

INDEX TO VOLUME II.

**** Figures in black-faced type refer to the numbered paragraphs in the 'weekly summary'; those in ordinary type, to pages.**
Names of contributors are printed in small capitals.

- ABBOTT, C. C.** Evidences of glacial man, 437; kalmias and rhododendrons, 201; occurrence of mound-builders' pipes in New Jersey, *ill.* 258; occurrence of the swallow-tailed hawk in New Jersey, 222; the intelligence of birds, 301.
- Abyssal mollusks**, 27, 208, 453.
- Acid in juice of beet**, 76.
- Aconitum lycoctonum**, 691.
- Acoustic rotation apparatus**, *ill.* 818.
- Adams's Evolution**, reviewed, 659.
- Aesculus glabra**, flowers of, 89.
- Africa**, French missionary work in, 225; Masal people in, 502; notes on, 298; Portuguese in, 423; South, land-holding in, 73.
- African exploration**, 92; psychology, 195.
- Agaricus**, 631.
- Agave americana**, 836.
- Agricultural botany**, 335; prices, history of, 353; station, New York, 687.
- Agriculture**: its needs and opportunities, 329; values in, 378.
- Ainos of Japan**, 134.
- Alaska**, ethnology of, 667; geological changes in, 655, 294; vegetation in, 519.
- Albatross**, U. S. fish-commission steamer, *ill.* 6, 66; four-days' cruise of, *ill.* 615; electric light on, *ill.* 642, 671, 705.
- Albite**, 389, 418.
- Alcohols**, action of, on heart, 96.
- Alexander**, Stephen, 27.
- Algae**, and tastes and odors, 333; injurious, 23; Swedish, 564.
- Algebraical equations**, 409.
- Algeria**, artesian wells in, 116; geological map of, 606.
- Allegheny oil-sands**, 18.
- ALLEN, J. A.** The right whale of the North Atlantic, 134, 267.
- Alligator lucius**, 831.
- Almacantar**, tests with, 239.
- Alnwick castle antiquities**, reviewed, 136.
- Alphabet**, 438; universal, 350.
- Alpine railways**, 635.
- Alps**, pre-Cambrian rocks of, 322.
- ALVORD, B.** Importance of lime-juice in the pemmican for arctic expeditions, 471.
- Amelia county, Va.**, minerals from, 338.
- America**, autochthones of, 37; north-west, 253.
- American apiculturist**, 147; archaeological institute, 753; archeology, lectures on, 581; association for the advancement of science, 116, 146, 151, 179, 190, 211, 227, 253, 273, 314, 340, 358, 384; at Minneapolis, 181; explorations at Assos, *ill.* 646; forestry congress, 117; oriental society, 651; ornithologists' union, 516; scholarship, 167; society of civil engineers, 75, 100; of mechanical engineers, 62, 267; of microscopists, 117, 465.
- Americanists**, congress of, 667.
- Amido-compounds**, nutritive value of, 551.
- Amiurus natalis**, 144; nebulosus, 144; prosthitis, 144.
- Ammocoetes**, 731.
- Amphinema apicatum**, 773.
- Amphipoda**, 793.
- Ampullaria Powelli**, 808.
- Anaesthesia**, production of, 338.
- Ancient temples**, restoration of, 740.
- Angular measure**, units of, 840.
- Anhydrite**, reproduction of, 313.
- Aniline dyes**, 486.
- Animal chlorophyll**, 487.
- Annals of mathematics**, 698.
- Annam**, 341.
- Annelid and coral**, 94.
- Anomura of New England**, 257.
- Anoplophrya socialis**, 790.
- Ant**, leaping, 386; accident, distribution of, 493.
- Antase**, 52.
- Anthomyia canicularis**, 774.
- Anthracite fields of Pennsylvania**, 385.
- Anthropological institute**, London, 540; studies, 358.
- Anthropology at Berlin**, 539; manuals of, 149.
- Antimony**, atomic weight of, 479.
- Antiquity of man in America**, 779.
- Antrostomus vociferus**, 167.
- Aortic insufficiency**, 527.
- Apallies containing iodine**, 242.
- Appalachian mountain-club**, 518.
- Apteryx**, respiratory organs of, 376.
- Aquilegia**, 691; longissima, 691.
- Arago laboratory at Banyuls**, *ill.* 556.
- Archaeological institute of America**, *ill.* 646, 753.
- Archeology**, American, lectures on, 581; in India, 809; in Portugal, 764.
- Architeuthis**, model of, at Fisheries exhibition, 683.
- Archiv für anthropologie**, 607.
- Arctic expeditions**, pemmican for, 471; land, 559; notes, 318, 365.
- Arion hortensis**, slime-spinning by, 492.
- Arithmetic**, binary, 755; rule for division in, 738.
- Arkansas**, forest-trees of, 342.
- Arilberg tunnel**, 781.
- Arrow release**, 369.
- Artemia salina**, 571.
- Arterial pressure**, 527.
- Artesian wells**, 116.
- ARTHUR, J. C.** A supposed poisonous seaweed in the lakes of Minnesota, 333.
- Asaphus**, 341.
- Asclepias**, pollination of, 427.
- Ascospores in Saccharomyces**, 347.
- ASHBURNER, C. A.** The Dora coal-field, Virginia, 794.
- Asia**, Pulmonata of, 429.
- Asparagin**, chemistry of, 202.
- Asphalt mortar**, 415.
- Aspidonectes spinifer**, 338.
- Assassins**, skulls of, 212.
- Association for advancement of science and teaching**, 210.
- Assos**, explorations at, *ill.* 646; meeting, report of, 712.
- Astarte triquetra**, 277.
- Astronomical instruments**, 202.
- Astronomy**, biographical history of, 623; illustrative apparatus for, *ill.* 218.
- Atlantic Ocean**, age of, 666.
- Atmospheric electricity**, 291.
- Atomic motions**, nature of, 76, 123.
- Audibility**, limit of, 42.
- Augite**, 484.
- Aurantiaceae**, spines of, 566.
- Auriculidae**, shell in, 371.
- Aurora**, 472, *ill.* 75.
- Auroral experiments in Lapland**, *ill.* 819.
- Australia**, bismuth of, 554.
- Australian class systems**, 69; coal flora, 520.
- Authors**, suggestion to, 755.
- Automatism**, conscious, 339.
- Awers**, on the *Berliner Jahrbuch*, 711.
- Avery**, on the Khasi language, 651.
- Aztalan**, 352.
- Aztec music**, 305.
- B.**, L. English *ch*, 712; teaching language to brutes, 682.
- B.**, M. Area of a plane triangle, 794.
- BABBITT, F. E.** Vestiges of glacial man in central Minnesota, 369.
- Babylonian research**, 40.
- Bacteria**, 466.
- BAIRD, G. W.** The electric light on the U. S. fish-commission steamer Albatross, *ill.* 642, 671, 705.
- BAKER, M.** Magnetic observations at Los Angeles, Cal., *ill.* 58.
- BAKER, T. R.** A comparison of terracotta lumber with other materials, 292.
- BALDACCIO, L.** The earthquake of July 28, 1883, in the island of Ischia, *ill.* 396.
- Balfour**, Francis Maitland, *portrait*, 299; his researches on Peripatus, *ill.* 306.
- Balloon**, fall of, *ill.* 189; of Paris observatory, 451.
- Banyuls**, Arago laboratory at, *ill.* 556.
- Barite**, reproduction of, 313.
- Barley**, growth of, 448.
- Barometric laws**, 315; maxima and minima, 451.
- Barrande**, Joachim, *portrait*, 699, 727; bequest of, 725.
- Basal substance**, structureless, 161.
- Basalt**, Ottendorf, 271.
- Basic process at Peine works**, 358.
- Batstoe River**, fishes of, 163.
- Bavarian forest**, 185; meteorology, 251.
- BEAL, W. J.** Agriculture: its needs and opportunities, 328.
- Beavers at London fisheries exhibition**, 28.
- Beet-juice**, glutamin in, 517.
- Belgium**, geology of, 14.
- BELL, A. M.** A universal language and its vehicle, — a universal alphabet, 350.
- Bell's Primer of visible speech**, reviewed, 204.
- Ben Nevis**, meteorological observatory on, 666; observations at, 203.
- BENEDICT, J. E.** Invertebrates captured by the Albatross, 617.
- Benzotrichloride**, phenols, and phenylamines, 50.
- Bering Sea**, news from, 205.
- Berlin**, anthropology at, 539.
- Berliner Jahrbuch**, 711.
- Beryllium**, spectrum of, 243.
- Bessemerizing copper mattes**, 333.
- BIGELOW, H. R.** The mechanism of direction, 622.
- Binary arithmetic**, experiments in, 755.
- Birchbark poems**, 414.
- Bird-life**, New-England, 357.
- Birds' ears**, *ill.* 422, 552, 586.
- Birds**, Illinois, 282; intelligence of, 301; notes of, 167; of Tonkak, 99; pacinian corpuscles of, 460.
- Bismuth of Australia**, 554; solutions, electrolysis of, 141.
- Biziura**, anatomy of, 435.
- Blackham**, G. E., on naming oculars, 465.
- Blake**, J. F., on St. David's rocks, 635.
- Blake dredgings**, 574.
- Bleaching**, 546.
- Blissus leucopterus**, 540.
- Blood corpuscles**, colorless, 353; serum, chemistry and physiology of, 31; vesicles, 462.
- Boas**, J. E. V., on the phylogeny of the higher Crustacea, 790.
- Body and will**, 600.
- Boilers**, compound engines and, 477.
- Bolivian rivers**, 274.
- Bolometer**, cheap, 137.

- BOLTON, H. C., and JULIEN, A. A. Musical sand, 713. See also JULIEN, A. A., and BOLTON, H. C.
- Bolton's Catalogue of scientific and technical periodicals, 92.
- Bombay, deaths from snake-bite in, 147.
- Book notices, minor, 626.
- Borneo, north-eastern, 288.
- BOSS, L. Comet *b*, 1883 (Brooks), 449.
- Boston society of natural history, 518, 635; Walker prize of, 146; zoölogical society, 810.
- Botanical club, 340.
- BOTANICULUS. Achenial hairs of Senecio, 267.
- Botany, elementary, 13, 105.
- Bottoms, ocean, 41.
- Boulenger, G. A., catalogue of, 810.
- Boundary-line between Guatemala and Mexico, 484.
- Bove's new expedition, 254.
- BOWERS, S. In an Indian grave, 105; many snakes killed, 135.
- Boyd county, Ky., glacial phenomena in, 654.
- Boyle's law, apparatus for, *ill.* 284.
- Brachionus Gleasoni, 468.
- Brachiopoda, shell-structure of, 325.
- Brachyura in New England, 257.
- Brain-weight, 193.
- Branchial arches and clefts, 463.
- Brass, dissociation of, 178.
- BRAUNS, D. The Ainos of Japan, 134.
- Bremiker's Logarithmic tables, reviewed, 174.
- BREWSTER, W. Singular lightning, *ill.* 135.
- Briggs's Steam-heating, reviewed, 686.
- Brine shrimps, American and European, 653.
- British association for the advancement of science, 477, 502, 504, 529, 549, 562, 593, 635, 666.
- British Columbia, fisheries of, 342; fungi, illustrations of, 346; Helices, 525; institution of mechanical engineers, 310; patent law, 608.
- Bromides, ammoniacal, of zinc, 12.
- Brontosaurus, restoration of, *ill.* 209.
- Bronze, invention and spread of, 527; tempering of, 537.
- BROOKS, Margarette W. Bone fish-hooks, *ill.* 653.
- BROOKS, W. K. The phylogeny of the higher Crustacea, 790.
- Brooks comet, 450.
- BROWN, R. Greenland geology, 539.
- Building-stones, 481.
- Burnham's Limestones and marbles, reviewed, 203.
- Burrill, T. J., on preparing and mounting bacteria, 465.
