lar mass of quartz, and may be a cosalite with about half its Pb replaced by Ag_2. —— Mr. A. H. Low described a new modification of the battery method for the estimation of copper, by which great accuracy in results is attained in from one to two hours. Substances which usually interfere with this process are either quickly removed, or their presence is rendered harmless by original methods. A full description of the process will soon appear.

Numismatic and antiquarian society, Philadelphia.

April 3. — Dr. Brinton spoke of some recent explorations made by him in the Trenton gravels, in search of the evidences of the existence of the palaeocystic man. —— Mr. Scott mentioned the fact that arrow-heads had been found at Otaheite, apparently of human manufacture, but which, upon investigation, turned out to be made by the action of the sands of the seashore under the influence of the winds. —— Mr. Barber exhibited a copper currency used by the Haidah Indians. It was a thin plate of worked copper in the shape of an axe-head, with a hole at each end, and some remarkable groovings. Its value was estimated at two dollars. They range in size from one inch to two feet.

NOTES AND NEWS.

THE following is a complete list of the papers read at the meeting of the National academy of sciences, April 15–18: — G. K. Gilbert, The sufficiency of terrestrial rotation to deflect river-courses: T. Sterry Hunt, The origin of crystalline rocks: Simon Newcomb, On the photographs of the transit of Venus taken at the Lick observatory: A. E. Verrill, Zoölogical results of the deep-sea dredging expedition of the U. S. fish-commission steamer Albatross: Ira Remsen, The quantitative estimation of carbon in ordinary phosphorus; Reduction of halogen derivatives of carbon compounds: Elias Loomis, Reduction of barometric observations to sea-level: C. S. Peirce, The study of comparative biography: C. S. Peirce and (by invitation) J. Jastrow, Whether there is a minimum perceptible difference of sensation: S. P. Langley, The character of the heat radiated from the soil: J. E. Hilgard, On the depth of the western part of the Atlantic Ocean and Gulf of Mexico, with an exhibition of a relief model; On the relative levels of the western part of the Atlantic Ocean and Gulf of Mexico with respect to the Gulf Stream; Account of some recent pendulum experiments in different parts of the world, made in connection with the U. S. coast and geodetic survey: E. D. Cope, On the structure and affinities of Didymodus, a still living genus of sharks of the carboniferous period; On the North-American species of mastodon: Theo. Gill and (by invitation) John A. Ryder, The characteristics of the lyomerous fishes; On the classification of the apodal fishes: Theo. Gill, On the ichthyological peculiarities of the bassalian realm: George F. Barker, On the Fritts selenium cell; On a lantern voltmeter: George J. Brush, On the occurrence of mercury in native silver from Lake Superior: H. A. Rowland, Progress in making a new photograph of the spectrum: B. Silliman, On the existence of tin ore in the older rocks of the Blue Ridge: H. M. Paul (by invitation), The Krakatoa atmospheric waves, and the question of a connection between barometric pressure and atmospheric electricity: John S. Billings, Memorandum on composite photographs in craniology: A. W. Wright, Some experiments upon the spectra of oxygen: Elliott Coues, On the application of trinomial nomenclature to zoölogy: E. M. Gallaudet (by invitation), Some recent results of the oral and aural teaching of the deaf, under the combined system: F. W. Clarke, (by invitation), Jade implements from Alaska: Henry L. Abbot, Recent progress in electrical fuzes: J. S. Diller (by invitation), The volcanic sand which fell at Unalashka, Oct. 20, 1883, and some considerations concerning its composition. The following biographical notices of deceased members were also read: of Gen. G. K. Warren, by H. L. Abbot; of Professor Stephen Alexander, by C. A. Young; of Dr. J. Lawrence Smith, by B. Silliman; and of Dr. John L. LeConte, by S. H. Scudder.

