica, Discovery of, W. H. HOBBS, 580
Anthropological Association, American, 29
Antitoxin, Scarlet Fever, R. D. COGILL, 535
Aqueous Solutions, R. BALLENTINE, 301
ARCHIBALD, R. C., Mathematicians and Poetry, 19, 46
ARNON, D. I., and D. R. HOAGLAND, Crop Production, 512
Arthritis in Mice, A. B. SABIN, 228
Artifacts in Canadian River Terraces, J. BIRD, 340
Ascorbic Acid, M. E. REID and R. L. WEINTRAUB, 587
ASHLEY-MONTAGU, M. F., Climate and Reproduction, 290
ASTWOOD, E. B., and R. O. GREEP, Nomenclature of Hormones, 81
AUCHTER, E. C., Animal and Human Nutrition, 421
Avian Digestion, Manganese in, H. S. WILGUS, JR., and A. R. PATTON, 393
Azotobacter, and High Acidity, R. L. STARKEY, 267; *agilis*, S. SORIANO, 563
Bacteria, Deleterious, W. STEWART, 492
BAILEY, W. K., Reproduction of Squash Types, 128
Baldwin, Samuel Prentiss, F. H. HERRICK, 212
BALLARD, W. W., New Hampshire Academy of Science, 606
BALLENTINE, R., Aqueous Solutions, 301
BARNHART, J. H., Eastern Asiatic Botany, E. D. MERRILL and E. H. WALKER, 297
Battelle Memorial Institute, 502
BAUERNFEIND, J. C., and L. C. NORRIS, The Antidermatosis Vitamin, 416
BEAMS, J. W., Power Ultracentrifuge, 543
Bean Seedlings, O. BIDDULPH, 393
BEARDSLEY, N. F., Units for F=ma, 58
BEEBE, W., Titans of the Deep, 317; The Blue Jay Cached the Nut, 366
BELL, E. T., Mathematical Snapshots, H. STEINHAUS, 248
BENEDICT, R. C., Cryptogamic Botany, G. M. SMITH, 13; Plant Physiology, 411
BEQUAERT, J., Hippoboscoid Flies, 267
Bermuda Onion Seed, Viability, E. BROWN, 292
BEST, C. H., Insulin, H. F. JENSEN, 248
BIDDULPH, O., Bean Seedlings, 393
Biological, Station, Bermuda, Oceanographic Vessel of, 28; Research Films, W. R. DURYEE and R. CHAMBERS, 57; Stain Commission, H. J. CONN, 367
Biology, Experimental, Federation, 146; Teachers, 241
Biophysics and Engineering, J. F. HERRICK, 499
BIRD, J., Artifacts in Canadian River Terraces, 340
BISSENETTE, T. H., and E. WILSON, The Mink, 418
BLISS, W. L., Early Man in Canada, 365
BLODGETT, K. B., Reflection of Light from Glass, 60
Blue Jay, and Nut, A. GESELE, 35; W. BEEBE, 366
BOGERT, M. T., Chemistry of the Carbon Compounds, T. W. J. TAYLOR and A. F. MILLIDGE, 487
BOHN, G. W., and C. M. TUCKER, Fusarium Wilt in Tomato, 603
BOND, R. M., Skeletons of Small Animals, 324
Bones, Mineralization of, P. B. MACK, 467
Boston Society of Natural History, 480
Botanical, Garden, New York, 171; Brooklyn, 455; Congress, S. AMERICAN, C. O. ERLANSON, 390; Meetings, 405
BOUYOUCOS, G. J., and A. H. MICK, Soil Moisture, 252
BOWEN, N. L., Geology and Chemistry, 135
BRADLEY, W. B., O. A. BEATH and H. F. EPPSON, Oat Hay Poisoning, 365
BRAGG, A. N., Zoological Nomenclature, 583
BRAGG, W., Archives of the Royal Society, 445
BRASCH, F. E., History of Science, A. WOLF, 536
BRATTON, A. C., A Mechanical Thermoregulator, 589
BRAUER, A., Kentucky Academy of Science, 539
Brewster, William, P. H. OEHSER, 198
Bridges, Calvin Blackman, T. H. MORGAN, 118
BRIDGMAN, P. W., Edwin Herbert Hall, 70; "Manifesto" by a Physicist, 179
British, Honors, 598; Association for the Advancement of Science, 216, 430
Britton, Wilton Everett, W. C. O'KANE, 332
BROWN, E., Viability of Bermuda Onion Seed, 292
BROWNE, C. A., Charles Edward Munroe, 26
Burner, Laboratory, J. J. LYNCH, 230
Bush, Vannevar, President of Carnegie Institution, 30
CAIRNS, W. D., Seismology, 113
Calcium Deprivation, D. M. GREENBERG, M. D. D. BOELTER and B. W. KNOFF, 18
CALDWELL, O. W., The Educated Minority, 591
CAMPBELL, D. H., Sex Hormones, 415
Carcinoma, Mammary, in the Rat, C. F. GESCHICKTER, 35
CARPENTER, D. C., Splitting Proteins, 251
CARPENTER, T. M., Lantern Slides, 372
CASSEL, H. M., and G. D. MILES, Liquid Membranes, 58