- Butterflies, sucking apparatus in, 576; variations in, 353.
- Butters, American, 291; artificial, 200.
- Cable-cars, 377.
- Cahokia, mounds of, 365.
- Calculus of variations, 266.
- Calibration of galvanometer, *ill.* 282.
- Cambodia, explorations in, 187.
- Cambrian rocks, 518.
- Cambridge entomological club, 30.
- CAMPBELL, J. The mound-builders identified, 365.
- Capron, J. R., on aural experiments in Lapland, *ill.* 819.
- Carbon dioxide, action of, on heat, 582.
- Carbonic oxide, liquefaction of, 4.
- Carboniferous age, vegetation of, 529.
- Cardinalis virginianus, 167.
- CARHART, H. S. The magnetophone, or the modification of the magnetic field by the rotation of a perforated metallic disk, 250, *ill.* 392.
- Carolina wreath, 436.
- Caroline Island, double stars discovered at, 66.
- Carp, German, 377.
- CARPENTER, F. D. Y. Minnesota weather, 262.
- CARPENTER, L. G. November shower of meteors, 713.
- Carpenter, W. B., on the germ-theory of disease, 666.
- Cartography, Russian, 83.
- Cartridges, compressed, 197.
- Carya alba, 761.
- Caspian Sea, 86; region, railways in, 296.
- Cassiterite, 482.
- Catalogues of physical and mathematical works, 342; of stars, errata in, 221.
- Caterpillar, monstrous, *ill.* 61.
- Catlinite, 169.
- Catskill group of Pennsylvania, 327.
- Caucasus, Mollusca of, 230; petroleum in, 367.
- Caverns, Devonshire, 562.
- CAYLEY, A. Obligations of mathematics to philosophy, and to questions of common life, 477, 502.
- Celestite, reproduction of, 313.
- Cell-division, 190.
- Census, tenth, table of ages of, 209.
- Centre of gravity of mass, determination of, *ill.* 283.
- Cereals, copper in, 143.
- Ceylon, 825.
- Ch, English, 712.
- Challenger reports, 837.
- CHAMBERLIN, T. C. The terminal moraine west of Ohio, 317.
- Chambers, V. T., 253, 839.
- Champlain valley, 633.
- CHANDLER, C. H. Kalmia, 309.
- CHANDLER, S. C., jun. On the possible connection of the Pons-Brooks comet with a meteor stream, 683; results of tests with the Almacantar in time and latitude, 239.
- Charnay collection, 170, 368.
- Chemical elements, indexing literature of, 287; problems, 627; reactions, speed of, 289.
- Chemistry, instruction in, at Harvard university, 91; theoretical, 826.
- Chesapeake oyster-beds, *ill.* 440.
- Cheshire salt districts, 210.
- Chester, A. H., on a new method of dry mounting, 465.
- China, meteorology in, 390; telegraph-line in, 186.
- Chinch-bug in New York, 540, 621.
- Chinese laws and customs, 237; not homogeneous, 379; tombs, 235.
- Chitons, organization of, 398.
- Chlorine, hydrates of, 11.
- Chlorophyll, animal, 487.
- Cholera commission, German, 675; epidemic, cause of, 297; in Egypt, 838; precautions against, 452.
- Chonetes, 526, 326.
- Christie, W. H. M., on the Greenwich observatory, 103.
- Chukchi, peninsula, population of, 419.
- Cincinnati glacial dam at, 319, 436; industrial exposition, 452; society of natural history, 384, 605, 839.
- Cinnoline derivatives, 77.
- Circulation, action of respiratory movements on, 496; in kidneys, 499.
- Cirolana concharum, host for, 373.
- Civil engineers, American society of, 75, 100.
- CLARKE, J. T., address of, before archaeological institute, 646; report of the Assos meeting, 712.
- Class systems, Australian, 69.
- Classification of natural sciences, 279; of sciences, 370.
- CLAYPOLE, E. W. A large crustacean from the Catskill group of Pennsylvania, 327; notes on the potato-beetle and the Hessian fly for 1883, 327; Rensselaeria and a fossil fish from the Hamilton group of Pennsylvania, 327; Rensselaeria from the Hamilton group of Pennsylvania, 471; the present condition of the box huckleberry, Vaccinium brachycurum, in Perry county, Penn., 335.
- Cleopatra's Needle, 113.
- Climate, Colorado, 623; in cure of consumption, 426, 457, 682; influence of, on vegetation, 519.
- Coal flora, Australian, 520; volatile constituents of, 220.
- Co-education of the sexes, 117.
- Colombia, 64.
- Color-markings of mammals, 164; changes of lungwort flowers, 319; words, 535.
- Colorado climate, 623.
- Colored population of United States, 376.
- Coloring-matter, animal, 452.
- Columbines, 394.
- Comet *b*, 1883 (Brooks), 449, 450; of 1882, 290; orbit of, 280; Pons-Brooks, 666, 683; elliptic elements of, 654.
- Comets, spectra of, 263.
- Commercial science, bureau of, 340.
- Complex variable, functions of, 308.
- Conchology, 658.
- Conductivity, unipolar, 136.
- Congress of Americanists, 667.
- Connecticut River, 118; waters, oyster farming in, 376.
- Consolidation of bulky materials, 331.
- Constant, solar, 44, 496.
- Consumption, cure of, 426, 457, 682.
- Contagia, study of, 212.
- Continental type, 321.
- COOK, C. S. The use of the spectroscope in meteorology, *ill.* 488.
- Co-operation between government and state geological surveys, 314.
- CORPE, E. D. The evidence for evolution in the history of the extinct Mammalia, 272; the structure of the skull in Diclonius mirabilis, a Laramie dinosaurian, 338; the trituberculate type of superior molar, and the origin of the quadrutuberculate, 338; two primitive types of Ungulata, 338.
- Copepoda, fresh-water, 29.
- Copper extraction process, 248; in cereals, 143; mattes, 333; prehistoric, 351; production of world, 359; sulphates of, 10.
- Cordierite, 558.
- Cormorant, osteology of, 739, 822.
- Corn, 335; butt and tip kernels of, 201; composition of, 290.
- Cornell university, electrical science at, 147; mathematical library, special list, reviewed, 827.
- Corvidae, 265.
- Corwin, cruise of, 752.
- Coturnia variabilis, 467.
- Cottin, on the fall of a balloon, *ill.* 189.
- COUES, E. A hearing of birds' ears, *ill.* 422, 552, 586.
- COULTER, J. M. Development of a dandelion flower, 336; some glacial action in Indiana, 6.
- Cox, E. T. Cable-cars for city passenger traffic, 377.
- Crevaux, death of, 151; search for, 30, 222, 485; voyages of, in Guiana, 152.
- Crico-thyroid muscle, function of, 165.
- CROCKER, F. B. Regulation of electro-motive force, 821.
- CROSBY, W. O. Probable occurrence of the Taconian system in Cuba, 740.
- Crows, prehensile feet of, 265.
- Crustacea, phyllopod, 571; phylogeny of, 790.
- Cryptogams, synonymy of, 424.
- Crystals in bark of trees, *ill.* 707, 780.
- Cuba, mines of, 81; Taconian system in, 740; woods of, 780.
- Cubica, real roots of, 158.
- Cumacea, 793.
- Cunéé, tribes of, 404.
- Curare, 534.
- Current-meter, 292.
- Currents of Pacific Ocean, 117.
- Curtonera stabulans, 697.
- Cuspidine, 449.
- Cutaneous nerves in mammals, 35.
- Cutts, R. D., 810.
- Cyclones, *ill.* 589, 610, 639, 701, 729, 758.
- Cypella, pollination of, 189.
- Cypress, American swamp, 38.
- Cystoliths, formation of, 25.
- DALL, W. H. First use of wire in sounding, 12.
- Damage to delicate substances by packing, 651.
- DANA, J. D. Evidence from southern

- New England against the iceberg theory of the drift, 390.
 Dandelion flower, 336.
 Danish expeditions in Greenland, 150.
 Darwin memorial fund, 341.
 Darwin on instinct, 782.
 Date-palms, cultivation of, 453.
 Davidson, G., on solar eclipse of Oct. 20, 1883, 338.
 DAWSON, J. W. Glacial deposits, 321; rhizocarps in the paleozoic period, 326; some unsolved problems in geology, 190.
 Deaf and dumb, instruction of, 780.
 Deaths from snake-bite, 147.
 Decapoda, 793.
 Decomposition of water by metalloids, 244.
 Deep-sea explorations, French, 484; research, water-bottles and thermometers for, *ill.* 155.
 Defective effect of earth's rotation, 135.
 Deformation of earth's surface, 183.
 Delaland-Guerineau prize, 385.
 Delaware, stratified drift in, 221.
 DeLong records, reviewed, *ill.* 540.
 Dendroeca aestiva, 302.
 Denmark polar meteorological station, 840.
 Dentine, 264.
 Dentition, laws of, 464.
 Design arguments, 309.
 Deutzia scabra, 385.
 Developer, concentrated, 6.
 Devonian formation, paleontology of, 836.
 Devonshire caverns, 562.
 Diaphragm, development of, 233.
 Dickson expedition, 28.
 Dielionus mirabilis, 338.
 Didymoplexis, pedicels in, 125.
 Differential equation, 410; partial, 441.
 Digestion of meats and milk, 303.
 Digitaline, action of, on heart, 530.
 DILLER, J. S. Notes on the geology of the Troad, 255.
 DIMMOCK, G. The Arago laboratory at Banyuls, *ill.* 556.
 Dipterous larvae in man, 697, 494.
 Direction, mechanism of, 554, 622, *ill.* 655; of growth in plants, 5; sense of, 739.
 Disease, germ-theory of, 666; germs of, 388.
 Dissociation of brass, 178; of salts, *ill.* 288.
 District of Columbia, lithology of, 553.
 Division, new rule for, 788.
 DODGE, J. R. Enhancement of values in agriculture by reason of non-agricultural population, 378.
 Doetsch copper extraction process, 248.
 Dog, intelligence of, 822.
 DOLBEAR, A. E. The conditions necessary for the sensation of light, 214; the static telephone, 285.
 Domes, rotation of, 280.
 Domestication of horses, 130.
 Dora coal-field, 794.
 DORSEY, J. O. Marriage laws of the Omahas and cognate tribes, *ill.* 599; Osage war customs, 368.
 Double stars, list of, 66.
 Dowson's gas, 445.
 Drainage system of Iowa, 762.
 Drift, iceberg theory of, 390; in Delaware, 221.
 DUDLEY, W. R. An abnormal orchid, *Habenaria hyperborea*, 335; origin of the flora of the central New York lake region, 336.
 Dudley observatory, Albany, N.Y., 449.
 DVOŘÁK, V., on acoustic rotation apparatus, *ill.* 818.
 Dyer, C. B., 118.
 Earth, density of, 175; formations, 367; mass of, increase of, 820.
 Earthquake at New Madrid, Mo., in 1811, 324; at Ischia, *ill.* 396.
 Easter Island, 213.
 EASTMAN, J. R. Internal contacts in transits of the inferior planets, 239.
 Echinella articulata, 333.
 Eclipse expedition, French, 591; of 1882, 11; solar, of May 6, 1883, 237, 241.
 Eclipses and terrestrial magnetism, 451; of Jupiter's satellites, 40, 173.
 Economic entomology, 406; in England, 149.
 EDDY, H. T. Kinetic considerations as to the nature of the atomic motions which probably originate radiations, 76, 123; radiant heat, 793; the kinetic theory of the specific heat of solids, 284, 424.
 EGBERT, H. V. Elliptic elements of comet Pons-Brooks, 654.
 Eggs, birds', white of, 322; yolkless artificial, 323.
 Egypt, ancient, flora of, 39.
 Egyptian mechanical methods, 467.
 Electric head-light, 509; light on the Albatross, *ill.* 642, 671, 705; railway, 636; stop for steam-engines, 46; tram-car, 696.