— Tornado circular xxi., just issued by the signal-service, accompanies a second series of preliminary tornado-charts, showing the local storms of March 11, in their relation to broad cyclonic circulation of the same date. Eight tornado-tracks are mapped, — one in southern Illinois, one in central Kentucky, the rest in Mississippi and Alabama, — all occurring between two and seven in the afternoon. Their attitude with regard to the centre of low pressure is much the same as was shown for the tornadoes of Feb. 19. They are from seven hundred to a thousand miles south by east of the cyclone centre, within the area of warm southerly winds, and just east of the area of cool north-westerly winds; the two being separated by strong thermal gradients. There were five persons killed and fifty wounded by these tornadoes. The loss would have been much more severe, had not the people secreted themselves in cellars and 'dug-outs' on the approach of the storms. A more detailed study is promised at a later date.

— Dr. G. Stanley Hall, the well-known writer and lecturer on philosophical and educational subjects, has been appointed professor of psychology and pedagogics in the Johns Hopkins university. Dr. Hall was graduated at Williams college, and at a later day received the degree of doctor of philosophy from Harvard college, and afterward prosecuted his studies in Germany under Ludwig and Wundt. His lectures have been sought for in many colleges, and his co-operation in educational associations has been highly prized. He has written for the *Princeton review*, *Mind*, *The nation*, and other periodicals; and many of his papers were collected and published in a separate volume. He is now engaged in a prolonged inquiry respecting the education of young children, from which important results are anticipated. He is a man of unusual aptitude and training; and his friends believe that in the chair to which he is now appointed he will exercise a strong influence for good,

both in promoting the study of the mind, and in the training of young men to be teachers in colleges and high schools. He has also been deeply engaged in psycho-physic researches, soon to be published. Convenient rooms and suitable apparatus for this work have been provided by the university.

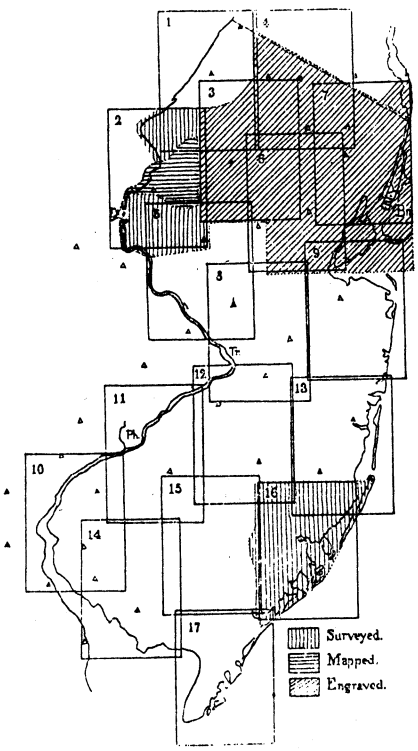
— Dr. William H. Welch, a graduate in arts of Yale college, and in medicine of the College of physicians and surgeons in New York, has been appointed professor of pathology in the medical faculty of the Johns Hopkins university. Dr. Welch is now pathologist to the Bellevue medical college in New York. He has given evidence of his ability as an independent investigator and as a skilful teacher; and, in connection with the Johns Hopkins hospital and university, he will have an excellent opportunity to advance the science to which he is devoted.

— Among recent contributions to invertebrate paleontology, we note Bulletin No. 2 of the Illinois state museum of natural history at Springfield, in which two new species of Crustacea, fifty-one of Mollusca, and three of Crinoidea from the carboniferous formation, are described by Prof. A. H. Worthen. Should the publication of a supplementary volume of the reports of the geological survey of the state be authorized by the legislature, the species now described will be fully illustrated. Meanwhile the typical specimens have been placed on exhibition in the state museum.

— A notice of some new species of primordial fossils in the collection of the American museum of natural history, New York, with remarks on species previously known, by Mr. R. P. Whitfield, appears in Bulletin No. 5 of the museum. These organisms are chiefly Brachiopoda and Crustacea, and are illustrated by two excellent plates.

— The recent geological work of the New Jersey survey has been chiefly in connection with the cretaceous formations, the artesian wells that they feed along the coast, and the crystalline rocks and their iron ores. The flowing well at Ocean Grove now yields a daily supply of sixty thousand gallons of sparkling, pure water, from a depth of about four hundred feet, or within twenty feet of the estimate, based on dip of strata, given by the survey in 1882. A second successful well has been lately bored in the same place. The drainage of the Great meadows, in Warren county, a work recommended by the survey, continues to show its efficiency: ordinary rains are quickly carried off; the autumnal and miasmatic diseases, formerly so much dreaded in its neighborhood, have disappeared; and the waste swamp-land, wherever brought into cultivation, shows a decided superiority over the surrounding high ground. Evidence is given to show the intrusive origin of the triassic trap-sheets of the Watchung (Newark) Mountains; and their crescentic outline is said to be "such as would be expected from a vertical force pressing against an inclined stratum of rock." Professor Newberry has nearly completed his monograph on the triassic fishes, and Professor Whitfield is at work on the invertebrate fossils of the New Jersey cretaceous.