- Catalogue Numbers, A. S. WARTHIN, JR., 324
 Cell, E. W. SINNOTT, 41; and Protoplasm, Symposium on, 455
 Chemical Society, American, 157; Baltimore Meeting, 145; Student Chapters, 215; Symposium, H. C. UREY, 463; of Washington, Hillebrand Prize, 194
 Chemistry, and Geology, N. L. BOWEN, 135; Research Conferences on, F. R. MOULTON, 559
 Chick, Embryo Growth Curve, I. M. LERNER, 16; and Pathogenic Fungi, M. MOORE, 514
 Chicken, Eggs, Developing, N. D. LEVINE, C. A. BRANDLY and H. GRAHAM, 161; Rous, Tumor Agent, K. G. STERN and F. DURAN-REYNALS, 609
 Chickens, Goiter in, A. R. PATTON, H. S. WILGUS, JR., and G. S. HARSHFIELD, 162
 Chicks, Infections with Rabies, J. R. DAWSON, JR., 300
 Chimpanzee, R. M. YERKES and H. W. NISSEN, 585
 Chlorazol as Anti-coagulant, W. MODEL, 349
 CHRISTENSEN, B. E., Determination of Ethylene, 319
 CLARK, C. U., Grigore Antipa, 343
 CLARK, W. M., S. P. L. Sørensen, 282
 CLARKE, G. L., Plankton as Food Source, 602
 Coal, Microbiology of, F. W. FUCHS, 389
 COCKERELL, T. D. A., Charles Darwin, G. West, 59; Travels of a Plant Explorer, D. Fairchild, 221; Birds and the Species Problem, C. B. Ticehurst, 537
 "Coenzyme R" and Biotin, P. M. WEST and P. W. WILSON, 607
 COGGESHALL, L. T., Lymphocytic Choriomeningitis and Mosquitoes, 515
 COGHILL, R. D., Scarlet Fever Antitoxin, 535
 COLE, H. I., and H. T. CARDOSO, Alepic and Alepylic Acids, 200
 Commonwealth Fund, Work of, 214; Grants for Medical Research, 261
 Compound Words, C. A. WEATHERBY, 413; H. J. CONN, 582
 COMPTON, K. T., Elihu Thomson, 188
 CONKLIN, E. G., American Philosophical Society, 436
 CONN, H. J., Biological Stains, 367; Compound Names, 582
 Contrasts, F. H. KEYES, 207
 COOKE, C. M., JR., Pacific Entomological Survey, 556
 COOLIDGE, W. D., Elihu Thomson, 187
 CORI, C. F., G. SCHMIDT and G. T. CORI, Muscle Extract, 464
 Corn Embryo Oil, O. H. EMERSON, G. A. EMERSON and H. M. EVANS, 183
 Cotton Plants, Sand Culture of, H. S. OLCOTT, 608
 COUCH, J. N., Fungi, H. C. I. Gwynn-Vaughan and B. Barnes, 295
 CROMWELL, H. W., E. E. SWEEBE and T. C. CAMP, Bacteria of the *Listerella* Group, 293
 CRONEIS, C., Fossils, 314; Adolf Carl Noé, 379
 Crop Production, D. I. ARNON and D. R. HOAGLAND, 512
 CROSS, G. L., Oklahoma Academy of Science, 367
 CROSS, J. C., Mold in Food for *Drosophila*, 40
 Crown-gall, S. F. SNIESZKO and P. PALUCH, 200
 Cryptobranchus, A Reversed, I. B. HANSEN, 128
 Crystals, Growth of Calcite, L. T. PATTON, 485
 Cuban Society of Natural History, L. H. RIVERO, 367
 Cultural Horizon, Pre-ceramic, L. C. EISELEY, 221
 Culture Mites, H. N. HANSEN and W. C. SNYDER, 350
 Currents, Ocean-bottom, F. P. SHEPARD, R. REVELLE and H. S. DIETZ, 488
 Cushing, Harvey, Seventieth Birthday, 383
 Cytology, Experimental, International Congress, 597
 Dairy Science, Imperial Bureau of, 260
 Danforth, Stuart T., G. N. WOLCOTT, 169
 Darwin Library at Down House, 479
 DAVIS, G. E., Visual Comparison of Spectrograms, 229
 DAWSON, J. R., JR., Infection of Chicks with Rabies, 300
 DEEM, A. W., F. THONE, JR., and L. W. DURRELL, Poisonous Range Plant, 435
 Democracy, Consciousness and, H. W. SHIMER, 325
 DENNY, F. E., Plant Physiology, E. C. MILLER, 295
 Dental Symbols, E. S. RIGGS, 315
 Descartes and the Modern World, L. C. KARPINSKI, 150
 DICE, L. R., Filing Negatives and Records, 39
 DIEHL, H. S., Zoology for Premedical Students, 604
 Dissecting Appliance, P. H. POPE, 252
 DODD, E. L., Statistical Methods, G. W. SNEDECOR, 317
 DOUNCE, A. L., and O. D. FRAMPTON, Crystalline Horse Liver Catalase, 300
 DOYLE, M. H., and M. A. BRADLEY, Making an Index, 220
Drosophila, Mold in Food for, J. C. CROSS, 40
 DURYEE, W. R., and R. CHAMBERS, Biological Films, 57
 EARLE, W. R., Iron Hematoxylin Stain, 323
 Early Man in Canada, W. L. BLISS, 365
 Earth Structure and Origin, K. M. MATHER, 65
 East, Edward Murray, R. A. EMERSON, 51
 EASTLICK, H. L., Heredity vs. Environment in Breeds of Fowls, 17
 ECKEL, E. B., Gas Bubbles in "Oolites," 37
 Ecological Principles, W. C. ALLEE and T. PARK, 166
 EDINGTON, W. E., Indiana Academy of Science, 15
 Education, Adult, in Philadelphia, 552
 Einstein, Albert, Birthday, 242, 335
 EISELEY, L. C., Pre-ceramic Cultural Horizon, 221
 ELLERY, E., The Society of Sigma Xi, 201
 Ellis, Havelock, in Honor of, 173
 ELSASSER, T. H., and G. B. WALLACE, Serum from Malignant Tumors, 250
 EMERSON, O. H., G. A. EMERSON and H. M. EVANS, Corn Embryo Oil, 183
 EMERSON, R. A., Edward Murray East, 51
 Encephalomyelitis, in Monkeys, R. W. G. WYCKOFF, 542; Equine, Virus of, B. HOWITT, 541
Endamoeba histolytica, W. W. FRYE, H. E. MELENEY, 564
 Endocrinology, British Journal of, 334
 Engineering, D. C. JACKSON, 231; College of, at Cornell University, 239, 454; Laboratory, of Case School, 240; Council, Patent Inquiry, 333; Hydraulic, and Biophysics, J. F. HERRICK, 499
 Engineers, Civil, Awards, 74; Mining and Metallurgical, Awards, 173
 Entomological, Society, 381; Survey, Pacific, C. M. COOKE, 556
 ERICKSON, H. D., Crushing Strength of Wood, 38
 ERLANSON, C. O., S. American Botanical Congress, 390
 Erythrocytes, Elliptical, H. L. RATCLIFFE, 154
 Eskimo Sexual Functions, C. A. MILLS, 11
 Ethylene, Determination of, B. E. CHRISTENSEN, 319
 Eugenics, Opposition to, S. J. HOLMES, 351
 EVANS, H. M., Corn Embryo Oil, 183; Gonadotropic Hormones, 249
 Expedition, Fijian, 214; Gravity, Netherlands, 359
 F = ma, Treatment, N. F. BEARDSLEY, 58
 Faradic Stimulation, F. A. FENDER, 491
 Farm Research Laboratories, 28
 Fellowships, Alfred P. Sloan, 285; Guggenheim, 311; Lalor, 335; National Research Council, 550
 FENDER, F. A., Faradic Stimulation, 491
 FENT, L. S., "Lucite," 371, 536
 FERNALD, M. L., How Soon Will the Manual be Done?, 329
 Ferns and Flowering Plants of Pennsylvania, 429
 FERREE, C. E., and G. RAND, Night Flying, 223
 Field Museum, 29, 552
 Filing Negatives and Records, L. R. DICE, 39
 Firefly, Path of, C. T. KNIPP, 386
 Fish, Entrance into Estuary, H. M. ROGERS, 412
 Flea, Tropical Rat, R. L. ROUDABUSH, 79
 Flexner, Abraham, Lectures, 312
 Flies, Hippoboscids, J. BEQUAERT, 267
 Flying, Night, C. E. FERREE and G. RAND, 223
 FORBES, E. B., Substitute for Soda Lime, 252
 Foreign Journals in the U.S.S.R., A. V. HILL, 246
 FOSBERG, F. R., Type Specimens, 245
 Fossil Fragments, C. CRONEIS, 314
 FOSTER, J. W., and S. A. WAKSMAN, Sexuality in *Rhizopus nigricans*, 37