 Electric-lighting, 240; engine for, 107; fire risks of, 781; machines, 106, 452.
 Electrical dinners, 254; signals, *ill.* 823.
 Electricity, atmospheric, 291.
 Electro-magnets, 16.
 Electrolysis of bismuth solutions, 141.
 Electromotive force, regulation of, 821; thermochemical properties of, 177.
 ELLIOT, S. L. Variations in butterflies, 353.
 Ellipse, perimeter of, 265.
 Elliptic functions, 542.
 Ellis's North-American fungi, 255.
 Emblematic mounds, 365, 366.
 EMERTON, J. H. The model of Architeuthis at the Fisheries exhibition, 683.
 Empholite, 450.
 Endowment of biological research, 504.
 Engineers, civil, American society of, 75, 100; mechanical, American society of, 62, 267.
 Engines, compound, 477; heavy, 309; of lake steamers, 139; simple and compound, 384; spherical steam, 544; two-cylinder compound, 543.
 English law, 408; sparrow, trick of, 201.
 Ephilpids, characters of, 65.
 Epidemic diseases in plants, 334.
 Epidermal glands of caterpillars and Malachius, 350; membranes, lignification of, 123.
 Epithelium, pulmonary, 97.
 Equations, algebraical, 409; differential, 410, 441; elliptic differential, 238; linear differential, 134; of equilibrium, 382; of third degree, 44.
 Equilibrium, function of, 458; equations of, 382.
 Eroding power of ice, 320.
 Eskimo stone pyramids, 782.
 Ethnology, 439; of Alaska, 667; of Yunnan and Shan country, 500; Roumanian, 133.
 Euphausiacea, 791, 793.
 EVANS, G. W. Radiometers with curved vanes, 215.
 Evolution, 659; evidence for, in history of extinct Mammalia, 272.
 Experimental method in science, 683.
 Explosive, new, 196.
 Explosives, nature of, 667.
 Eye, embryology of, 91.
 Eyelid, human, 36.
 Factory acts, 485.
 Fairy-rings, 16.
 False claims, 13.
 Family registers, 599.
 FARLOW, W. G. Relations of certain forms of algae to disagreeable tastes and odors, 333; the spread of epidemic diseases in plants, 334.
 FARQUHAR, H. Experiments in binary arithmetic, 755.
 Fat, absorption of, by lymph-cells, 192; origin of, 400.
 Fattened animals, maintenance of, 512.
 Feeding-rations, 145.
 Fell, J. B., on alpine railways, 635.
 Felspars in rocks, 336.
 Fergusson's Parthenon, reviewed, 740.
 Ferryboat, enormous, 412.
 Fertilization, insects *vs.*, 320; of Leptospermum, 276.
 Fertilizer, sulphuric acid as, 335.
 Fertilizers, effect of, on oats, 550; for tobacco, 516; nitrogenous, 549.
 Ficaria, sterility of, 568.
 Field-clubs and local societies, 1.
 Figures, symmetrical linear, produced by reflection, *ill.* 36.
 Finley's Tornado studies, reviewed, 403.
 Fire risks of electric lighting, 781.
 Fish-commission steamer Albatross, *ill.* 6, 66.
 Fish-hooks, bone, *ill.* 653.
 Fisheries exhibition, international, 129, *ill.* 155, 612; beavers at, 28; mollusks at, 128, 431; water-bottles and thermometers for deep-sea research at, *ill.* 155; zoology at, 180.
 Fisheries of British Columbia, 342; salmon, 343.
 Fishes of Batstoe River, 163.
 FISK, S. A. Climate in the cure of consumption, 426, 457.
 Flamsteed, 666.
 FLETCHER, Alice C. Observations on the laws and privileges of the gens in Indian society, 367; symbolic earth formations, 367.
 FLETCHER, R. Human proportion, 539.
 Fletcher's Human proportion, reviewed, 354.
 Flexure corrections of meridian circle, 239; of broken transit, 1.
 Flora, fossil, of Greenland, 440; of New-York lake region, 336.
 Florida, reefs, keys, and peninsula of, 764.
 Floucularia, 83.
 Flow in rotary pumps, 292.
 Fluorite, crystals of, 148.
 Fluosilicates, hardening limestones with, 311.
 Flynn's Hydraulic tables, reviewed, 627.
 Fodder, sunflower cake as, 552.
 Folklore in the Panjab, 259; society, 92.
 FOLWELL, W. W., address of, before American association at Minneapolis, 227.
 Forbes, S. A., on diseased caterpillars, 483.
 Forest-trees of Arkansas, 342.
 Forestry congress, American, 117; science of, 698.
 Fossil flora of Greenland, 440.
 Foye's Chemical problems, reviewed, 627.
 FRAZER, P. Lewis's Geology of Philadelphia, 269, 540.
 French association for the advancement of science, 389; eclipse expedition, 591; geographical explorations, 596; law, 408.
 FRISBIE, E. Orbit of the great comet of 1882, 280.
 FRITTS, C. E. New form of selenium cell, with some remarkable electrical discoveries made by its use, 283.
 Frog, bird-eating, 148; palate of, nerves of, 68.
 Frost, effect of, on fire-plug casings, 411.
 Fruit-insects, 174.
 Fuchsian functions, 506.
 Fulminating compound, 198.
 Functions, elliptic, 542; real, 329; theory of, 41.
 Fundamental catalogue of the *Berliner Jahrbuch*, 411.
 Fungi, British, 346; Iowa, 22; North American, 255; Ohio, 24, 425.
 Fungorum, Sylloge, 345.
 Fuze, time, for artillery, 9.
 GAGE, S. H. Pharyngeal respiration in the soft-shelled turtle, *Aspidonectes spinifer*, 338. See also WILDER, B. G., and GAGE, S. H.
 GAGE, S. H., on cataloguing, labelling, and storing microscopical preparations, 465.
 Galibis, 194.
 Galicia, petroleum from, 510.
 Gallinae, sternal processes in, 622.
 Galton's Human faculty, reviewed, 79; proposed family registers, 599.
 Galvanometer, calibration of, *ill.* 282.
 Games, Japanese, 366.
 Gamma-dichloridibromopropionic and gamma-dichlorbromacrylic acids, 288.

- Gases evolved during conversion of grass into hay, 109.
- GEDDINGS, W. H. Climate in the cure of consumption, 682.
- Geikie's Geology, reviewed, 823.
- Gelatine film, 135.
- Genital armature of Lepidoptera, 30.
- Gens in Indian society, 367.
- Geodetic association, international, of Europe, 656; report of committee of, 604.
- Geographic control of marine sediments, *ill.* 560; explorations, French, 596; names, 28.
- Geologic age of Atlantic Ocean, 666; changes in Alaska, 655, 294; commission of Spain, 148; formations, synchronism of, 739, *ill.* 794, 362; map of Spain, 29; subjects, reports of committees on, of American association, 314.
- Geologists, international congress of, 314.
- Geology, 823; of Belgium, 14; of Greenland, 539; of Pennsylvania, 49; of Philadelphia, 269, 402, 540, 652; of the Troad, 255; unsolved problems in, 190.
- Gephyreans, anatomy of, 93.
- Germ-layers of rodents, 191.
- Germ-theory of disease, 666.
- German survey of northern heavens, 229.
- Germicide value of therapeutic agents, 433.
- Germs of disease, 385.
- Geyser comparisons, 101.
- Gibraltar land-shells, 370.
- GILBERT, G. K. Drainage system and loess distribution of eastern Iowa, 762; pre-Bonneville climate, 170.
- Glacial action in Indiana, 6; age, ice in, 436; boundary between New Jersey and Illinois, 316; cañons, 315; clays at Alton, Ill., 327; dam at Cincinnati, 319; deposits, 321; epoch in Minnesota, 319; man, evidences of, 437; man in Minnesota, 369; period, Connecticut River in, 118; phenomena in Boyd county, 654.
- Glaciation of North America, 316.
- Glands, epidermal, of caterpillars, 350.
- Glutamin in beet-juice, 517.
- Glycerine, reconversion of nitro-glycerine into, 218.
- GODWIN-AUSTEN, H. H. The Himalayas, 593.
- Gold in limestone, 270.
- GOODE, G. B. The international fisheries exhibition, 129, *ill.* 612.
- Gottsche's Pebbles of Schleswig-Holstein, reviewed, 443.
- Gould, B. A., 451, 666.
- Government as a publishing-house, 31.
- Grain, damage to, by wetting, 181.
- Granites, Minnesota and New England, 324.
- Grant quarry, 413.
- Grants for scientific purposes in England, 549.
- Grape-mould, oospores of, 563.
- Grasses, protogyny of, 226.
- Gravitation, influence of, upon growth in plants, 5.
- Gravity and cell-division, 190.
- GRAY, E. The static telephone, 286.
- Great Basin, field-work of division of, 633.
- Greely relief expedition, *ill.* 412.
- Green's Eureka, reviewed, 109.
- Greenland, colonization of, 29; Danish expeditions in, 150; exploration of, 451; fossil flora of, 440; geology, 539; Graah's investigations in, 422; inland ice of, *ill.* 732.
- Greenwich observatory, 103.
- Growth in plants, 5; influence of atmospheric pressure on, 188.
- Guano, aves, 548.
- Guatemala, explorations in, 262.
- Guiana, voyages in, 152.
- Guilds, history of, 469.
- Guinea, Portuguese, 562.
- Gulf Stream, explorations in region of, 153.
- Gun with hexagonal section of bore, 696.
- H., A. P. Letters in a surface film, 309.
- H., H. A. Sun-spot observations, 72.
- Habenaria hyperborea, 335.
- Haeckel's Ceylon, reviewed, 825.
- Haemoglobin in blood of Branchiopoda, 28.
- Hafgygia, 21.
- HALE, H. The Iroquois institutions and language, 496.
- Hale's Iroquois book of rites, reviewed, 270.
- Halite, 555.
- HALL, E. H. Auroral experiments in Lapland, *ill.* 819.
- Hall, I. H., on the Arabic translation of the Bible, 651; on the temple to Zeus Labranos in Cyprus, 651.
- HALL, J. Preliminary note on the microscopic shell-structure of the paleozoic Brachiopoda, 325.
- HALSTED, B. D. A combination walnut, *ill.* 761; notes on sassafras-leaves, *ill.* 491; a strange sassafras-leaf, *ill.* 684.
- Hamilton group of Pennsylvania, 327, 399.
- Hamlin, F. M., on microscopical examination of seminal stains on cloth, 465.
- Hardness in water, estimation of, 142.
- Harrington's Life of Sir W. E. Logan, reviewed, 573.
- Harris on early American cartography, 115.
- HART, C. P. Conscious automatism, 339.
- HART, S. Natural snowballs or snow-rollers, 285.
- Harvard university, instruction in chemistry, 91; Lawrence scientific school, 342.
- HASTINGS, C. S. See HOLDEN, E. S., and HASTINGS, C. S.
- Hausmannite, artificial, 13.
- Hawaii, rainfall at, 252.
- Hay, conversion of grass into, 109.
- HAYNES, H. W. Alnwick castle antiquities, 136.
- Heart, development of, 579; and alcohols, 96; beat, influence of pressure on, 210; systole and diastole of, 584.
- Heat-dissipation, 581.
- Heating by exhaust-steam, 140.
- Heavens, northern, survey of, 229.
- Heer, Oswald, 550; *portrait*, 583.
- Heer's Fossil flora of Greenland, reviewed, 440.
- HEILPRIN, A. Synchronism of geological formations, *ill.* 794.
- Heilprin, Angelo, 581.
- Helices, British, 525.
- Heliostat, new, *ill.* 285.
- Hell's observations of transit of Venus in 1769, 219.
- Henderson gas-furnace, 80.
- HENDRICKS, J. E. Deflective effect of the earth's rotation, 135.
- HERNDON, C. G. Specific gravities of sea-water determined on the Albatross, 618.