— The annual report of the geological survey of New Jersey, by Professor George H. Cook, was recently published, and shows the same careful and successful administration of the survey that has been characteristic of it for several years past. In spite of the very limited cost, — "the expenses of the survey are kept strictly within the annual appropriation of $8,000," — valuable and effective work is steadily accomplished. The most considerable undertaking at present is the topographical survey of the state, in charge of Mr. C. C. Vermeule. The primary stations, shown in the accompanying figure by a small triangle,



are provided by the U. S. coast-survey, and are now nearly completed. The plan of final publication of the state map in seventeen sheets is also shown. They will be on a scale of one inch to a mile, with contours every twenty feet in the hilly districts of the north, and every ten feet in the smoother country farther south. The surveys over the roughest and most difficult part of the state are now finished; and, although half the total area is not yet covered, it is said that more than half the labor is done. The state's area is estimated to be 7,576 square miles. Of this, 1,116 square miles were surveyed last year, giving a total of 2,856. 1,893 square miles have been mapped, and 1,691 engraved. When completed, there will be prepared, also, a general map, on a scale of five inches to a mile, of the whole state. This will be printed on a sheet twenty-four by thirty-four

inches, uniform with the seventeen others; and New Jersey will then have, beyond comparison, the finest map of any state in the country.

— Reports from Mount Hamilton, California, say that this has been the most stormy winter known since observations were begun at the Lick observatory. The bad weather did not begin till so late in January that a drought in California was feared; but there have been forty inches of rain and melted snow up to April 4, and at that date the mountain was covered with two feet of snow. The anemometer cups were blown away, with the wind-gauge indicating sixty-five miles per hour. The lowest temperature was + 12°; and at this temperature outside, water did not freeze within the uncompleted buildings.

— A communication from A. W. Howitt of Gippsland, Victoria, states that he is engaged in preparing an account of the ceremonies practised by the Australian aborigines in the initiation of their youths to the privilege of manhood. He has recently had an opportunity of witnessing some of these ceremonies, never before practised in the presence of white men.

— Mr. J. Park Harrison writes to the editor of *The academy* concerning Saxon sun-dials, as follows: "The extreme rarity of Saxon sun-dials, or, perhaps, the paucity of dials that have been recognized as such, will render the discovery of an example in Daglingworth church, near Cirencester, of some interest to antiquaries. In this case there can be no doubt that the dial is coeval with the church, which has been pronounced by several of our best authorities to be Saxon. As in other equally early examples, the five principal hours are marked on the stone, and the dial is placed over the south doorway. At Daglingworth it has been well protected by a porch of somewhat later date. I hope that this notice may lead to a careful examination of the walls of other early churches."

— Jean Baptiste Dumas, the eminent French chemist, and leader of the French academy, died April 11, at the age of eighty-four. He was born at Alais, Gard. His early scientific education was in the study of pharmacy in his native village, and, later, in Geneva. At the age of twenty-one he found his way to Paris, where he continued to be prominent till the last year of his life.

— A paper on the structure and formation of coal, read by Mr. E. Wethered before the Geological society of London, March 5, is an attempt to show, 1°, that some coals are made up of spores, while others contain few or no spores, these variations often occurring in the different layers of the same seam or bed; 2°, that the so-called bituminous coals are largely made up of a brown amorphous substance, or bitumen, to the formation of which wood-tissue certainly contributed much more than spores. In an appendix to this paper, by Professor Harker, he refers the spores found in the coals to the modern genus Isoëtes, and suggests for them the generic title Isoëtoides. In the discussion, Mr. Carruthers dissented from the view that the coal-spores are related to Isoëtes, or any other form of submerged vegetation, believing them to belong to Sigillaria and Lepidodendron. Professor Dawkins agreed with Mr. Carruthers, and also followed Professor Huxley in holding that the resinous or bituminous portion of coal is chiefly due to the spores, and cannot be derived from woody tissue by ordinary process of decay. Similar views were expressed by Mr. Newton, Prof. T. Rupert Jones, and Mr. Bauerman.