- Foundation, Banting Research, V. E. HENDERSON and A. W. HAM, 182; Commonwealth Fund, 261; Alfred P. Sloan, 285; Guggenheim, 311; Rockefeller, 319; Lalor, 335
- Fowls, Heredity vs. Environment in, H. L. EASTLICK, 17; Leucosis in, K. G. STERN and A. KIRSCHBAUM, 610
- FRAMPTON, V. L., and A. M. SAUM, Tobacco Mosaic Virus Protein, 84
- FRANCIS, W. D., Structure of Protoplasm, 127
- Franklin, Fabian, F. D. MURNAGHAN, 283
- Franklin Institute, Medals of the, 406
- FRANKLIN, R. G., Glutathione and Sulfur, 298
- FRYE, W. W., and H. E. MELENEY, Liver Extract and Endamoeba histolytica, 564
- FUCHS, F. W., Microbiology of Coal, 389
- Fungi, Pathogenic, M. MOORE, 514
- Funnel-heating Device, L. N. MARKWOOD, 612
- "g," Determination of, H. LANDSBERG, 245
- Gastric Secretion, Inhibition of, J. S. GRAY, E. WIECZOROWSKI and A. C. IVY, 489
- Genetics, International Congress of, 528
- Geographical Society, American Exhibit, 551
- Geological Society, London, 123; of America, 215, 262, 561; California, 284; in Milwaukee, 528; Association, N. Y. State, 606
- Geologists, Pennsylvania, Field Conference, M. N. SCHAFFNER, 607
- Geology, Institute of, Venezuela, N. B. KNOX, 309; and Chemistry, N. L. BOWEN, 135; and Geography, Lectures in, C. R. LONGWELL, 509
- GEORGE, W. C., Henry van Peters Wilson, 119
- Germany, Jewish Physicians in, 52
- GESCHICKTER, C. F., Mammary Carcinoma in the Rat, 35
- GESELL, A., The Blue Jay and the Nut, 35
- Gibbs, Josiah Willard, C. A. KRAUS, 275
- GIESE, A. C., Ultra-violet Light, 266
- GJULLIN, C. M., W. W. YATES and H. H. STAGE, Hatching of Mosquito Eggs, 539
- Glucose Metabolism and Assimilation, T. J. B. STIER, M. I. NEWTON and H. SPRINCE, 85
- Glutathione and Sulfur, R. G. FRANKLIN, 298
- GLYNN, J. H., Soy-bean Protein, 444
- Goff, Carlos Clyde, M. N. WALKER, 309
- GORDON, C. E., Graptolites from Highgate, Vt., 462
- "Grains," Types in, N. E. STEVENS, 339
- Graptolites from Highgate, Vt., C. E. GORDON, 462
- GRAVES, L. M., Calculus of Variations, 527
- GRAY, J. S., E. WIECZOROWSKI and A. C. IVY, Inhibition of Gastric Secretion, 489
- GREENBERG, D. M., M. D. D. BOELTER and B. W. KNOPF, Calcium Deprivation, 178
- Greenwich Observatory, 575
- GREGG, A., The North American University, 569
- GREGORY, R., Science, Religion and Social Ethics, 163
- GRIFF, D., A Thermoregulator, 468
- GRIGGS, M. A., Lundgardh Spectroscopic Method, 134
- GURIN, S., C. BACHMAN and D. W. WILSON, Urine in Pregnancy, 62
- Hall, Edwin Herbert, P. W. BRIDGMAN, 70
- HAMOR, W. A., Research at the Mellon Institute, 343
- Handedness of Twins, D. C. RIFE, 178
- HANSEN, H. N., and W. C. SNYDER, Culture Mites, 350
- HANSEN, I. B., A Reversed Cryptobranchus, 128
- HARRIS, S. A., and K. FOLKERS, Synthetic Vitamin B₆, 347
- HARTMAN, F. A., H. J. SPOOR and L. A. LEWIS, Sodium Factor of the Adrenal, 204
- HARVEY, E. N., Luminescence of Adhesive Tape, 460
- HASKINS, C. P., The American Physical Society, 269
- Hay Poisoning, Oat, W. B. BRADLEY, O. A. BEATH and H. F. EPPSON, 365
- Health, Program, National, 120; DeLamar Institute, 360; Swedish Institute, 429; Public, M. P. HORWOOD, 517
- HELLEBRANDT, F. A., and J. KRÁL, Sokol Festival, 413
- HENDERSON, V. E., and A. W. HAM, Banting Research Foundation, 182
- Heredity vs. Environment in Fowls, H. L. EASTLICK, 17
- HERRICK, F. H., Samuel Prentiss Baldwin, 212
- HERRICK, J. F., Biophysics and Engineering, 499
- Heterotrypsin, Crystalline, Isolation of, K. HOFFMANN and M. BERGMANN, 86
- HEYL, H. L., Hormone in Royal Jelly, 540
- HILL, A. V., Foreign Journals in the U.S.S.R., 246
- Hill, Arthur E., J. P. SIMMONS, 428
- HOBBS, W. H., The Discovery of Antarctica, 580
- HOFFMANN, K., and M. BERGMANN, Isolation of Crystalline Heterotrypsin, 86
- HOLMES, H. N., E. J. AMBERG and K. CAMPBELL, Vitamin C and Lead Poisoning, 322
- HOLMES, S. J., Opposition to Eugenics, 351
- HONESS, R. F., X-ray and the Coccidia of the Rabbit, 486
- Hoover, Earl E., C. L. HUBBS, 283
- Hormones, Nomenclature, E. B. ASTWOOD and R. O. GREEP, 81; Gonadotropic, H. M. EVANS, 249; Role of, J. R. RAPER, 321; Sex, D. H. CAMPBELL, 415; in Royal Jelly, H. L. HEYL, 540
- Horticultural Society of New York, 430
- HORTON, D., Amer. Assoc. of Scientific Workers, 58
- HORWOOD, M. P., Public Health Progress, 517
- HOWELL, D. E., and R. CRAIG, A Small Hygrometer, 544
- HOWITT, B., Virus of Equine Encephalomyelitis, 541
- HUBBS, C. L., Earl E. Hoover, 283; The Term, Predatee, 605
- HULL, G. F., Text-books in Physics, P. Wessel, H. A. Perkins, A. W. Smith, A. E. Caswell, LeR. D. Weld, W. B. Anderson, M. Y. Colby, S. W. Williams, Millikan, Gale and Edwards, C. M. Kilby, Black and Davis, Clark, Gorton and Sears, 154; The Physical World, Echels, Shaver and Howard, 318
- HUNTER, W. A., and L. A. PENNINGTON, Rat and Auditory Discrimination, 87
- HYDE, R. R., Infectious Myxomatosis, 205
- Hydrosols and Electrolytic Ions, P. C. NUTTING, 131
- Hygrometer, Small, D. E. HOWELL and R. CRAIG, 544
- Hypertension by Cellophane, I. H. PAGE, 273
- Ice Crystal Patterns, J. G. WOODROOF, 87
- Indexing, L. J. MILNE, 64; M. H. DOYLE and M. A. BRADLEY, 220; E. H. MCCLELLAND, 342; W. F. LAMOREUX, 567; C. G. MILLER, 568
- Infantile Paralysis, Grants for, 72
- Influenza Virus, Swine, R. E. SHOPE, 441
- Iodine as Plant Nutrient, W. L. POWERS, 434
- Isotopes, Chemical Properties of, T. I. TAYLOR, 176
- JACK, H. A., Language Difficulty, 558
- JACKSON, D. C., Engineering and Civilization, 231
- JACOT, A. P., Soil under Spruce Mull, 462
- JAFFE, H. vonR., Crystal Physics, W. A. Wooster, 81
- JANSSEN, R. E., Citations in Nomenclature, 152
- Johns Hopkins Hospital Anniversary, 431
- JOHNSON, D., The Manifesto of a Physicist, 246
- JOHNSON, T. B., and M. M. ENDICOTT, Vitamin Research, 297
- KARPINSKI, L. C., Descartes and the Modern World, 150
- KATZ, G., Intravenous Diffusion Pump, 63
- KENNARD, M. A., Tuberculosis in Primates, 442
- KEYES, F. G., Contrasts, 207
- KIECH, V. C., Southwestern Division, 73
- KNIGHT, C. A., R. A. DUTCHER and N. B. GUERRANT, Vitamin C, 183
- KNIPP, C. T., Path of the Firefly, 386
- KNOX, N. B., Institute of Geology of Venezuela, 309
- Kohler, Elmer Peter, 595
- KRAUS, C. A., Josiah Willard Gibbs, 275
- KRECKER, F. H., Polycheate Annelid Worms, 153
- KROGH, A., Teaching of Physiology, 545
- KROGMAN, W. M., Thomas Wingate Todd, 143
- Kymograph Paper, F. H. PRATT, 590
- LAMOREUX, W. F., Indexing Slides, 567
- LANDSBERG, H., Determination of "g," 245
- Language Difficulty, H. A. JACK, 558
- Lantern Slides, T. M. CARPENTER, 372
- LAERSEN, E. S., JR., Petrography, W. C. Krumbein and F. J. Pettijohn, 559