- HERRICK, F. H. A reckless flier, 222; prairie warbler in New Hampshire, 309; trick of the English sparrow, 201.
- Herrick's Types of animal life, reviewed, 688.
- Herschel on star-gauges, 117.
- Hertwig, O., on the origin of the mesoderm, *ill.* 817.
- Hessian fly, 337.
- Hicks, Henry. St. David's rocks and universal law, *ill.* 167.
- Hicks's Critique of design arguments, reviewed, 309.
- HILGARD, E. W. The practical value of soil-analysis, 435.
- Himalayas, 593.
- HINDS, J. I. D. Sense of direction, 739.
- HINRICHS, G. Remarks on the tracings of self-registering instruments, and the value of the signal-service indications for Iowa, in June and July, 1883, 285.
- Hirudinea, nervous system of, 456.
- Histology of insects, 430; systematic, 88.
- HITCHCOCK, C. H. The early history of the North-American continent, 293.
- HITCHCOCK, R. Water-bottles and thermometers for deep-sea research at the International fisheries exhibition, *ill.* 155.
- Hoangnan, 754.
- Hoe-shaped implement, 179.
- Hoek, P. P. C., on oyster-culture in Holland, 79.
- Hogs, species of, 302.
- Holbrook, M. L., on the termination of the nerves in the kidneys, 465.
- HOLDEN, E. S. A system of local warnings against tornadoes, 521; Bremiker's Logarithmic tables, 174; errata in catalogues of stars, 221; the fundamental catalogue of the *Berliner Jahrbuch*, 711; the search for Crevaux, 222; the total solar eclipse of May 6, 1883, 237.
- HOLDEN, E. S., and HASTINGS, C. S. List of new double stars discovered at Caroline Island, 66.
- HOLDER, J. B. The right whale of the North Atlantic, 132, 266.
- Holland, oyster-culture in, 79; zoölogical station, *ill.* 618.
- Honigman's locomotive, 474.
- Hop-vine borer, 159.
- Hopkins, E. W., on Manu, 651.
- HORN, G. H. John Lawrence LeConte, *portrait*, 783.
- Horse, domestication of, 130; Indians and, 72.
- HOUGH, F. B. The methods of statistics, 371.
- HOUGH, G. W. Physical phenomena on the planet Jupiter, 240; The rotation of domes, 280.
- HOVEY, H. C. Oyster farming in Connecticut waters, 376.
- HOWLAND, E. P. The application of nitrous oxide and air to produce anaesthesia; with clinics on animals in an experimental air-chamber, 338.
- HOY, P. R. The tornado at Racine, May 18, 1883, 281.
- Hull on the geological age of the North Atlantic Ocean, 666.
- Human faculty, 79; proportion, 354, 539.
- Humblebees vs. field-mice, 470.
- Humboldt fund of Berlin academy of sciences, 180.
- Humerus, perforated, 326.
- Humming-birds, flight of, 436.
- HUNT, T. S. A classification of the natural sciences, 279; false claims, 13; the pre-Cambrian rocks of the Alps, 322; the pre-Cambrian rocks of Wales, 403; the serpentine of Staten Island, New York, 323.
- Huntington's logarithm tables, 29.
- Hunyadi Janos water, 754.
- Huranbee, laterite from, 337.
- Hurricanes, August, 635.
- Hybrid between gayal and zebu, 101.
- Hydrates of chlorine, 11.
- Hydraulic tables, 627.
- Hydrography of Siberian Sea, 420.
- Hydroid polyp, new, 26.
- Igdukinone, 268.
- Hygrometer studies, 391.
- Hymenoptera, 157.
- Hyperelliptic functions, 214; integrals, 471.
- Hypertrichosis, 505.
- Ice age, Minnesota valley in, 318; dam at Cincinnati, 436; eroding power of, 320; of Greenland, *ill.* 732; thickness of, in glacial times, 685.
- Iceberg theory of the drift, evidence against, 390.
- Icelanders, calendars of, 782.
- Icterus Baltimore, 302.
- Idaho, fauna of, 66.
- Ideas of motion, 713.
- Igloo of Innuit, *ill.* 182, 216, 259, 304, 347.
- Iguanodon, fossil, 451.
- Illinois birds, 282; state laboratory of natural history, 483, 698.
- Illumination, dark-field, of lines on glass, 240.
- Ilyanassa obsoleta, bifurcate tentacle in, 622.
- Implements, natural history of, 43.
- Impregnation of ovum, 583.
- India, archeology in, 809.

- Indian courtship, 377; grave, 105; surveys, 120.
- Indiana, glacial action in, 6; state university, 116, 605, 685.
- Indians, North-American, 72.
- Indigo group, compounds of, 511.
- Individuality, origin of, 321.
- Inrapura, ascent of, 273.
- Infection, points of, 105.
- Infusoria, 467.
- INGERSOLL, E. Tree-growth, 569.
- Inuit, igloo of, *ill.* 182, 216, 259, 304, 347.
- Insect fungi, 369.
- Insects, American paleoecology, 60; classification of, 457; histology of, 430; protection against, 378; vs. fertilization, 320.
- Inspired science, 109.
- Instinct, 782.
- Instruments, self-registering, 285.
- Integrals, hyperelliptic, 471.
- Intelligence of American turret spider, 43; of birds, 301.
- International congress of geologists, 314; exhibition to illustrate health and education, 839; fisheries exhibition, 129, *ill.* 155, 612; prizes at, 606; geodetic association of Europe, transactions of, reviewed, 656; geodetic commission, 814.
- Intra-mercurial planet, 605.
- Invention, origin of, 779.
- Iolite, 558.
- Iowa academy of sciences, 607; drainage system and loess distribution of, 762; fungi, 22; water-lime group in, 323; weather bulletin, 254, 810; weather service, 27, 339.
- Iris, innervation of movements of, 438.
- Iron in mounds, 304; manufacture, gaseous fuel in, 246.
- Iroquois, 154; book of rites, 270; institutions and language, 496.
- Irritability of spinal cord, 433.
- Ischia, earthquake at, *ill.* 396, 485.
- Isopoda, 793; of Blake dredgings, 574.
- JACOBS, F. O. Change of birds' notes, 167.
- Jacobson, organ of, in Ophidia, 301.
- JAMES, J. F. Achenal hairs of Senecio, 201; dissemination of Phlox, 496.
- JANSEN, J. French observations on the solar eclipse of May 6, 1883, 241.
- Janssen, P. J., on the French eclipse expedition, 591.
- Japan, meteorological observatory of, 253; population of, 346.
- Japanese games, 366.
- JASTROW, J. The mechanism of direction, *ill.* 655.
- Java earthquake, *map*, 469, 725.
- Jeannette, voyage of, *ill.* 540.
- JEFFERSON, T. E. A new system for the treatment of sewer-gas, 379.
- JEFFRIES, J. A. Osteology of the cornu-morant, 739; sternal processes in Gallinae, 622.
- Jeromeffite, 250.
- Jews in Africa, 154.
- Johns Hopkins university biological laboratory, 147, 209; chemical laboratory, 149; circulars, 341; fellowships, 341; physical laboratory, 146, 254; special lectures, 253.
- Joly's Man before metals, reviewed, 626.
- JORDAN, D. S. Museum of the Indiana university, 685.
- Juglans nigra, 761.
- JULIEN, A. A., and BOLTON, H. C. The singing beach at Manchester, Mass., 325. See also BOLTON, H. C., and JULIEN, A. A.
- Jupiter, astrophysical observations of, 172; physical phenomena on, 240; satellites of, 40, 173.
- Jutish type of face, 466.
- Kabyles, sociology of, 393.
- Kalmias, 201, 267, 309.
- Kame rivers of Maine, 319.
- Kansas, State university of, 90, 340.
- Kapoc, 754.
- KELLCOTT, D. S. Psephenus Lecontei: the external anatomy of the larva, 337.
- Kellicott, D. S., on stalked infusoria in crayfish, 465.
- KENNEDY, W. S. The influence of winds upon tree-growth, 470.
- Ketones, compounds of, with hydrazine, 78.
- Kidney, clia in, 531; circulation in, 469.
- Kinetic theory of melting and boiling, 284; of specific heat of solids, 284, 424.
- KING, F. H. A dog plans and executes with reference to the future, 822; aurora, 472; the influence of gravitation, moisture, and light, upon the direction of growth in the root and stem of plants, 6.
- KIRKICUTT, L. P. 'Rex magnus', 345.
- Kinship, notation of, 533.
- KIRKWOOD, D. The relative ages of planets, comets, and meteors, 12.
- Kitchens of the east, 369.
- KNEELAND, S. P. Prehensile feet of the crows, 263; the wild tribes of Luzon, *ill.* 522.
- Koch, Report of the German cholera commission, 675.
- Kola, 780.
- Kongo, 55; basin, muatiamvo of, 56.
- Konkoly's Astronomical instruments, reviewed, 202.
- Kummer's surface, 541.
- Lagenella nobilis, 22.
- Laminaria, 21, 21; Andersonii, 21; Cloustoni, 21; platymeris, 21.
- Lamprey, development of teeth in, *ill.* 731.
- Land-holding, 73; history of, 768.
- Langie, Fleuriot de, 148.
- LANGLEY, J. W., and MCGEE, C. K. The sub-aqueous dissociation of certain salts, *ill.* 288.
- LANGLEY, S. P. An interesting sun-spot, *ill.* 266.
- Language, teaching, to brutes, 682.
- Languages, 439.
- LANKESTER, E. R. The endowment of biological research, 504.
- Laramie plants, 517.
- Lasius flavus, 143.
- Laterite from Huranbee, 337.
- Lawrence scientific school embryological laboratory, 342.
- LECONTE, John. Solar constant, 44.
- LeConte, John Lawrence, 696, *portrait*, 783; collections of, 808.
- LECONTE, JOSEPH. The reefs, keys, and peninsula of Florida, 764.
- Ledger's Sun and its planets, reviewed, 17.
- LEIDY, J. Crystals in the bark of trees, *ill.* 707.
- Leidy, J., on Manayunkia speciosa, 762; on Urnatella gracilis, *ill.* 789.
- Lepidium, 105; seeds of, 202.
- Lepidoptera, genital armature of, 30.
- Leptospermum, fertilization of, 276.
- LESLEY, J. P. Wright's ice-dam at Cincinnati, 436.
- Lessar's expedition toward the Oxus, 840.
- LESSEPS, F. de. French geographical explorations, 596.
- Levelling, spirit, errors in, 269.
- LEWIS, H. C. Geology of Philadelphia, 402, 652; the great terminal moraine across Pennsylvania, *ill.* 163.
- Lewis's Geology of Philadelphia, reviewed, 269.
- Libinia, anatomy of, 372.
- Library, public, of Cincinnati, 484.
- Lick observatory, 29; trust, 609.
- Licking valley, pebbles in, 436.
- Life insurance, 376.
- Light, influence of, upon growth in plants, 5; sensation of, 214.
- Lightning, origin of, 204; singular, *ill.* 135.
- Ligula Mansoni, 721.
- Lime-juice in pemmican, 471.
- Limestone, gold in, 270.
- Limestones and marbles, 203.
- Linear substitutions, 472.
- Linnaean society of New South Wales, 276.
- LINTNER, J. A. The chinch-bug in New York, 540.
- Liquids, molecular volume of, 547.
- Literature of chemical elements, 287; of pollination, 341.
- Lithiophilite, 483.
- Lithology, journalistic, 114; of District of Columbia, 553.
- Liver, development of, 100.
- Lockwood, S. A bifurcate tentacle in Ilyanassa obsoleta, 622.
- Locomotives, compound, 49; in Europe, 475; electric head-light for, 509; fireless, 474.
- Loess at Alton, Ill., 327; distribution of, in Iowa, 762.
- Logan, Sir William, 573.
- Logarithmic tables, 174.
- Losos of central China, 405.
- London anthropological institute, 540.
- Lonchera involucrata, 802.