— The members of the Scientific society of Indiana university are giving special attention to the local vertebrate fauna, and to the fishes recently collected at Havana and Key West, which are in the museum of the university.

— The *Engineer* for March 21 states that Cailletet, so well known in connection with the liquefaction of gases, has constructed an apparatus for the continuous production of intense cold, which consists of a closed steel cylinder containing a coil of copper pipe which projects from each end of the cylinder. Two copper tubes are also screwed into the cylinder; and one of these communicates with the mercurial piston-pump already used by Cailletet, while the other receives the ethylene which has been compressed by the pump, and cooled by methyl chlorate. By this arrangement he forms a circuit in which the same quantity of ethylene is repeatedly evaporated in the copper coil, producing intense cold, and then compressed again by the pump being sufficiently cooled with methyl chloride, and ready for evaporation again. This process goes on as long as the sucking and compressing pumps are working.

— The report of the English secretary of legation at Rome, concerning the new national library there, is given at length in the *Journal of the Society of arts* for March 21. The Italian government has taken over from the Jesuits the celebrated Collegio romano and its observatory. Various scientific societies have their rooms on the ground-floor. The first and second floors contain the ancient library, formerly in two divisions, one accessible only to the priests. A new hall has been built capable of containing 2,400 volumes, and a reading-room capable of holding two hundred persons. With the addition of the celebrated Casanatense, the richest ancient public library in Rome, the Victor Immanuel institute has space for 1,000,000 works. It seems as if the monks had made no additions to the library for nearly a century, and the first thing to which the resources of the library had to be applied was the purchase of modern classics, Shakspeare, Goethe, etc.: the collections Didot, Hachette, and Brockhaus have been purchased. From November, 1881, to November, 1882, there were 4,594 scientific works bought, while the government officials sent in 16,186 pamphlets and other documents. The library is open from nine o'clock until three, and in winter it is open in the evening from seven o'clock until ten.

— Dr. A. B. Griffiths, who has for some time been devoting his time to the study of the origin of petroleum, and advocates the organic view, writes to the *Chemical news* that he has found phenol in the stem,

leaves, and cones of Pinus sylvestris, — a discovery which he thus connects with the results of his investigations on the flora of the carboniferous period: "Taking into consideration the fact that solid paraffine is found in petroleum and is also found in coal, and from my own work, that phenol exists in Pinus sylvestris and has been found by others in coal which is produced by the decomposition of a flora containing numerous gigantic coniferae allied to Pinus, and that petroleum contains phenol, and each (i.e., petroleum and coal) contains a number of hydrocarbons common to both, I am inclined to think that the balance of evidence is in favor of the hypothesis that petroleum has been produced in nature from a vegetable source in the interior of the globe. Of course, there can be no practical or direct evidence as to the origin of petroleum: therefore 'theories are the only lights with which we can penetrate the obscurity of the unknown, and they are to be valued just as far as they illuminate our path.' In conclusion, I think that this is a connecting-link between the old pine and fir forests of by-gone ages, and the origin of petroleum in nature."

— The new English dictionary of the Philological society, edited by Dr. Murray, and pronounced by Mr. Furnivall to be the best dictionary of any language, has only reached the word ANT, and nobody knows when the end of the alphabet will come; but part i. gives a clear indication of the plan on which the work is to proceed, and shows that scholars in all departments, and not philologists alone, are to be benefited by its publication. Indeed, the construction of this dictionary has been governed by the scientific method. The authors began by observing and collecting facts, then proceeded to classify them, and then to ascertain what was taught by the facts. Three and a half million citations were made by thirteen hundred readers. Among the collaborators were many Americans, led by Prof. F. A. March. Rev. Dr. Pierson of Iowa sent sixty thousand quotations. From such resources, added to those already at command in Richardson, and other general dictionaries, and in the special glossaries of the Bible, Shakspeare, Milton, Pope, etc., it has been possible to determine the history of almost every word. It is curious to observe how sometimes the course has been upward from the language of common life to that of abstract philosophy; at other times the word goes down in respectability like a drunkard, and becomes positively vulgar. Indeed, the differentiation of words resembles the development of living beings: from very simple germs, very complex organisms are evolved. The 'form-history' of a word is what the editor calls its morphology, and includes a discussion of the derivation, phonetic changes, corruption, obsolescence, revival, etc.