- LAUDE, H. H., Heat Resistance in Plants, 556
 LAZIER, E. L., Laboratory Pump, 419
 Leaf-spot Diseases, Bacterial, J. J. REID, M. A. FARRELL and D. E. HALEY, 566
 Leaves, Transpiration Rate of, H. B. SMITH, 268
 LEONARD, F. C., Goose Lake, Calif., Meteorite, 508
 LERNER, I. M., Chick Embryo Growth Curve, 16
 LEVENE, P. A., G. M. MEYER and M. KUNA, Pectic Acid, 370
 LEVINE, N. D., C. A. BRANDLY and R. GRAHAM, Developing Chicken Eggs, 161
 Light, Reflection of, from Glass, K. B. BLODGETT, 60; Ultra-violet, A. C. GIESE, 266
 LILLIE, F. R., Address of the President of the National Academy of Sciences, 395
 LILLY, V. G., and L. H. LEONIAN, Vitamin B₁ in Soil, 292
 Lime, Soda, Substitute for, E. B. FORBES, 252
 LINCOLN, R. E., Bacterial Wilt of Maize, 159
 Lipman, Jacob Goodale, A. G. MCCALL, 378
 Listerella Group, Bacteria of the, H. W. CROMWELL, E. E. SWEEBE and T. C. CAMP, 293
 Liver, Fat, Mammalian, H. O. WILES and S. MAURER, 293; Crystalline Horse, Catalase, A. L. DOUNCE and O. D. FRAMPTON, 300
 LOCHHEAD, J. H., Luminous Paint, 301
 LONGWELL, C. R., Lectures in Geology, 509
 LOOSANOFF, V. L., Spawning of *Ostrea virginica*, 177
 LOWTHER, F. DEL., Maholi Galagos Breed in Captivity, 604
 Lucite, L. S. FENT, 371, 536
 LUCK, J. M., The Pacific Division, 504
 LUTMAN, B. F., Herbals, A. Arber, 294
 LYNCH, J. J., Laboratory Burner, 230
 MCBAIN, J. W., and A. H. LEWIS, Transparent Ultracentrifuge, 611
 MCCALL, A. G., Jacob Goodale Lipman, 378
 MCCLELLAND, E. H., Mechanics of Indexing, 342
 McDonald Observatory, 193; O. STRUVE, 493
 McDougall, William, K. ZENER, 191
 MCGILL, J. T., Tennessee Academy of Science, 14
 MACK, P. B., Mineralization of Bones, 467
 MCKAY, J. W., and H. L. CRANE, Xenia in the Chestnut, 348
 MACKENZIE, C. G., and E. V. MCCOLLUM, Vitamin E and Muscular Dystrophy, 370
 MCMAHON, J. F., City Air and Sulfur Fumes, 61
 McMurrich, James Playfair, J. C. WATT, 307
 MADISON, L. C., R. C. MILLER and T. B. KEITH, Nicotinic Acid, 490
 Maholi Galagos Breed in Captivity, F. DEL. LOWTHER, 604
 Maize, Bacterial Wilt of, R. E. LINCOLN, 159
 Malaria Parasite, Avian, H. D. MANWELL and F. GOLDSTEIN, 131
 MANWELL, R. D., and F. GOLDSTEIN, Avian Malaria Parasite, 131
 MARKWOOD, L. N., Funnel-heating Device, 612
 Marsh Gas in Peat-bogs, H. A. ALLARD, 533
 Mathematical, Competition, 123; Analysis at the Massachusetts Institute of Technology, 172
 Mathematicians, Poetry and Drama, R. C. ARCHIBALD, 19, 46
 MATHER, K. F., Earth Structure and Origin, 65; The Geological Sciences, F. D. ADAMS, 486
 MATTHEWS, H. D., A Winter Whirlwind, 316
 Maxwell, Samuel Steen, J. M. D. OLMSTED, 259
 Medals: Hoover, 5; Rumford, 54; Willard Gibbs, 195, 481; Franklin Institute, 406; National Academy of Sciences, 407
 Mellon Institute, Research at, W. A. HAMOR, 343
 Meningotoxoid, New, T. V. ÖZ, 588
 Meteorite, Benld, B. H. WILSON, 34; Goose Lake, Calif., F. C. LEONARD, 508
 Meteorological Society, American, 552
 MEYER, M. F., Space Perception by Radio, 389
 Mice, Avitaminosis K Produced in, R. MURPHY, 203
 Micro-copepoda in Marine Phytoplankton Catches, W. E. ALLEN, 532
 Microfilm Copying, A. SEIDELL, 219
 Microfilms and Scientific Research, A. SEIDELL, 32
 Microorganisms from Rheumatic Exudates and Tissues, H. F. SWIFT and T. M. BROWN, 271
 MILLER, C. G., Lantern Slides from Typewritten Material, 568
 MILLER, E. C. L., Virginia Academy of Science, 538
 MILLER, E. DEW., Erythrocytes of Sloth, 12
 MILLS, C. A., Eskimo Sexual Functions, 11
 MILNE, L. J., Making an Index, 64
 Minerals in Animal Tissues, G. H. SCOTT and D. M. PACKER, 227
 Minks, T. H. BISSONNETTE and E. WILSON, 418
 Minority, Educated, Problems of an, O. W. CALDWELL, 591
 Missouri Botanical Garden, Tropical Station, 310
 MITCHELL, W. C., Science and the State of Mind, 1
 MODELL, W., Chlorazol as an Anti-coagulant, 349
 MORGAN, A., and H. D. SIMMS, Vitamin Deficiency, 565
 MORGAN, T. H., Calvin Blackman Bridges, 118; Edmund Beecher Wilson, 258
 MOORE, M., Pathogenic Fungi, 514
 MORRIS, M. L., and T. J. MURRAY, Sulfanilamide, 274
 Mosquito Eggs, Hatching of, C. M. GJULLIN, W. W. YATES and H. H. STAGE, 539
 Mosquitoes and Lymphocytic Choriomeningitis, L. T. COGGESHALL, 515
 MOULTON, F. R., American Association, Richmond, 89; Milwaukee, 469; Birth Pains of, 507; Conferences on Chemistry, 559
 Munroe, Charles Edward, C. A. BROWNE, 26
 MURNAGHAN, F. D., Fabian Franklin, 283
 MURPHY, R., Avitaminosis K Produced in Mice, 203
 Muscle Extract, C. F. CORI, G. SCHMIDT and G. T. CORI, 464
 Museum, South Kensington, 4; of Natural History, American, 382
 Myxomatosis, Infectious, R. R. HYDE, 205
 NICHOLS, R. L., Nieves Penitentes, 557
 Nicotinic Acid, L. C. MADISON, R. C. MILLER and T. B. KEITH, 490
 Noé, Adolf Carl, C. CRONEIS, 379
 Nomenclatural Practice, W. H. OSGOOD, 9
 Nomenclature, Hormone, E. B. ASTWOOD and R. O. GREEP, 81; Citations in, R. E. JANSSEN, 152
 Northwestern University, Institute of Technology, 286
 Nutrition, Animal and Human, E. C. AUCHTER, 421
 NUTTING, P. G., Hydrosols and Electrolytic Ions, 131
 Observatory, McDonald, 193, O. STRUVE, 493
 OESHER, P. H., William Brewster, 198; Asiatic Botany, E. D. MERRILL and E. H. WALKER, 342
 ÖZ, T. V., A New Meningotoxoid, 588
 Ohio State University Lake Laboratory, 502
 O'KANE, W. C., Wilton Everett Britton, 332
 OLCOTT, H. S., Sand Culture of Cotton Plants, 608
 OLMSTED, J. M. D., Samuel Steen Maxwell, 259
 "Oolites," Gas Bubbles in, E. B. ECKEL, 37
 Orton, Edward, Geologist, A. C. SWINNERTON, 373
 OSGOOD, W. H., Nomenclatural Practice, 9
 Ovum Culture, G. PINCUS, 509
 Pacific Science Congress, Sixth, 146, 577
 PAGE, I. H., Hypertension by Cellophane, 273
 Paint, Luminous, J. H. LOCHHEAD, 301
 Parasite of Puerto Rican Mole-cricket, G. N. WOLCOTT, 508
 Parks, National, 171, 193
 Parthenocarpy, Induced, C.-Y. WONG, 417
 Patents, for Acts of Nature, C. E. RUBY, 387; for Chemical Compounds, J. H. SIMONS, 535
 PATON, R. F., Illinois Academy of Science, 605
 PATTON, A. R., H. S. WILGUS, JR., and G. S. HARSHFIELD, Goiter in Chickens, 162
 PATTON, L. T., Growth of Calcite Crystals, 485
 Pearson, Raymond A., 357
 Pectic Acid, P. A. LEVENE, G. M. MEYER and M. KUNA, 370
 Pediatric Research, Council for, 53
 PERLA, D., Excess of Vitamin B₁, 132