- Lophogastrida, 793.
- Lorillard City, 260.
- LOVEWELL, J. T. Tornado at Racine, 1883, 281.
- Luminous paint, 698.
- Lungs, air-tight, 160; development of, 100.
- Luxotype process, *ill.* 809.
- Luzon, wild tribes of, *ill.* 522.
- Lymphatic vessels, 462.
- Lymphatics of periosteum, 63.
- LYON, D. G. Recent Babylonian research, 40.
- Lysimeter record, 290.
- MABERY, C. F. and NICHOLSON, H. H. On γ dienordibromopropionic and γ -dichlorobromacrylic acids, 288.
- Mabery, C. F., 452.
- MACADAMS, W. A new vertebrate from the St. Louis limestone, 327; animal remains from the loess and glacial clays at Alton, Ill., 327; the great mounds of Cahokia, 365.
- McCalla, A., on verification of microscopical observation, 465.
- McCook, H. C., on the intelligence of the American turret spider, 43.
- MACFARLANE, J. The 'earthquake' at New Madrid, Mo., in 1811, probably not an earthquake, 324.
- MCGEE, C. K. See LANGLEY, J. W., and MCGEE, C. K.
- MCGEE, W. J. Glacial cañons, 315.
- McGee, W. J., on drainage system and loess distribution of Iowa, 762.
- McKay, Charles Leslie, 635.
- MACLOSKIE, G. Macloskie's Elementary botany, 105; seeds of Lepidium, 202.
- Macloskie's Elementary botany, 105; reviewed, 13.
- Macrobiothia, 103.
- Madagascar, 38.
- Magnetic observations, *ill.* 58; survey of Missouri, 251.
- Magnetism, terrestrial, 451.
- Magnetophone, 250, *ill.* 392.
- Magyars, origin of, 102.
- Mahlemuts, 607.
- Maine building-stones, 481; kame rivers in, 319.
- Maize ensilage, proteine of, 387; kernels, structure of, 334.
- Malagasy place-names, 236.
- Mammalia, extinct, evolution in history of, 272.
- Mammals, color-markings of, 164.
- Man, antiquity of, 779; before metals, 626; dipterous maggots in, 494; glacial, 437; glacial, in Minnesota, 369; region of evolution of, 70; place of, in nature, 532.
- Manatee, epiphyses on vertebrae of, 211.
- Manayunkia speciosa, 762.
- Manchester, singing beach at, 325.
- Mandrill, birth of, 498.
- MANN, W. Impregnation in the turkey, 105.
- Manures, influence of, on soil, 111; relation of, to seed, 513; phosphatic, in drought, 180.
- Manuring oats, 361; with potash salts, 360.

- MARCOU, J. B. The affinities of *Richthofenia*, 103.
- MAREY, E. J. The physiological station of Paris, *ill.* 678, 709.
- Marine sediments, control of, *ill.* 560.
- Marriage laws of Omahas, *ill.* 599.
- Martin, H. N., 209.
- Maryland oyster commission, 665.
- Masal people, 502.
- MASON, O. T. The Charnay collection at Washington, 368; the scope and value of anthropological studies, 358.
- Massachusetts agricultural experiment-station, 636; institute of technology, Boston, 449, 605.
- Mastodon *arvernensis*, 386.
- Mathematics, obligations of, to philosophy, 477, 502.
- Maturation of mammalian ovum, 583.
- Maudsley's Body and will, reviewed, 600.
- Mavia tribes of negroes, 407.
- MAXWELL, S. A. The formation of tornadoes, 620.
- Maynard's Manual of taxidermy, reviewed, 312.
- Mechanical engineers, society of, 62, 267; methods, Egyptian, 467.
- Mechanism of direction, 554, 622, *ill.* 655.
- Medal of Imperial geographical society, 118.
- Medical profession in England, 667.
- Mediterranean Mollusca, 126; oysters, 430.
- Medusae, American, life-history of, 489.
- MEEHAN, T. Rapid geological changes in Alaska, 655.
- Melanippe montanata, 55.
- MELL, P. H., Jun. Method for making electrical signals, *ill.* 823.
- Melophorus Bagoti, 143.
- Melospiza melodia, 303.
- Melting, kinetic theory of, 284.
- MENDENHALL, T. C. A method of distributing weather forecasts by means of railways, 252.
- Mentzelia laevicaulis, 124.
- Meridian circle, flexure corrections of, 239.
- Meromyza americana, 833.
- Merovingian grants of immunity, 470.
- MERRIMAN, G. B. Illustrative apparatus for astronomy, *ill.* 218.
- Mesoderm, composition of, 11; origin of, *ill.* 815.
- Mesogonistius chaetodon, 722.
- Metalloids, decomposition of water by, 244.
- Meteoritic iron, 222.
- Meteorite in Argentine Republic, 386.
- Meteorological notes, 364; observatory of Japan, 253; station at Orange Harbor, 384.
- Meteorology, Bavarian, 251; elementary, 226; in China, 390; of St. Michaels, 61; spectroscope in, *ill.* 488; theoretical, 767.
- Meteors, November, 713; observation of, 725.
- Metre of archives, relation between, and imperial yard, 250.
- Metrical standard of mound-builders, 365.
- Micrococcus, 483.
- Microscope, treatise on, 313.
- Microscopic life, rare forms of, 428; sections, reconstruction of objects from, 521.
- Microscopical diagnosis, 83.
- Microscopists, American society of, 117, 465.
- Milk, preserved, 144.
- Mill-engines, 7.
- Miller manual labor school, 606.
- Miller-Hauefnels' Theoretical meteorology, reviewed, 767.
- Milne, John, 341.
- Mimicry, 228.
- MIXER, R. H. Fishes obtained by the Albatross, 617.
- Mineral resources of United States, 413.
- Minerals from Amelia county, Va., 338.
- Mines of Cuba, 81.
- Mining region, Prescott, 82.
- Minnesota, glacial epoch in, 319; granites, 324; valley in ice age, 318; weather, 262.
- MINOT, C. S. Balfour's last researches on *Peripatus*, *ill.* 306; composition of the mesoderm, 11; histology of insects, 430; origin of the mesoderm, *ill.* 815; primitive streak of vertebrates, 105.
- Mirage, 5.
- Missionary work, French, 225.
- Missouri, magnetic survey of, 251; river, descent of, 518; weather service, 26.
- Mitra, notes on, 286.
- Mitra cryptodon, 207.
- MIXTER, C. S. The increase of the colored population of the United States, 376.
- Mohawks, life among, 366.
- Moisture, influence of, upon growth in plants, 5.
- Molar, superior, 338.
- Molecular volume of liquids, 547.
- Mollusks, abyssal, 27, 208, 453; of Caucasus, 230; extramarine, of New Guinea, 490; at Fisheries exhibition, 128, 431; Mediterranean, 126; notes on, 59; use of, 587.
- Moncel's, du, Electro-magnets, reviewed, 16.
- Mongols, hospitality of, 148.
- Montgolfiers' monument, *ill.* 517.
- Moraine, terminal, across Pennsylvania, *ill.* 163; west of Ohio, 317.
- Moraines, 321.
- Morin, 666.
- MORSE, E. S. A new plan of museum case, 333; in-door games of the Japanese, 366; methods of arrow release, 369; *Mya arenaria*: its changes in pliocene and prehistoric times, 336; papers of, at Minneapolis, 437; the kitchens of the east, 369; the utilization of the sun's rays for warming and ventilating apartments, 283.
- Morse's papers at Minneapolis, 437.
- Morton's Heroes of science—astronomers, reviewed, 623.
- Motion, ideas of, 713.
- Motor-nerve endings, 162.
- Motors, prime, 443.
- Mouchez on the Paris observatory, 131.
- Mound-builders identified, 365; metrical standard of, 365; pipes of, *ill.* 258.
- Mounds, emblematic, 365, 366; iron in, 304; Missouri, 366; of Cahokia, 365; of Wisconsin, 378.
- Mountain sheep, 210.
- Mourlon's Geology of Belgium, reviewed, 14.
- Mouth of vertebrates, 33.
- M'tesa, death of, 403.
- Mucor racemosus, 112; tenuis, 112.
- Mucors, zygosporos of, 122.
- Müller, Hermann, 484; *portrait*, 487.
- Muraenopsis tridactylus in captivity, *ill.* 159.
- MURTFELDT, M. E. Periodicity of *Sabbacia angularis*, 335.
- Musca vomitoria, 430.
- Muscle-fibres, development of, 258.
- Muscovite, enclosures in, 182.
- Museum case, new, 333.
- Music, Aztec, 305.
- Musical sand, 713.
- Muskoki strategy, 440.
- Mya arenaria, 336, 740.
- Mycidium, 88.
- Mysidacea, 793.
- Mythologic parallels, 504.
- Mythology, Navajo, 468.
- Naples zoological station, 93.
- National academy of sciences, November meeting of, 669; observatory, 415; scholarships, English, 385; traits in science, 455.
- Natural sciences, classification of, 279.
- Navajo mythology, 468.
- Naval observatory. See U. S. naval observatory.
- NEALE, D. H. O'Neale. The national railway exposition, *ill.* 3, 32, 97, 125, 417.
- Nebalia, 793.
- Nebraska, fresh-water shells from, *ill.* 808.
- NELSON, E. T. From superstition to humbug, 739.
- Nemertean proboscis, homology of, 348.
- Nemertines, spermatogenesis of, 95.
- Nerve-endings in caudal skin of tadpoles, 279.
- Nerves of human eyelid, 36.
- Nervous centres, histology of, 578; system of Siphonophores, 571.
- Neumayr's plan for a Nomenclator palaeontologicus, 778.
- NEWBERRY, J. S. The ancient glaciation of North America: its extent, character, and teachings, 316; the eroding power of ice, 320.
- NEWCOMB, S. The psychological mechanism of direction, 554; the units of mass and force, 493.
- Newcomb, S., 451; on Hell's observations of the transit of Venus in 1769, 219.
- New-England Brachyura and Anomura, 257; granites, 324; ice in glacial times, 685.
- New Guinea, 119, 324; mollusca of, 490.
- New Jersey state microscopical society, 373, 494; mound-builders' pipes in, *ill.* 258.
- New Madrid, earthquake at, in 1811, 324.
- New-York agricultural station, report of, reviewed, 687; lake region, flora of, 356.
- Niagara River, history of, 315.
- NICHOLSON, H. H. See MABERY, C. F., and NICHOLSON, H. H.
- Nickel extraction, 247.
- NIPHER, F. E. Magnetic survey of Missouri, 251; plan for a state weather service, 252; tornado at Racine, 1883, 281.
- Nitrification in soil, 388.
- Nitro-glycerine, 218.
- Nitrogen, determination of, 15; liquefaction of, 4.
- Nitrogenous fertilizers, 549.
- Nitrous oxide, application of, to produce anaesthesia, 338.
- Nomenclator palaeontologicus, 778.
- Nordenskiöld, 451; claims of, 341; on the inland ice of Greenland, *ill.* 732.
- North America, glaciation of, 316.
- North-American continent, history of, 293.
- Northern heavens, survey of, 229.
- Northern notes, 19, 20.
- NORTON, C. E., address of, before Archaeological institute of America, 646.
- Norway, maps of, 184.
- Notarchus, shell in, 207.
- Notes, African, 87; Arctic, 84; Asian, 85; on mollusca, 59; northern, 19, 20; South American, 153.
- Notornis, sternum of, 459.
- Nottingham records, 171.
- Nucleus, division of, in protozoa, 570.
- Nudibranchs, researches on, 454.
- NUENT, E. Humblebees *vs.* field-mice, 470; synchronism of geological formations, 739.
- Oats, effects of fertilizers on, 550.
- Observation, precision of, 519.
- Observatory at Vienna, 92; Greenwich, 103; national, 415; Paris, 131; equatorially mounted telescope at, 782.
- Odontoblasts, 284.