In order to whet the appetite of those readers of *Science* who may not have had an opportunity to examine this masterly introduction, we shall cull a few examples, taken almost at random, of the mode of treatment which Dr. Murray and his coadjutors have followed. Almost every page will give us interesting material. A good many mathematicians who know that 'algebra' is an Arabic term will be surprised to find, that, so far as can be ascertained, it came into English use first (as early as 1541) in the sense of re-integrating broken bones, so that an algebraist or algebrista was 'a bone-setter,' and ten years later (in 1551), in the sense of the science of 'redintegration,' or equation, the mathematical sense which alone remains current. The historical use of another Arabic word, 'alcohol,' is likewise interesting. Its first recorded appearance in English is in 1543, when it meant any fine impalpable powder produced by sublimation, as alcohol of sulphur; and hence it was applied to fluids, an essence or spirit obtained by distillation, as alcohol of wine, and so ultimately to an extensive class of compounds of the same type as spirit of wine, some of which, far from being volatile, are not even liquid. The very convenient scientific group of 'actinic' words appears to have been introduced by Sir J. Herschel, who invented an instrument, which he called an actinometer, for measuring the intensity of the sun's heating-rays, described by him in 1825. More than a score of words etymologically related to this are now in scientific use. By and by we may expect a like multiplication from 'bolometer,' which Professor Langley has set in motion. 'Agnostic' is traced to a suggestion of Huxley's at a meeting of the Metaphysical society of London in 1869, and he had in mind the altar referred to by St. Paul as erected 'to the unknown God.' The first use of the term in print may be found in the *Spectator* for Jan. 29, 1870. 'Agnosticism' followed naturally a few months later. 'Ant' and 'emmet' have a common ancestry in the West Saxon *aemete*. In one form or another, they have been known to our language since the year 1000. 'Aluminium' first came into use in the form 'alumium,' which Sir Humphry Davy employed in 1808. Four years later he spoke of 'aluminum,' not yet obtained in a perfectly free state; and very quickly the *Quarterly review* substituted 'aluminium' for its less classical predecessor, and this is the form now commonly adopted. The biography of 'academy' is of interest. Caxton used the form 'achadomye' in 1474, referring to Plato's dwelling; but it was almost a century later (1549, 1588) when it began to be used as the name of a modern seat of learning. Perhaps it came to England from Geneva, where a protestant foundation took the name of an 'academy,' to be distinguished from the ecclesiastical 'university.' Toward the end of the seventeenth century the Royal academy of sciences in Paris was talked about in London; and in 1769 an academy of fine arts, that which is now in London *the* Academy, was founded. The American use of 'academical' as applying to an undergraduate classical college, in distinction from a scientific or professional school, does not appear to have been noted.

— Alabama may now be said to have a state weather service. As now organized, there is a corps of twenty-two observers working under the patronage of the state commissioner of agriculture, no appropriation having as yet been made by the legislature. The service was organized in February, by Dr. P. H. Mell,

jun., of Auburn, and now issues a monthly bulletin. It is hoped, that, during the next session of the legislature, the service may be placed on a permanent footing.

— The Massachusetts charitable mechanic association announces its fifteenth exhibition to open in September, 1884, and to continue for not longer than ten weeks.

— Professor Angelo Heilprin began a course of fifteen lectures on geology, before the Teachers' institute of Philadelphia, in the hall of the Academy of natural sciences, Wednesday, April 23.

— The Ottawa field-naturalists' club, which for five years has been engaged in developing the natural history of that district, has issued a circular calling attention to its success in the past, aud urging its members and others to still greater exertions. The excursions the coming season are expected to be of especial interest, and through them it is hoped that many may be enticed to help in the scientific work. Observations of the migrations of birds are especially called for.