- Philosophical Society, American, 382; E. G. CONKLIN, 436
Photography, Standards for, 215
Physical Society, American, C. P. HASKINS, 269
Physicist, The Manifesto of a, P. W. BRIDGMAN, 179; D. JOHNSON, 246
Physics, American Institute, Symposium, Temperature, 145; Chicago, 361; Theoretical, C. F. SQUIRE, 180, and Spectroscopy, Conferences, 480
Physiology, Teaching of, A. KROGH, 545
Phytogeographers, W. C. STEERE, 341
PINCUS, G., Ovum Culture, 509
PINKERTON, H., and O. A. BESSEY, Murine Typhus Infection in Rats, 368
Plankton as Food Source, G. L. CLARKE, 602
Plant, Growth Inhibitor, W. S. STEWART, W. BERGREN and C. E. REDEMANN, 185; Physiology, R. C. BENEDICT, 411; Range, Poisonous, A. W. DEEM, F. THONE, JR., and L. W. DURRELL, 435
Plants, Heat Resistance in, H. H. LAUDE, 556
Polyploids of Melandrium, H. E. WARMKE and A. F. BLAKESLEE, 391
POOL, R. J., Biology, P. D. STRAUSBAUGH and B. R. WEIMER, 558
POPE, P. H., Dissecting Appliance, 252
POWELL, H. M., and W. A. JAMIESON, Rabbit Antipneumococcus Serum, 392
POWERS, W. L., Iodine as Plant Nutrient, 434
PRATT, F. H., Kymograph Paper, 590
Predatee, The Term, L. D. WOOSTER, 436; C. L. HUBBS, 605
Progress and Decline, J. R. SWANTON, 253
Proteins, Splitting by, D. C. CARPENTER, 251
Protoplasm, Structure of, W. D. FRANCIS, 127
Puerto Rico, School of Tropical Medicine, 239
Pump, Intravenous Diffusion, G. KATZ, 63; Laboratory, E. L. LAZIER, 419
Rabbit, Coccidia of, and X-ray, R. F. HONESS, 486
Racial Theories and Democracy, H. A. WALLACE, 140
Radio, Station without Static, 72; Space Perception by, M. F. MEYER, 389
RAINES, M. A., Wick Culture, 205
RAINEY, C. C., Non-aqueous Liquids, 435
RAPER, J. R., Role of Hormones, 321
Rat, Auditory Discrimination of, W. A. HUNTER and L. A. PENNINGTON, 87
RATCLIFFE, H. L., Elliptical Erythrocytes, 154
Rats, Hypophysectomized, and Radiation, E. ANDERSON and OTHERS, 588
RAZRAN, G. H. S., Salivary Conditioning, 160
REID, J. J., M. A. FARRELL and D. E. HALEY, Bacterial Leaf-spot Diseases, 566
REID, M. E., and R. L. WEINTRAUB, Ascorbic Acid, 587
REINHARD, E. G., Rhizocephalan Peltogaster Paguri, 80
Reproduction and Climate, M. F. ASHLEY-MONTAGU, 290
Research, Scientific, and the Federal Government, 75, 121; Foundation, Banting, V. E. HENDERSON and A. W. HAM, 182; Medical, and Grants of Commonwealth Fund, 261; Grants of Geological Society of America, 262, 561; Vitamin, T. B. JOHNSON and M. M. ENDICOTT, 297; Institutes, Industrial, 334; at Mellon Institute, W. A. HAMOR, 343; Council, 550; Conferences on Chemistry, F. R. MOULTON, 559
Rhizocephalan Peltogaster Paguri, E. G. REINHARD, 80
RIPE, D. C., Handedness of Twins, 178
RIGGS, E. S., Dental Symbols, 315
RIVERO, L. H., Cuban Society of Natural History, 367
ROBBINS, W. J., Plant Physiology, E. C. B. WRIGHT, 296; Thiamin and Plant Growth, 303
ROBBINS, W. W., Economic Botany, A. F. HILL, 294; Economic Plants, H. E. HAYWARD, 296
Rockefeller Foundation, 319
ROGERS, H. M., Entrance of Fish into an Estuary, 412
ROSENTHAL, S. M., Sulfanilamide Therapy, R. R. MELLON, P. GROSS and F. B. COOPER, 129
ROUDABUSH, R. L., Tropical Rat Flea, 79
Royal, Society, London, 285; Archives, W. BRAGG, 445; Foreign Members, 504; Conversazione, 526; Meteorological Society, 552; Jelly, H. L. HEYL, 540
RUBY, C. E., Patents for Acts of Nature, 387
RUGH, R., Amphibian Gametes, 302
SABIN, A. B., Arthritis in Mice, 228
Salivary Conditioning, G. H. S. RAZRAN, 160
Sapir, Edward, L. SPIER, 237
SCHAEFER, V. J., Ultra-violet Light and Multilayers, 465
Schaffner, John Henry, A. WALLER, 427
SCHAFFNER, M. N., Field Conference of Pennsylvania Geologists, 607
SCHOENHEIMER, R., S. RATNER and D. RITTENBERG, Amino Acids in the Proteids of Normal Animals, 272
SCHREINER, O., Edmund Cecil Shorey, 238
Science, and the State of Mind, W. C. MITCHELL, 1; in the South, J. ALEXANDER, 12; Instruction, L. W. TAYLOR, 34; Religion and Social Ethics, R. GREGORY, 163; versus Unemployment, R. I. ALLEN, 474
Scientific Workers, American Association of, D. HORTON, 58
SCOTT, G. H., and D. M. PACKER, Minerals in Animal Tissues, 227
SCUDI, J. V., H. D. RATISH and J. G. M. BULLOWA, Sulfa-pyridine, 516
SEARS, P. B., Plant Ecology, J. E. Weaver and F. E. Clements, 295
SEEGERS, W. H., Purified Thrombin, 86
SEIDELL, A., Microfilms, 32; Microfilm Copying, 219
Seismology, W. D. CAIRNS, 113
Serum, Rabbit Antipneumococcus, H. M. POWELL and W. A. JAMIESON, 392
Sexuality in *Rhizopus nigricans*, J. W. FOSTER and S. A. WAKSMAN, 37
SHAFFER, P. A., Sulphanilamid, 547
SHEPARD, F. P., and E. C. LAFOND, Undertow, 78; R. REVELLE and R. S. DIETZ, Ocean-bottom Currents, 488
SHIMER, H. W., Consciousness and Democracy, 325
Shocks, Induction, J. E. THOMAS, 133
SHOPE, R. E., Swine Influenza Virus, 441
Shorey, Edmund Cecil, O. SCHREINER, 238
Sigma Pi Sigma Convention, M. W. WHITE, 509
Sigma Xi, The Society of, E. ELLERY, 201
SIMMONS, J. P., Arthur E. Hill, 428
SIMONS, J. H., Patents for Chemical Compounds, 535
SINNOTT, E. W., The Cell, 41
Skulls and Skeletons of Small Animals, R. M. BOND, 324
Slides, Indexing, W. F. LAMOREUX, 567; Lantern, from Typewritten Material, C. G. MILLER, 568
Sloth, Erythrocytes of, E. DEW. MILLER, 12
SMITH, H. B., Transpiration Rate of Leaves, 268
SMITH, R. C., Kansas Academy of Science, 510
SMITH, R. H., Insects of Subtropical Fruits, H. J. Quayle, 83
SNIESZKO, S. F., and J. PALUCH, Experimental Crown-gall, 200
Snowslide, Striations, J. R. WELLS, 316
Soil, Moisture, G. J. BOUYOUCOS and A. H. MICK, 252; Conservation Service, 359; under Spruce Mull, A. P. JACOT, 462; Science, International Society of, 576
Sokol Festival, F. A. HELLEBRANDT and J. KRÁL, 413
Sørensen, S. P. L., W. M. CLARK, 282
SORIANO, S., *Azotobacter agilis*, 563
Soy-bean Protein, J. H. GLYNN, 444
Spawning of *Ostrea virginica*, V. L. LOOSANOFF, 177
Spectrograms, Visual Comparison of, G. E. DAVIS, 229
Spectrographic Method, Lundegardh, M. A. GRIGGS, 134
SPIER, L., Edward Sapir, 237
Squash Types, Reproduction of, W. K. BAILEY, 128
SQUIRE, C. F., Theoretical Physics, 180
STADELMAN, R., Teosinte Seed and Birds, 461
Stain, Iron Hematoxylin, W. R. EARLE, 323
STANLEY, W. M., and M. A. LAUFFER, Disintegration of Tobacco Mosaic Virus in Urea Solutions, 345
STARKEY, R. L., *Azotobacter* and High Acidity, 267
Starred Scientists, S. S. VISHER, 583
STEERE, W. C., Phytogeographers, 341