- Ohio fungi, 24, 425; mechanics' institute, 839, 178; Wesleyan university, 91.
- Ohm, measurement of, 138.
- Oil-sands, Allegheny, 18.
- Olfactory lobes, 90.
- Olmeas, 287.
- Omahas, marriage laws of, *ill.* 599.
- Ontario, rain-storm in, 272.
- Ophidia, organ of Jacobson in, 301.
- Ophryocystis Bütschlii, 143.
- Opuntia vulgaris, 381.
- Orange Harbor, meteorological station at, 384.
- Orchis mascula, 567.
- Oregon, fauna of, 66.
- Oriental society, American, 651.
- Origin of invention, 779.
- Orkney-islanders, 465.
- Orkneys and Shetland, *ill.* 743.
- Ormerod's Economic entomology, reviewed, 406.
- Ornamental forms in nature, 298.

- Ornithologists', American, convention, 342; union, 516.
 Ornithorhynchus, lingual sense-organs of, 461.
 Orographic framework of earth, 321.
 Orthis, 326.
 Os intermedium of foot, 283.
 Osage war customs, 368.
 OSBORN, H. Note on Phytotidae, 337.
 OSBORN, H. F. Francis Galton's proposed family registers, 599; Francis Maitland Balfour, *portrait*, 299.
 Ottawa field-naturalists' club, 810; microscopical society, 753.
 Ottendorf basal, 271.
 Ovum, mammalian, 583.
 OWEN, R. The 'continental type'; or the normal orography and geology of continents, 321; the earth's orographic framework: its seismology and geology, 321; the 'stony girdle' of the earth, 436.
 OXUS, 86.
 Oxygen, action of, on heart, 582; active, 478.
 Oyster beds, Chesapeake, *ill.* 440; commission, Maryland, 665; culture in Holland, 79; farming, 376; fertilization of, 58; rearing, from eggs, 298; shell, structure of, 491.
 Oysters, Mediterranean, 430; rearing, from artificially fertilized eggs, 463.
 Pachino, fossils of, 524.
 Pacific Ocean, currents of, 117.
 Pacinian corpuscles, 460.
 PACKARD, A. S., jun. The specific distinctness of the American and European brine-shrimps, 653.
 Packard's Phyllopod Crustacea, reviewed, 571.
 Paleontology of Devonian formation, 836.
 Paleozoic insects, 60; rocks of Nebraska, *ill.* 808.
 Panamakanal, 607.
 Panjāb, folk-lore in, 259.
 Panopeus, development of, 575.
 PAXTON, J. H. Silurian strata near Winnipeg, 169.
 Paper, fire-proof, 606.
 Papua, north-eastern, 501.
 Parallel surfaces, 383.
 Paramecium and tannin, 91.
 Paris observatory, 131; telescope at, 782.
 Parker, Charles F., 517.
 Parthenon, 740.
 Passeres, anatomy of, 375.
 Pasteur's speech at Dôle, 414.
 Patagonia, exploration of, 254.
 Pathological anatomy, 405.
 Pawnees, 104.
 PEALE, A. C. Some geyser comparisons, 101.
 Pebbles, clay, 324; in Licking valley, 436; of Schleswig-Holstein, 443.
 PEET, S. D. Game-drives among the emblematic mounds, 366; the correspondence between the prehistoric map of North America and the system of social development, 368; typical shapes among the emblematic mounds, 365.
 PEIRCE, C. S. A new rule for division in arithmetic, 788.
 PENGELEY, W. The Devonshire caverns and their contents, 562.
 PENHALLOW, D. P. Relation of root and leaf areas; corn, 335.
 Pennsylvania, anthracite fields of, 385; geology of, 49.
 Pentastomum from Alligator lucius, 573.
 Pericardium, development of, 233.
 Periodic functions, 3.
 Peristomeum, lymphatics of, 63.
 Peripatus, researches on, *ill.* 306.
 Peronospora, 334; viticola, 831.
 Perspective, modern, 354.
 Peters, J. P., on the Phoenician alphabet, 651.
 Petitot, É. F. S. J., 385.
 Petroleum, constituents of, 510.
 Petromyzon, 731; pituitary body in, *ill.* 184.
 Petromyzontids, classification of, 64.
 Phalacrocorax bicristatus, osteology of, *ill.* 640.
 Phalansterium digitatum Stein, 496.
 Phaseolus multiflorus, epicotyl of, 300.
 Phenols and phenylamines, 50.
 Philadelphia academy of natural sciences, 17, 18, 26, 35, 66, 163, 294, 362, 374, 397, 399, 493, 495, 519, 522; engineers' club, 581, 636, 697, 726, 754, 411; geology of, 269, 402, 540, 652.
 Phlox, dissemination of, 496.
 Phoronis, development of, 455.
 Phortis gibbosa, 773.
 Phosphates, 199.
 Phosphoric acid, determination of, 147; soluble and reverted, 416.
 Photographing Reichenbach's flames, 267; solar corona, 280.
 Phryganidae, 147.
 Phycologia Mediterranea, 426.
 Phyllopoda, 793.
 Phylloxera, 336.
 Phylogeny of Crustacea, 790.
 Physa prisca, 808.
 Physiological station of Paris, *ill.* 678, 709.
 Phytotidae, 337.
 PICKERING, W. H. Surface conditions on the other planets, 10.
 Picro-epidote, 249.
 Pinches, T. G., on recent Babylonian research, 40.
 Pipes, mound-builders', *ill.* 258.
 Pituitary body in Petromyzon, *ill.* 184.
 Placenta, structure of, 528.
 Planaria polychroa, embryology of, 349.
 Plane triangle, area of, 794.
 Planet, discovery of, 209; new, 752.
 Planets, comets, and meteors, relative ages of, 12; surface conditions on, 10.
 Plant-life, 544.
 Plants, disinfection of, 840; fossil, from Fort Union group, 517; marsh and aquatic, 582.
 Plateau, J. A. F., 667.
 Pleurotomidae of Senegambia, 229.
 Plumbic oxides, 312.
 Pogonomyrmex occidentalis, 773.
 POHLMAN, J. The life-history of the Niagara River, 315.
 Point Barrow expedition, 517; signal station at, 550.
 Poisoning, reports of trials for, 754.
 Polar stations, 316.
 Pollination, literature of, 341; of Asclepias, 427; of Cypella, 189; of prickly-pear, 227; of Rutaceae, 57; of willow, 569.
 Poneræ, 386; contracta, 143.
 Pons-Brooks comet, 654, 666; connection of, with meteor-stream, 683.
 Population, colored, of United States, 376; notes on, 341.
 Porpita, anatomy and histology of, 396.
 Portland society of natural history, 726; White Mountain club, 607.
 Portuguese in Africa, 423.
 Potash salts, manuring with, 360.
 Potato beetle, 337; culture, 515; wild, analysis of, 712.
 Potatoes, hill-culture of, 386; seed, 514.
 Potsdam sandstones, 51.
 POWELL, J. W. A classification of the sciences, 370; terraces, 321.
 Prairie warbler in New Hampshire, 309.
 Pratt, J., on surface conditions on the other planets, 10.
 Pre-Bonneville climate, 170.
 Pre-Cambrian rocks, 322; of Wales, 403.
 Precision of observation, 519.
 Prehistoric map of North America, 368; trepanning, 168.
 Prescott mining region, 82.
 Pressure, effect of, on gelatine film, 135; on valves, 216.
 Prickly-pear, pollination of, 227.
 Priestley's apparatus, 339.
 Prime meridian, common, 451, 696.
 Primitive streak, morphology of, 488; of vertebrates, 105; visual organs, 739.
 Pritchard's expedition to Cairo, 30.
 Prize-essays, 683; Riberi, 384; subjects of, of French academy of sciences, 91.
 Prize, Walker. See Walker prize.
 Prjevalski's travels, 297.
 Proctor's Great Pyramid, reviewed, 625.
 Projectiles, experiments with, 58.
 Proportion, human, 354.
 Proteine, determination of, 146.
 Protozoa, nucleus in, 570; preservation of, 523.
 Psephenus Lecontei, 337.
 Pseudonematon nervosum, 382.
 Psocus, spinning habit of, 495; sexpunctatus, 774.
 Psychology, African, 195.
 Psyllidae of United States, 337.
 Puccinia malvacearum, 334.
 Pueblo of Tallyhogan, 580; ruins, 667.
 Puerco beds in France, 17.
 Pulmonaria officinalis, 577.
 Pulmonata of Asia, 429.
 Pulque, Mexican, 586.
 Pulse rate and temperature, 62.
 Pumping-engines, 330; economy of, 508.
 Pumps, rotary, flow in, 292.
 Puncturella nouchina, 22.
 Puno railroad, 52.
 Pyramid, Great, 625.
 Pyrenomyces, 630.
 Pyronome, 245.
 Quinine, influence of, on heat-dissipation, 581.
 R., J. M. Ordnance experiments at Annapolis, 58.
 Racine, tornado of, 281.
 Radiant heat, 793.
 Radiations, atomic motions which originate, 76, 123.
 Radiometers with curved vanes, 215.
 Railroad time, standard, 570.
 Rails, finishing, 476.
 Railway, electric, 636; exposition, national, *ill.* 3, 32, 97, 125, 417; time, standard, 494; trains, resistance of, 444.
 Railways, alpine, 635; in Caspian region, 296.
 Rainfall at Hawaii, 252; observations in Great Britain, 253.
 Rain-storm in Ontario, 272.
 RATHBUN, R. Sponge-culture in Florida, 213; the U. S. fish-commission steamer Albatross, *ill.* 6, 66.
 READE, J. Sonnet, 255.
 REDDOTS, C. Swallows in Boston, 135, 222.
 Reflection, figures produced by, *ill.* 36.
 Reichenbach's flames, 267.
 Reis, Philipp, *ill.* 472.
 Renssen's Theoretical chemistry, reviewed, 826.
 Rensselaeria, 327; from Hamilton group of Pennsylvania, 471.
 Research, biological, 504.
 Respiration, pharyngeal, in turtle, 338.
 Respiratory movements, action of, on circulation, 496.
 Retina, molecular layer of, 98.
 Revoll's journey to Somali-land, 206.
 Rex magnus, 345.
 Rhizocarps in paleozoic period, 326.
 Rhizodendron flavitincta, 22.
 Rhododendrons, 201, 267.
 Rhytina, sexual variation of, 402.
 Riberi's Archeology in Portugal, reviewed, 764.
 Riberi prize, 384.
 RICHARDSON, C. The composition of American wheat and corn, 290; the sotol, a Mexican forage-plant, 291.
 Richthofenia, affinities of, 103.
 Rig Veda, color-words in, 535.
 RILEY, C. V. Improved method of spraying trees for protection against insects, 378; some recent discoveries in reference to Phylloxera, 336; the chinch-bug in New York, 621; the Psyllidae of the United States, 337.
 Ringicula, monograph of, 231.
 Riverdale, explosion of, 464.
 Rivularia, 21; fluitans, 333.
 Rock, Miles, 453, 484.

- Rocks of Tryberg, 149.
 Rodents, germ-layers of, 191.
 Roestelia aurantiaca, 385.
 ROGERS, W. A. A new method of investigating the flexure corrections of a meridian circle, 239; an improved method of producing a dark-field illumination of lines ruled upon glass, 240; determination of the relation between the imperial yard and the metre of the archives, 250; the German survey of the northern heavens, 229.
 Rogers, W. A., on a standard centimetre, 465; the action of a diamond in ruling lines on glass, 465.
 Romalea microptera, *ill.* 811.
 Ross's History of land-holding, reviewed, 768.
 Rosse, I. C., 752.
 Rotation of earth, 135.
 Rotifers, descriptions of, 92.
 Roumanian ethnology, 133.
 ROWLAND, H. A. A plea for pure science, 242; the static telephone, 285; tornado at Racine, 1883, 281.
 Rowland, H. A., on earth-currents, 251.
