taining a brief *résumé* of the principal characteristics of the period, together with a short account of the progress made during the period in each of the branches of the mathematical science of the time, — geometry, arithmetic, physics, and astronomy. This is followed by the biographies of the mathematicians and physicists of the period and an analysis of their work.

The three introductory chapters, taken together, form a short and interesting history of Greek mathematics; while the biographies are sufficiently full, and the analyses are remarkably clear and concise.

SECONDARY BATTERIES.

The chemistry of the secondary batteries of Planté and Faure. By J. H. GLADSTONE and ALFRED TRIBE. London, *Macmillan & Co.*, 1883. (Nature series.) 11+59 p. 16°.

THE valuable papers of Gladstone and Tribe, originally printed in *Nature*, have been published in a collected form in the present volume, which contains much information as to the chemical actions going on in the Planté and Faure batteries. In successive chapters the authors consider the subjects of local action, the chemical changes occurring in the charge and discharge of the cell, the function of the sulphate of lead formed, and some minor topics. The chapter devoted to the function of the sulphate of lead, which the authors have shown to be formed in the normal action of the battery, is especially interesting. In the formation of a Faure cell, sulphate of lead, originally produced by local action, is oxidated to a peroxide on one plate, and reduced to spongy metallic lead on the other; and, when the cell is discharged, lead sulphate is finally produced on both plates. On recharging the battery, the authors consider that the lead sulphate is again oxidated on one plate, and reduced on the other, as when the cell was originally formed, — a point which is a very practical one, as the lead sulphate, if not oxidated, will soon prove fatal to the usefulness of the cell. This view, announced in the original papers, is substantiated by a number of recent experiments, notwithstanding the doubts that have been thrown upon it; so that, in charging and recharging, the plate of the cell is not corroded. It is also shown that the fact noticed by Planté, that elevation of temperature facilitates the formation of the cell, is explained by the more rapid formation of lead sulphate under these conditions.

RECENT PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Vassar brothers' institute, Poughkeepsie.

Dec. 5. — Professor W. B. Dwight gave the results of a recent re-examination by himself of Van Duzer's iron-mine, Cornwall station, Orange county, N.Y. Here a low ridge presents a red rock of sandstone and conglomerate, running into red shales to the south, in contact conformably with a highly fossiliferous limestone in nearly vertical layers. No other combination of the kind is apparent in this region, and there was much speculation among early geologists as to the horizon. W. B. Rogers called the red rock the triassico-jurassic sandstone; Dr. W. Horton considered it the Medina group, and assigned the limestone some place lower; Prof. Mather, with some doubt, concurred with Horton, and further assigned the limestone to the Catskill shaly limestone. Prof. Dwight, after a careful study of the locality, is satisfied that the red rocks are of the Medina epoch, and the limestones lower Helderberg; but by the fossils he identifies, in addition to the Catskill shaly limestone, the tentaculite limestone and the lower pentamerous groups. He finds no foundation for the statements of Horton, indorsed by Mather, that the iron ore occurs in layers between the layers of limestone. On the other hand, it is a bed of limonite formed at the base of the ridge superficially, as in other iron-mines of the region, by the decomposition of the red ferruginous shales at the junction with the limestone.

Five hundred and sixty-two specimens, representing various departments of natural history and archeology, were reported to the museum by the secretary.

Franklin institute, Philadelphia.

December 19. — A special committee, appointed to consider the propriety of recommending the councils of the city of Philadelphia to pass an ordinance requiring steam-engineers to pass an examination and to be provided with a license, as evidence of their competency, made majority and minority reports; the first taking the view that such action on the part of the society would be inexpedient, and the latter recommending such action. The reports were freely discussed, *pro* and *con;* and the subject was postponed for final action until the stated meeting in January.

Mr. G. Morgan Eldridge then read a paper on 'The British patent designs and trade-marks act of 1883 as affecting American inventors,' explaining the provisions of the new law to go into operation on the 1st

of January, 1884, and especially clearing up many points wherein the technical journals, which had favorably reviewed its provisions, had erred.

Prof. E. J. Houston introduced Mr. Patrick B. Delaney of New York, who thereupon described in detail his lately invented system of synchronous-multiplex telegraphy, illustrating the same with the aid of detail-drawings and lantern-slides of essential portions of his apparatus. Mr. Delaney's system, as thus far perfected, permits of the sending of seventy-two separate and distinct messages over a single wire simultaneously.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Geological survey.