- STEFANSSON, V., A Dilemma in Vitamins, 484
 STERN, K. G., and F. DURAN-REYNALS, Rous Chicken Tumor Agent, 609; and A. KIRSCHBAUM, Leucosis in Fowls, 610
 STEVENS, John Frank, Award of Hoover Medal, 5
 STEVENS, N. E., Plant Pathology, F. D. Heald, 295; Types in "Grains," 339
 STEWART, W., Protozoan Cultures, 492
 STEWART, W. S., W. BERGREN and C. E. REDEMANN, Plant Growth Inhibitor, 185
 STIER, T. J. B., M. I. NEWTON and H. SPRINCE, Glucose Metabolism and Assimilation, 85
 STRAUS, W. L., JR., Herbert Henry Woollard, 404
 STRUYE, O., Dedication of McDonald Observatory, 493
 Sulfanilamide, P. A. SHAFFER, 547; and Meningoencephalitis, M. L. MORRIS and T. J. MURRAY, 274
 Sulfapyridine, J. V. SCUDI, H. D. RATISH and J. G. M. BULLOWA, 516
 Sulfur Fumes and City Air, J. F. McMAHON, 61
 SWANTON, J. R., Progress and Decline, 253
 SWIFT, H. F., and T. M. BROWN, Microorganisms from Rheumatic Exudates and Tissues, 271
 SWINNERTON, A. C., Edward Orton, Geologist, 373
 Szent-Györgyi, Albert, Abraham Flexner Lecturer, 312