 Royal society's awards of medals, 838.
 ROYCE, J. Stricker's Studies on ideas of motion, 713.
 Rubellan, 556.
 Russian cartography, 83.
 Rust, protection of iron from, 414.
 Rutaceae, pollination of, 57.
 Rutot, A., on the geographic control of marine sediment, *ill.* 560.
 RYDER, J. A. Oyster-culture in Holland, 79; primitive visual organs, 739; rearing oysters from artificially fertilized eggs at Stockton, Md., 463.
 S., C. A. International geodetic association of Europe, 656.
 S., J. M. Function of the colorless blood-corpuscles, 353.
 Sabbacia angularis, 335.
 Sabine, Sir Edward, 27.
 Saccharomyces, ascospores in, 347.
 St. David's rocks, *ill.* 167, 635.
 St. Louis limestone, 327.
 St. Michaels, meteorology of, 61.
 St. Peters sandstones, 51.
 SALMON, D. E. Reliability of the evidence obtained in the study of contagia, 212.
 Salmon fisheries in the north-west, 343; parasite of, 256.
 Salt Lake City, earthquakes at, 580.
 Sand, musical, 713, 764.
 Sarcophaga carnaria, 774.
 Sassafras-leaves, *ill.* 491, 684.
 Saturn, 307, 381; appearance of, 838; rings of, 149, 764, 289, 355; divisions in, 306.
 Saunders's Insects injurious to fruits, reviewed, 174.
 SAUVAGE, H. E. The zoological station of Holland, *ill.* 618.
 SAWIN, A. M. Equations of third degree, 44; real roots of cubics, 158.
 Sayornis fuscus, 303.
 Schleswig-Holstein, pebbles of, 443.
 Schmeckel, L., on ocean waters and bottoms, 41.
 Scholarships, English, 385.
 SCHOTT, C. A. Standard railroad time, 570.
 Schuster, on the eclipse of 1882, 11.
 SCHWATKA, F. The Igloo of the Innuit, *ill.* 182, 216, 259, 304, 347.
 Schwatka, itinerary of, 754; trip of, up the Yukon, 550.
 Science, national traits in, 455; plea for pure, 242.
 Sciences, classification of, 370.
 SCOTT, W. B. On the development of teeth in the lamprey, *ill.* 731; on the development of the pituitary body in Petromyzon, and the significance of that organ in other types, *ill.* 184.
 Scott's Elementary meteorology, reviewed, 226.
 Scovillite, 223.
 Screw-propeller, theory of, 442.
 Seaweed, poisonous, 333.
 Secular increase of earth's mass, 820.
 Seeborn's Village community, reviewed, 356.
 Seed, influence of, on crop, 417; influence of position on, 335; testing, 334.
 Selenium cell, new form of, 283.
 Senecio, achenial hairs of, 201, 267.
 Senegambia, Pleurotomidae of, 229.
 Sensation of light, conditions necessary for, 214.
 Sensory nerves, stimuli in, 166.
 Serers of Joal and Portudal, 132.
 Serpent venom, 34, 503.
 Serpentine of Staten Island, 323.
 Sewer-gas, 379.
 Sexual variation of Rhytina, 403.
 Shaking towers, 261.
 SHALER, N. S. The American swamp-cypress, 38.
 Shan country, ethnology of, 500.
 Shaping-machines, 292.
 SHARPLES, S. P. Kalmia or rhododendron, 267.
 Shell in brachiopods and chitons, 127.
 Shell-structure of Chonetes, 526.
 Shells, fresh-water, from Nebraska, *ill.* 808.
 Short, J. T., 698.
 SHUFELDT, R. W. Osteology of the cormorant, 822; remarks upon the osteology of Phalacrocorax bicristatus, *ill.* 640; Romalea microptera, *ill.* 811; the habits of Muraenopsis tridactylus in captivity, with observations on its anatomy, *ill.* 159.
 Siberia, charts of, 421.
 Siberian coast, settlements on, 560; sea, hydrography of, 420.
 Siemens, C. W., 725.
 Siemens's Solar energy, reviewed, 108.
 Sierra Leone, 561.
 Singing beach, 325.
 Siphonophores, nervous system in, 571.
 Sleep, depth of, 285.
 Slime-spinning, 492.
 SMILEY, C. W. The German carp, and its introduction into the United States, 377.
 SMITH, E. A. Life among the Mohawks in the Catholic missions of Quebec province, 366.
 SMITH, E. The Iroquois, 134.
 Smith, J. Lawrence, 667.
 SMITH, Q. C. Colorado climate, 623.
 SMITH, S. I. Packard's Phyllopod Crustacea, 571.
 Smuts, American, 275.
 Smyth on prime meridian, 451.
 Snakes killed, 135.
 Snowballs, natural, 285.
 Social development, 368.
 Society of mechanical engineers, 636; transactions of, reviewed, 267.
 Society of naturalists of eastern United States, 810.
 Society for promotion of agricultural science, 117.
 Sociology, dynamic, 45, 105, 171, 222; of Kabyles, 393.
 Soil, absorption of moisture by, 110; analysis, value of, 435; conductivity of, 480; influence of manures on, 111; moisture of, 112.
 Solanum tuberosum, 712.
 Solar constant, 44, 496; eclipse of May 6, 1883, 237, 241; electric potential, 328; energy, 108; prominence, reversal of lines in, 621.
 Soldiers, French, *ill.* 605.
 Solen, visual organs of, 397.
 Somali-land, journey to, 206.
 Sonnet, 255.
 Sorghum kernels, structure of, 334.
 Sotol, 291.
 Sound, transmission of, by gases, 44; velocity of, 45.
 South America, notes on, 344.
 Spain, geological commission of, 148; geological map of, 29.
 Specific heat of solids, 284, 424.
 Spectroscope, use of, in meteorology, *ill.* 488.
 Spectrum, origin of lines A and B in, 327.
 Speed of chemical reactions, 289.
 Spermatozoon of newt, 67.
 Spider, American turret, 43.
 Spinal cord, irritability of, 433.
 Spirit-levelling, 269.
 Spirogyra majuscula, 607.
 Spitzbergen, Swedish party at, 209.
 Spizella socialis, 301.
 Sponge-culture in Florida, 213.
 Sporangites bilobatus, 326; braziliensis, 326.
 Sporozoon, new, 156.
 Spottiswoode, William, 27, 116, 385.
 Spraying trees, 378.
 Squares, undeveloped properties of, 241.
 SQUIER, G. H. Erratic pebbles in the Licking valley, 436.
 Squillacea, 793.
 Staining blood-corpuscles, 32.
 Standard railroad time, 570.
 Stanley, H. M., on evolution as bearing on method in teleology, 634.
 Star-places, catalogue of, 840.
 Stars, catalogues of, 221.
 State weather services, 252; July reports of, 399; August reports of, 559; September reports of, 681.
 Staten Island, natural science association, 753; serpentine of, 323.
 Statistics, methods of, 371.
 Statue of Liberty, engineering of, 357.
 Steam boilers, economy of, 332; engine, efficiency of, 48; electric stop for, 46; spherical, 544; heating, 686; jackets for steam-engines, 108; whistles, 507.
 Steamer, Sound, 241.
 Steamers, forms of, 47; on the Rhone, 385.
 Stearns and Coues' New-England bird-life, reviewed, 357.
 Steel castings, 545; compressed, 8.
 Step's Plant-life, reviewed, 544.
 Sternberg, on the germicide value of certain therapeutic agents, 433.
 Stevenson's Geology of southern Pennsylvania, reviewed, 49.
 Stibnite from Japan, 295.
 STOKES, A. C. Phalansterium digitatum Stein, 496.
 STONE, G. H. The kame rivers of Maine, 319.
 Stone-chat, plumages of, 580.
 Stony girdle of earth, 436.
 STOKER, F. H. Symmetrical linear figures produced by reflection along a river-bank, *ill.* 36.
 STOWELL, C. H. Trutat's Elementary treatise on the microscope, 313.
 Stowell's Microscopical diagnosis, reviewed, 83.
 Strawberry, insects affecting the, 158.
 Stricker's Ideas of motion, reviewed, 713.
 Stromatopora, 170.
 Strophodonta, 326.
 Strophomena, 326.
 STURTEVANT, E. L. Agricultural botany, 335; analysis of the wild potato, 712; influence of position on seed, 335; parallelism of structure of maize and sorghum kernels, 334; twelve months of lysimeter record at the New-York agricultural experiment-station, 290.
 Subsidse of land, 210.
 Substitutions, linear, 472.
 Sulphates, basic, of copper, 10.
 Sulphides, formation of, by pressure, 14.
 Sulphuric acid as fertilizer, 335; from pyrites, 79.
 Sulu Islands, 288.
 Sun and its planets, 17.
 Sundews, fed and unfed, 486.
 Sunfish, rare, increase of, 434.
 Sunflower-cake as fodder, 552.
 Sun-spot inequalities, 696; interesting, *ill.* 266, 309; observations, 72.
 Sun-spots, 115.
 Superphosphates, fineness of, 447; reversion of, 446.
 Superstition, from, to humbug, 637, 739.
 Surface-condensers for marine engines,

- 413; conditions on planets, 10; film, letters in, 309.
 Surfaces, classification of, 74; curvature of, 215; of constant curvature, 174; of second degree, 280; parallel, 383.
 Sus, 548.
 Swallow-tailed hawk in New Jersey, 222.
 Swallows in Boston, 135, 222.
 Swamp cypress, 38.
 Swedish Algae, 564; party at Spitzbergen, 209.
 Swift, reckless, 222.
 Swiss naturalists, meeting of, 400.
 Sylvester, J. J., 781, 837.
 Symbiosis, 395.
 Symbolic earth formations, 367.
 T., W. B. Rings of Saturn, 764.
 Taconian system in Cuba, 740.
 Tadpoles, nerve-endings in, 279.
 TANNER, Z. L. A four-days' cruise of the Albatross, *ill.* 615.
 Tarantula, restoration of limbs in, 374.
 Tarantula arenicola, 43.
 Target-shooting, 473.
 TARR, R. S. Musical sand, 764.
 Tattooing among civilized people, 585.
 Taxation among Romans, 354.
 Taxidermy, manual of, 312.
 Taxodium distichum, 38.
 Taylor's Alphabet, reviewed, 438.
 Teeth, mutilations of, 234; of lamprey, *ill.* 731.
 Teleology and evolution, 634.
 Telephone, efficiency of, 239; static, 285.
 Telescope, equatorially mounted, 782.
 Temporal bones, 129.
 Tenuirostres, tongues of, 437.
 Terra-cotta lumber, 292.
 Terraces, 321.
 Tertiary rocks, classification of, 696.
 Testicularia Cyperi, 112.
 Testing-machine, Emery's, 356.
 Tetrahedrite and zinc blende, 557.
 Textile laboratory, 696.
 Thalassema millita, 147.
 Therapeutic agents, 433.
 Thermochemical properties of electromotive force, 177.
 Thermotropism, 299.
 Theta-functions, double, 2.
 Thibet, investigations in, 392.
 THOMAS, B. E. A method for the calibration of a galvanometer, *ill.* 282; a method of determining the centre of gravity of a mass, *ill.* 283; a new heliostat, *ill.* 285; two forms of apparatus for Boyle's law, *ill.* 284.
 Thompson's Philipp Reis, reviewed, *ill.* 472.
 Thomson and Tait's Natural philosophy, reviewed, 497, 795.
 Thripidae, 578.
 Thryothorus ludovicianus, 722.
 Thunderbolts, deaths by, 606.
 Thunder-storms, 339.
 THURSTON, R. H. The explosion of the Riverdale, 464.
 TIFFANY, A. S. The equivalent of the New-York water-lime group developed in Iowa, 323.
 Timber-trees, specimens from, 668.
 Time, standard, 755; unification of, and longitude, 814; universal, 697.
 Timor, ethnology of, 406.
 Tissues, preservation of, 522.