Geological field-work. — Mr. J. S. Diller, in his reconnaissance of the Cascade Range, passed through the Dalles, at the north end of the range, and followed it southward into California. The following is an abstract of the preliminary report made by him to Capt. C. E. Dutton, who has charge of the investigation of the volcanic rocks of that region. Andesites and basalts are found on the west side; and at Oregon City the lavas have a thickness of three hundred feet. The massive rocks stretch far southward towards Salem; and on them rest extensive alluvial deposits which form fertile plains in the valley of the Willamette, French's Prairie being one of them. Between Salem and Albany the eruptive rocks also occur; but at Jefferson, a short distance north of Albany, the miocene sandstone occurs, and is extensively used in the neighborhood for building-purposes. From Albany to Eugene City, both eruptive rocks and the miocene sandstones occur, the latter being well exposed at Springfield and before reaching the Calapooia Mountains. Thirty-five miles south of Eugene City the miocene sandstone is frequently penetrated by basaltic and other eruptive rocks. Near Cottage Grove the sandstone resembles somewhat a tufa, but contains coal, like the miocene north-east of Lebanon. Coal with a thickness of five feet is said to occur at the great bend of Pit River, but was not seen by Mr. Diller, as he did not visit the locality. The Calapooia Mountains are made up mainly of recent volcanic rocks, especially on the north side. Fragmental rocks are found on the south; but whether they are paleozoic, or not, remains in doubt. These beds extend to near Oakland, where well-marked tertiary appears. South of Rosebury is a belt two miles in width, of olivine enstatite rocks, altered, for the most part, into serpentine. It is bounded on the south by a highly tilted conglomerate, which resembles the millstone grit of the Alleghanies. No fossils were found in it, but on petrographical grounds it was referred to the cretaceous, which Mr. Diller says has not been recognized north of Rogue River valley, from which it is separated by a belt of crystalline stratified rocks, — the eastward continuation of the Rogue River Mountains. South of Myrtle Creek, schistose rocks occupy a belt along the southern branch of Umqua River to Cañonville, where crystalline schistose rocks form the prominent mountain ridge through which the gorge of Cañon Creek is cut. These rocks are penetrated by a granite which has probably been land-surface for a long time. This granite outcrops frequently in southern Oregon and northern California, especially in the Siskiyou Mountains, which are principally made up of it: it also forms Trinity Mountain and Castle Rock.

The crystalline rocks representing the eastern prolongation of the Rogue River Mountains are limited on the south by the supposed cretaceous rocks of Rogue River valley. Mr. Diller thinks that both cretaceous and tertiary rocks are embraced in the section seen on the north-east side of Stewart's Creek (a tributary of Rogue River extending eastward from Jacksonville). These rocks extend into California, where they are covered by the great flow of recent eruptive rocks in the plain north of Mount Shasta.

Little Shasta valley, especially between Shasta post-office and Mount Shasta, is an extensive plain covered by a flow of basic lava like that on the great plain east of the Cascade Range in central Oregon. Mount Shasta rises above a similar plain.

At the Haystacks, a short distance north of the base of Shasta, granite occurs. Between Mount Shasta and Lassens Peak, Cambrian, mesozoic, and tertiary occur. Around the eastern base of Shasta to Burney valley, and westward over the mountain crest to Buzzard Roost, little else is seen than basic volcanic rocks. Four miles west of Furnaceville the road leaves Cow Creek, and ascends to the 'plain,' which is covered with angular bowlders and thin soil underlaid by coarse conglomerate. From Buzzard's Roost a cañon along Cow Creek is cut in carboniferous limestone and other altered sedimentary rocks.

At Furnaceville, in the metamorphic rocks found west of the limestone, mining operations have been carried on; but at present the openings are deserted. Farther west, cretaceous (?) strata come in, dipping towards the Sacramento; and above them, tertiary rocks full of fossils. The latter extend to the alluvial plain of the Sacramento.

The Cascade Range, constituted almost wholly of basic lavas, is a low, broad arch, not less than seventy-five miles in diameter, rising from 3,300 feet at Summit Prairie, near Mount Hood, to 5,600 feet at Crater Lake. About the head of Deschutes River the general plain, which more or less gradually merges into the slope of the mountains, has a height of 4,700 feet. Throughout Oregon this plain lies about a thousand feet below the general crest of the range; and both are formed of lava sheets arising from fissure eruptions. There are numerous topographi-