 TAYLOR, L. W., Science Instruction, 34
 TAYLOR, T. I., Isotopes and Chemical Properties, 176
 Teosinte Seed and Birds, R. STADELMAN, 461
 Testing Materials, American Society, 479; 527
 Thermoregulator, D. GREIFF, 468; A. C. BRATTON, 589
 Thiamin, R. J. WILLIAMS and E. F. PRATT, 199; and Plant Growth, W. J. ROBBINS, 303
 THOMAS, J. E., Induction Shocks, 133
 Thomson, Elihu, W. D. COOLIDGE, 187; the Scientist, K. T. COMPTON, 188
 Thrombin, Purified, W. H. SEEGER and OTHERS, 86
 Timoshenko, Stephen, Anniversary Volume, 598
 Titans of the Deep, W. BEEBE, 317
 Tobacco Mosaic Virus, V. L. FRAMPTON and A. M. SAUM, 84; W. M. STANLEY and M. A. LAUFFER, 345
 Todd, Thomas Wingate, W. M. KROGMAN, 143
 Tomato, Fusarium Wilt in, G. W. BOHN and C. M. TUCKER, 603
 Toxoplasmosis, A. WOLF, D. COWEN and B. PAIGE, 226
 Tuberculosis in Primates, M. A. KENNARD, 442
 Tumors, Malignant, T. H. ELSASSER and G. B. WALLACE, 250
 TUVE, M. A., Uranium and Thorium Nuclei, 202
 Type Specimens, F. R. FOSBERG, 245
 Typhus Infection, Murine, in Rats, H. PINKERTON and O. A. BESSEY, 368

 U.S.S.R., Foreign Journals in, A. V. HILL, 246
 Ultracentrifuge, J. W. BEAMS, 543; Transparent, J. W. MCBAIN and A. H. LEWIS, 611
 Ultra-Violet Light and Multilayers, V. J. SCHAEFER, 465
 Undertow, F. P. SHEPARD and E. C. LAFOND, 78
 University, North American, A. GREGG, 569
 Uranium and Thorium Nuclei, M. A. TUVE, 202
 UREY, H. C., Symposium on Homogeneous Gas Reactions, 463
 Urine, Pregnancy, S. GURIN, C. BACHMAN and D. W. WILSON, 62

 Van Slyke, Dr., Award of Willard Gibbs Medal, 195, 481
 Variations, Calculus of, L. M. GRAVES, 527
 VILLELA, G. G., Vitamin B₁ in Cerebrospinal Fluid, 251

 VISHER, S. S., Season of Birth, E. Huntington, 487; Starred Scientists, 583
 Vitamin B₁, Excess of, D. PERLA, 132; in Soil, V. G. LILLY and L. H. LEONIAN, 292; in Cerebrospinal Fluid, G. G. VILLELA, 251; B₆, Synthetic, S. A. HARRIS and K. FOLKERS, 347; C, C. A. KNIGHT, R. A. DUTCHER and N. B. GUERRANT, 183; C, and Lead Poisoning, H. N. HOLMES, E. J. AMBERG and K. CAMPBELL, 322; E, Muscular Dystrophy, C. G. MACKENZIE and E. V. MCCOLLUM, 370; Research, T. B. JOHNSON and M. M. ENDICOTT, 297; Antidermatosis, J. C. BAUERNFEIND and L. C. NORRIS, 416; A Pantothenic Acid, R. J. WILLIAMS, 486; Deficiency, A. MORGAN and H. D. SIMMS, 565
 Vitamins, A Dilemma in, V. STEFANSSON, 484