 Tobacco, fertilizers for, 516.
 Todles, anatomy of, 281.
 Tolles, R. B., 726.
 Toltes, 325.
 Tombs, Chinese, 235.
 Tonkak, birds of, 99.
 Tornado at Racine, 1883, 281; studies, 403, 363.
 Tornadoes, *ill.* 589, 610, 639, 701, 729, 758; formation of, 620; warnings against, 521.
 TORREY, B. Do humming-birds fly backwards? 436.
 Touch-corpuscles, 529.
 Transit of Venus in 1769, 219.
 Transits of inferior planets, 239.
 Tree-growth, 569; influence of winds upon, 470.
 Trees, spraying, 378.
 Trenton natural history society, 428, 434, 436.
 Trepanning, prehistoric, 168.
 Tricycle, water, *ill.* 779.
 Trilobite with legs, 341.
 Trilobites from Pennsylvania, 399.
 Troad, geology of, 255.
 Troglodytes, 131.
 Trouvelot's red star, 605.
 TRUE, F. W. Ziphius on the New Jersey coast, 540.
 Trutat's Elementary treatise on the microscope, reviewed, 313.
 Tryberg, eruptive rocks of, 149.
 Tryon's Conchology, reviewed, 658.
 Tuberculosis, contagiousness of, 697.
 Tudor's Orkneys and Shetland, reviewed, *ill.* 743.
 Tultecas, 287.
 Tunis, coast-line of, 155.
 Tunnel, Arlberg, 781.
 Turkey, impregnation in, 105.
 Turrilopsis, 773.
 TYLOR, E. B. The natural history of implements, 43.
 Tylor's lectures at Oxford, 71.
 Types of animal life, 688.
 U., W. July reports of state weather services, 399.
 Ullmannite, 224.
 Ulvaceae, monograph of, 565.
 Ungulata, primitive types of, 338.
 United States bureau of ethnology, 580; department of agriculture, 29; fish-commission bulletin, reviewed, 685; geological survey, 633, 724, 777, 807, 836; magnetic observatory at Los Angeles, Cal., *ill.* 58; mineral resources, 413; national museum, 63, 119, 339, 580; naval bureau of ordnance, 58; naval institute, 28; naval observatory, 415; Psyllidae of, 337; signal-service, 343, 387, 755, 811.
 Units of mass and force, 493.
 Universal alphabet, 350.
 University of Michigan, 208.
 UPHAM, W. Changes in the currents of the ice of the last glacial epoch in eastern Minnesota, 319; the Minnesota valley in the ice age, 318; vestiges of glacial man in Minnesota, 369.
 Upton, W., 451.
 Uranus, 264.
 Urnatella gracilis, *ill.* 789.
 Urocyclus, anatomy of, 278.
 Uromyces acuminatus, 21.
 Ustilagineae, new, 121.
 Ustilago axicola, 112.
 Vaccination question, 606.
 Vaccinium brachycerum, 335.
 Valentin, G., 28.
 Values in agriculture, 378.
 Valves, pressure on, 216.
 Van Nostrand's engineering magazine, 810.
 Vanessa Antiopa, 353; Lintneri, 353.
 Vapor density, 293; determinations, 314.
 Variation of horizontal intensity, 176.
 Variations in butterflies, 353.
 Vaseline, use of, 333.
 Vaso-dilators of lower limb, 401.
 Vaso-motor nerves of leg, 497.
 Vedas, seamy side of, 538.
 Vegetation of carboniferous age, 529.
 Velocity of sound, 45.
 Venom of serpents, 34.
 Venus, transit of, in 1769, 219.
 VERRILL, A. E. Recent explorations in the region of the Gulf Stream off the eastern coast of the United States by the U. S. fish-commission, 153.
 VERY, F. W. An interesting sun-spot, *ill.* 266.
 Vesuvius, lava of, 254.
 Viallanes, on histology of insects, 430.
 Victoria, planet, observations of, 118.
 Village community, 356.
 VIRCHOW, R. The invention and spread of bronze, 527.
 Vireo noveboracensis, 302.
 Visible speech, 204; letters, 452.
 Visual organs of Solen, 397; primitive, 739.
 Vivisection, 551.
 Volatile constituents of coal, 220.
 Vorticella, 772.
 W., W. C. The American association at Minneapolis, 181; the lessons of the meeting, 211.
 Waagen, W., on the affinities of Richthofenia, 103.
 Wabash college, 451.
 WADSWORTH, M. E. Ocean waters and bottoms, 41.
 WALCOTT, C. D. Fresh-water shells from the paleozoic rocks of Nebraska, *ill.* 808.
 Waldeyer, on composition of the mesoderm, 11.
 WALDO, F. Solar constant, 496.
 Wales, pre-Cambrian rocks of, 403.
 Walker prize of Boston soc. nat. hist., 146.
 Walnut, combination, *ill.* 761.
 Wampum, 147.
 Ward's Dynamic sociology, reviewed, 45, 105, 171, 222.
 Warder, J. A., 254.
 WARDER, R. B. Suggestions for computing the speed of chemical reactions, 289.
 WARE, W. R., address of, before Archaeological institute, 649.
 Ware's Modern perspective, reviewed, 354.
 Warming and ventilating apartments, 283.
 WARREN, C. Prize-essays on the experimental method in science, 683.
 Washington, biological society of, 581, 636, 698; philosophical society of, 29, 518, 581, 635, 698, 754, 355, 473, 518.
 Water, ocean, 41; gas as fuel, 219; lime group in Iowa, 323; tricycle, *ill.* 779.
 Weather bulletin, Iowa, for May, 27; forecasts, distribution of, by railways, 252; in May, 1883, *ill.* 34; in June, 1883, *ill.* 186; in July, 1883, *ill.* 394; in August, 1883, *ill.* 524; in September, 1883, *ill.* 671; in October, 1883, *ill.* 786; Minnesota, 262; service in Japan, 253.
 Weather report, Kansas, for June, 90; Missouri, for May, 26.
 Weather services, state, July reports of, 399; August reports of, 559; September reports of, 681.
 WEBB, J. B. Descriptive geometrical treatment of surfaces of the second degree, 280; improvements in shaping-machines, 292; regularity of flow in double-cylinder rotary pumps, 292.
 WEST, E. P. Personal observations of the Missouri mounds from Omaha to St. Louis, 366.
 WESTCOTT, O. S. Some hitherto undeveloped properties of squares, 241.
 WETHERELL, L. Swallows in Boston, 222.
 Whale, right, of North Atlantic, 132, 266.
 Whaling-season, 317.
 Wheat, composition of, 290; crop, influence of temperature and rainfall on, 179; growth of, 448.
 Wheat-stem maggot, 577.
 Whirlwinds, *ill.* 589, 610, 639, 701, 729, 758; of sand, 340.
 Whispered vowels, 43.
 WHITE, I. C. Relation of the glacial dam at Cincinnati to the terrace in the upper Ohio and its tributaries, 319.
 Whiting, S. F., on college microscopical societies, 465.
 WHITMAN, C. O. The advantages of study at the Naples zoological station, *portrait* of Dohrn, 93.
 WHITTLESEY, C. Metrical standard of the mound-builders, by the method of even divisors, 365.
 WILDER, B. G., and GAGE, S. H. On the use of vaseline to prevent the loss of alcohol from specimen jars, 333.
 WILEY, H. W. American butters and their adulterations, 291.
 Williams, H. S., 147.
 Williams college, 808.
 WILLIAMSON, W. C. The vegetation of the carboniferous age, 529.
 Willow, pollination of, 569.

- WINCHELL, A. Secular increase of earth's mass, 820.
 WINCHELL, N. H. Clay pebbles from Princetown, Minn., 324; comparative strength of Minnesota and New-England granites, 324.
 Winnipeg, Silurian strata near, 169.
 Winslow's Report on the oyster-beds of the Chesapeake, reviewed, *ill.* 440.
 Wire, use of, in sounding, 12.
 Wisconsin agricultural experiment-station, 452.
 Wisconsin, mounds of, 378.
 Woods, Cuban, 780.
 WOOSTER, L. C. The thickness of the ice in New England in glacial times, 686.
 Worm with remarkable nervous system, 232.
 Worms, notes on, 432; papers on, 572.
 Worthington pumping-engine, 217.
 WRIGHT, E. Life-insurance and self-insurance, 376.
 WRIGHT, G. F. Depth of ice during the glacial age, 436; result of explorations of the glacial boundary between New Jersey and Illinois, 316; supposed glacial phenomena in Boyd county, Ky., 654.
 Wright's ice-dam at Cincinnati, 436.
 Xenicidae, 280.
 Yard, imperial, relation between, and metre of archives, 250.
 Yeast fungi, 368.
 YOUNG, C. A., address of, before American association at Minneapolis, 228; unusual reversal of lines in the summit of a solar prominence, 621.
 Yuma linguistic stock, 536.
 Yunnan, ethnology of, 500.
 Zaptychius carbonaria, 808.
 Zea, hybridization of, 485.
 Ziegler's Pathological anatomy, reviewed, 405.
 Zinc blende, parallel growth of, and tetrahedrite, 557.
 Ziphius on New Jersey coast, 540.
 Zoölogical station in Firth of Forth, 413; of Holland, *ill.* 618.

ERRATA.

- Page 61, col. 2, 5th line from bottom, for 'Alongshore, winds' read 'Along-shore winds.'
 " 146, " 2, 5th line from bottom, for 'Ayres' read 'Ayers.'
 " 199, " 2, line 13, for 'twenty-five hundred' read 'six hundred and ninety.'
 " 250, " 2, last line of first article, for '3.37039 inches' read '3.37027 inches.'
 " 395, in inscription of cut, for 'August' read 'July.'
 " 403, col. 1, line 28, for 'Tosell' read 'Torell.'
 " 403, " 1, " 34, for 'lithogical' read 'lithological.'
 " 403, " 1, " 43, for 'Irving in' read 'Irving on.'
 " 426, " 1, " 11, for 'similar' read 'only.'
 " 430, " 1, " 12, for 'poorer oxidizing' read 'oxidizing power.'
 " 430, " 1, " 32, for 'Purzgau' read 'Piurzgau.'
 " 459, " 2, " 25, for 'refine' read 'define.'
 " 465, " 2, " 10 of second article, for 'Koblanck' read 'Koblank.'
 " 466, " 2, " 13, for 'practical' read 'practised.'
 " 467, " 1, " 38, for 'of the surface' read 'on the surface.'
 Page 467, col. 2, 11th line from bottom, for 'in the crayfish' read 'on the crayfish.'
 " 468, " 1, line 19, for '0.145 inch' read ' $\frac{1}{45}$ inch.'
 " 468, " 2, " 1, for 'an angle' read 'afr angle.'
 " 468, " 2, " 32, for 'Clevinger' read 'Clevenger.'
 " 469, " 2, " 5, " " " "
 " 471, " 2, " 8, for 'Michan' read 'Mecham.'
 " 483, " 2, 4th line from bottom, for '5 μ ' read '5 μ .'
 " 523, " 2, last line, for 'Ifuagos' read 'Ifugayos.'
 " 540, " 2, line 15 of second article, for 'Z. cavisortris' read 'Z. cavirostris.'
 " 556, " 1, " 23, for '90°' read '45°.'
 " 569, " 2, last line but one, for 'San Joan' read 'San Juan.'
 " 570, " 1, line 18, for 'or Vancouver' read 'on Vancouver.'
 " 607, " 2, " 9, for 'catalogue of mollusks' read 'catalogue of his collection of mollusks.'
 " 701, " 2, note, for 'No. 42' read 'No. 41.'
 " 722, " 2, " 38, for 'Hectarininae' read 'Nectarininae.'
 " 735, in inscription of cut, for '1876' read '1870.'
 " 802, col. 1, line 38, for 'Lanicera' read 'Lonciera.'
 " 838, " 2, " 11, for 'Dearborn' read 'Davidson.'