— What a blow it would be to the scientific farmer, if it should be proved that the Ohio floods are due to some extent to the large amount of drainage-pipe and ditches which have been introduced of late years! A writer in the *New-York herald* urges the farmers to turn their backs on the drain-tile dealer, and devote their energies to deep ploughing, that the rain may the better be absorbed.

— The *Missionary herald* for March prints the following account from Mr. Gulick, one of its missionaries in Japan: —

No matter how cold it is, shoes are not allowed in the clean, matted rooms of any Japanese hotel or dwelling. Slippers are permitted as a concession to the foreigner. After making your prostrations to your callers, the proper position for yourself and all your company is to sit in a circle about the brazier, while tea and cakes or candies are passed around. After the tea the inevitable pipe, each individual carrying his own, is produced. A little pinch of dry fine-cut, half the size of a pea, is pressed into the microscopic bowl: the gentleman bends forward on his knee with the long pipe-stem in his mouth, touches the pipe to a live coal, gives a suck, bloats his cheeks for a moment with the warm smoke, and then expels it in two streams from his nostrils; a second whiff, then with a sharp rap of the pipe on the side of the brazier, or of a box for the purpose, the ashes are expelled, and he is ready to repeat the dose, or, with an air of satisfaction, tucks his pipe back into his belt. Each member of the circle is likely to repeat this operation from five to fifteen times in an hour; and you, the one abstainer, have the full benefit.

This is but one of the discomforts. The polite manner of sitting — the only manner admissible in refined society — is another and very great one. Your caller is announced. He drops on his hands and knees, and touches his forehead to the mat: you do the same. Perhaps a second bow, and you ask him to be seated: modestly he subsides at a little distance to the rear. You urge him to come up to the brazier and warm his hands: he declines. You urge him again, and he crawls forward. You are seated; all are seated. Your instep and the top of your stockinged or slippered feet press the floor, while you sit back full weight upon your heels and the upturned soles of your feet, with your knees straight before you. You, or your travelling-companion, pass the tea and cake. You exchange a few words with your caller, perhaps spread the palms of your cold hands over the few red coals, and try to look serene and composed. If you are an average foreigner, and not of the loose-jointed kind, about five minutes in this position is all you can endure, and you are ready to exclaim, 'Who shall deliver me from bondage to Japanese etiquette?' Your agony betrays itself in your face, and one of your polite visitors begs you to unbend and stretch out your feet. Thankful enough, you relieve your aching ankles and knees by assuming the attitude of the Turk, or the Hawaiian, on the mats. Occasionally the hotel-keeper, or your host, knowing the weakness of the foreigner, offers you a chair. But as vain is the effort of the man in a chair to be sociable with those on the mats as for a man on horseback to identify himself with a company of foot-passengers. Half an hour of enforced endurance of the standard polite position will render the ripe foreigner as lame as a foundered horse. The once flexible knee-joint refuses duty. But then, the Japanese are the most polite people in the world, and they will pardon any attitude in one whom they know and respect.

— We learn from *Nature* that a London *Times* correspondent writes from Iceland that reports of a volcanic eruption in the interior were current last year, and were founded on peculiar appearances of the sky, and especially on the observation from some of the remote inland farms of columns of smoke or vapor rising in the far distance. Nothing definite has, however, been ascertained as to these phenomena. An unusually large number of scientific men, — geologists, botanists, and philologists, — chiefly German and Swedish, visited Iceland last summer, and investigated its structure, flora, and language; and at present Professor Sophus Tromholt, well known in scientific circles by his researches as to the aurora borealis, is pursuing these investigations there, and intends to remain all the winter, as, from the clearness of the atmosphere and the frequency and brilliancy of the aurora, Iceland is exceedingly well suited for his observations.

— Some figures relative to the effect of different forms of artificial illumination on health have recently been published in the English *Science monthly*. A tallow candle is far the most unhealthy agent, and the electric light the best. The heat produced by the incandescent lamp is only about one-thirtieth of that produced by the tallow candle, while there is no carbonic acid or water produced at all. It is said, one gas-jet in a room vitiates the air as much as six human beings in a room.