 WALKER, M. N., Carlos Clyde Goff, 309
 WALLACE, H. A., Racial Theories and Democracy, 140
 WALLER, A., John Henry Schaffner, 427
 WALSH, J. L., Convergence, W. L. FERRAR, 59
 Warm Stage, E. M. ABRAHAMSON, 420
 WARMKE, H. E., and A. F. BLAKESLEE, Polyploids of Melandrium, 391
 WARTHIN, A. S., JR., Catalogue Numbers, 324
 Water, Movement of, through Liquid Membranes, H. M. CASSEL and G. D. MILES, 58; Transport through Non-aqueous Liquids, C. C. RAINEY, 435
 WATT, J. C., James Playfair McMurich, 307
 WEATHERBY, C. A., Compound Words, 413
 WEBER, N. A., The Sting of Paraponera clavata, 127
 Weeds, Classification of, E. ANDERSON, 364
 WELLS, J. R., Snowslide Striations, 316
 WEST, P. M., and P. W. WILSON, "Coenzyme R" and Biotin, 607
 Westinghouse Scholarships, 261
 Whirlwind, Winter, H. D. MATTHEWS, 316
 WHITE, M. W., Sigma Pi Sigma Convention, 509
 Wick Culture, M. A. RAINES, 205
 WILES, H. O., and S. MAURER, Mammalian Liver Fat, 293
 WILGUS, H. S., JR., and A. R. PATTON, Manganese in Avian Digestion, 393
 WILLARD, B., Pennsylvania Academy of Science, 366
 WILLIAMS, R. J., Pantothenic Acid, 486; and E. F. PRATT, Thiamin, 199
 WILSON, B. H., Benld Meteorite, 34
 Wilson, Edmund Beecher, T. H. MORGAN, 258
 Wilson, Henry Van Peters, W. C. GEORGE, 119
 WOLCOTT, G. N., Stuart T. Danforth, 169; Parasite of the Puerto Rican Mole-cricket, 508
 WOLF, A., D. COWEN and B. PAIGE, Human Toxoplasmosis, 226
 WONG, C.-Y., Induced Parthenocarpy, 417
 Wood, Robert Williams, Award of Rumford Medal, 54
 Wood, Strength of, H. D. ERICKSON, 38
 WOODROOF, J. G., Ice Crystal Patterns, 87
 Woollard, Henry Herbert, W. L. STRAUS, JR., 404
 WOOSTER, L. D., The Term Predatee, 436
 World's Fair, New York, Science at, 310
 Worms, Polychaete Annelid, F. H. KRECKER, 153
 WYCKOFF, R. W. G., Encephalomyelitis in Monkeys, 542

 Yale University, Doctorates, 599
 YERKES, R. M., and H. W. NISSEN, Sign Behavior in Chimpanzee, 585

 ZENER, K., William McDougall, 191
 Zenia in the Chestnut, J. W. MCKAY and H. L. CRANE, 348
 Zoological, Society of London, 453; Nomenclature, A. N. BRAGG, 583
 Zoology for Pre-medical Students, H. S. DIEHL, 604

In one fifteen-and-one-half-day transplant which was attached to the mesenteries of the host, the outer portion of the graft was covered with brown feathers, the inner portion possessed white plumage, and the characteristic brown pigment was lacking in the lower leg and foot. Furthermore, typical Brown Leghorn feathers covered the greater portion of the right wing of the host. Although this latter condition may have been due to a somatic variation, Dr. Harry L. Kempster, professor of poultry husbandry at the University of Missouri, joins me in the view that the pigmentation of the wing feathers has been induced by the graft. This case seems to indicate a mutual interaction between the host and transplant or between the hereditary constitution and the environment.

A diffusion gradient apparently does not explain these latter cases, since some well-attached grafts developed colored plumage and other less well-attached transplants possessed white feathers. Experiments are in progress which may shed additional light on the problem.

HERBERT L. EASTLICK

UNIVERSITY OF MISSOURI

NEW OBSERVATIONS ON THE EFFECTS OF CALCIUM DEPRIVATION¹

THE authors have observed that a profound neurological disturbance develops in growing rats maintained on diets very low in calcium (0.01 to 0.02 per cent.) which has heretofore not been associated with a deficiency of calcium. The neurological picture, which is quite complex, is suggestive of a diffuse lesion involving the cortex, basal ganglia, spinal cord and peripheral nerves.

The nervous condition is best demonstrated by subjecting the experimental animals to short and mild galvanic shocks from an induction coil after they have been on the low calcium ration for six weeks or more. This stimulus causes the rats to collapse. The rats remain conscious, but they respond poorly and sluggishly to all stimuli. They show little ability to right themselves or to grasp objects with their paws. The fore limbs remain relatively normal, but there is always a paralytic foot drop of one or both hind limbs. Immediately after the onset of the collapse, the tail becomes anesthetic, while the head and trunk appear to be hyperesthetic. After a lapse of about 24 hours, the head and trunk also become anesthetic. The normal propulsive locomotion of these animals is greatly altered, and they generally show a retropulsive response which is not observed in the normal rat.

The effects of the disturbance appear to be rever-

sible. The degree of prostration increases the longer the animals are kept on the calcium deficient diet. Severely depleted animals remain in a state of prostration for long periods of time and, as a result, usually die of inanition. Less severely deficient animals recover from the prostration after a varying period of time, even if they are still kept on the low calcium ration. Recovery, however, is hastened by feeding the control diet to the injured animals.

A condition similar to that which is induced by the galvanic stimulus may develop spontaneously in animals that have been maintained on the experimental diet for a period of from 9 to 14 weeks. The effect of the spontaneous collapse is very severe and the animals usually die within a few days.

Visible hemorrhage occurs frequently. In the central nervous system it has been observed in the cerebrum, spinal cord and the circle of Willis. This finding suggests that the neurological disturbance may well be a secondary effect of the vascular pathology. Hemorrhagic areas also have been noted in the lungs, gastrointestinal tract, bladder, bone and in the muscles of the gluteal region.

Chemically, the calcium deficient animals exhibit a low blood calcium, which was found to vary from 4.4 to 6.6 mg per 100 ml of serum.

Tetany does not occur in animals when merely reared on the low calcium rations. Tetany can be induced in thyro-parathyroidectomized rats by placing them on the low calcium diet. It takes 4 to 6 weeks to develop on this regimen. The tetanic spasms can be induced with a galvanic shock or, even better, with the hissing sound from an air jet.

Another point of considerable interest is that, although the bony skeleton is almost completely decalcified, the teeth appear to be relatively well calcified.

DAVID M. GREENBERG
MURIEL D. D. BOELTER
BENJAMIN W. KNOPF

DIVISION OF BIOCHEMISTRY,
UNIVERSITY OF CALIFORNIA MEDICAL SCHOOL,
BERKELEY

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