

misanthropical unbelief in every thing and every body, by the clear, sweet, and inspiring faith of Annie, furnish the thread of the story. It is thoroughly religious, thoroughly Christian, both in tone and teaching. Mr. Roe has already exhibited a remarkable power of description, which in this volume he uses with good effect in the scenes of the fire and the shipwreck. But he has also shown in this work greater skill and fidelity to nature in his character drawing, especially in portraying the gradual change wrought in Walter Gregory's character, whose moral nature is revolutionized while his essential individuality remains unchanged.

*Katherine Earl*, by ADELINE TRAFTON (Lee and Shepard), is a lively, sprightly, entertaining story, in this respect satisfying the just expectations of the readers of *An American Girl Abroad*. But in structure it is ingenious rather than strong, in style readable rather than powerful, and will serve better to pass pleasantly a winter's evening than to produce any permanent impression, either moral or intellectual, on the mind of the reader. It is in part the story of the experiences of a young girl who chooses to take care of herself rather than to be dependent on others, in this respect resembling Miss Alcott's *Work*. Unlike *Work*, the story is not the vehicle of a moral lesson; if there is a moral lesson in it, of which we are not quite sure, it is subordinate to the story. We commend it as a means of entertainment rather than as a vehicle of instruction.

*Salem*, a tale of the seventeenth century, by D. R. CASTLETON (Harper and Brothers), is a very pretty story of the old days when witches were executed in that now eminently conservative, quiet, and staid old city. We call it a pretty story, because in this particular instance the old grandmother, who was accused of being a witch, was not executed, but saved by the interposition of her beautiful granddaughter. The author has succeeded—and it was a difficult task—in painting a very graphic picture of a truly horrible superstition, without, however, making a horrible picture. As a historical portraiture of those times, and particularly of that most extraordinary superstition, it appears to be historically truthful, and is well worth reading, espe-

cially by younger readers, simply as a chapter in American history.

#### MISCELLANEOUS.

MR. BENJAMIN DOUGLASS has given to Lafayette College an endowment for promoting the study of the writings of early Christians in the original languages. Two volumes of a series of text-books prepared for this purpose are before us, *Latin Hymns* and *Extracts of the Ecclesiastical History of Eusebius*, both edited, with English notes, for use in schools and colleges, by Professor F. A. MARCH (Harper and Brothers). The text is beautifully printed; the Greek of Homer or of Plato has hardly ever been spread in a school-book upon a page so attractive. The selections are generally well made; indeed, one small volume here affords material for a somewhat comprehensive study of the history, language, metres, and growth of hymnology in the early and mediæval church. We have found the brief commentary on these hymns interesting and instructive. If that on Eusebius seems less so, it is perhaps because it lacks uniformity, some sections of it being designed for beginners who need drill in the elements of grammar, while others simply elucidate the sense or the use of words by appropriate citations from the LXX. and other authors. It is proposed to continue the series with selections from Augustine, Jerome, Origen, Lactantius, and other ecclesiastical writers, and it is to be hoped that the public demand will be such that some knowledge of all the great authors on religion and philosophy who have in turn swayed the thought of the church and the world in languages now "dead" will soon be opened to students. The projectors of the series do not, of course, imagine that the heathen classics can be superseded in schools by later writers as models of diction, nor even that Chrysostom and Origen are safer guides in philosophy and morals than Plato and Cicero. But no man's knowledge of even the classical languages is complete without the study of their later periods, and certainly much narrowness and ignorance in matters more important than philology have resulted from the general neglect in education of the authors whose writings the Douglass endowment aims to make better known.

## Editor's Scientific Record.

### SUMMARY OF SCIENTIFIC PROGRESS.

**A**STRONOMICAL SCIENCE continues to be absorbed in the now rapidly approaching events of the 8th of December. The expeditions to Egypt for observing the transit of Venus will have reached their destination before the middle of October. The English parties will have their head-quarters at Cairo, observers being stationed also at Alexandria, Thebes, and Suez. Professor Döllen, of Russia, will be stationed at Thebes.

Numerous investigations have been called forth by the appearance of the brilliant comet of Coggia, among the results of which we notice that Weber searched for but found no satisfactory proof of the rotation of either tail or nucleus about an axis. Several observers noted the resemblance of certain phenomena in the head of

the comet to those observed in Donati's comet. Besides these, Secchi, using a magnifying power of 1000, saw the nucleus reduced to a small diffuse globe of about two seconds diameter, and surrounded by very faint bushy rays; the absence of sharp outlines under such a high magnifying power shows, he thinks, that the nucleus can not be a solid body. Zenker confirms the observations of Wright as to the polarization of the cometary light in a plane passing through the earth, comet, and sun. Very careful observations of the tail of the comet were made by Abbe in Washington and by Heis in Münster, the latter of whom publishes an excellent series of drawings of the growth of the tail up to the 20th of July; this appendage seemed to him to attain its maximum length (seventy degrees) on the

18th. Less extensive series of observations are recorded by Tacchini and Groneman. In commenting on the observations of Heis, Faye remarks that the record of the position of the tail on the 20th of July constitutes a new fact in our knowledge of the phenomena of comets' tails, one, however, that does not militate against the theory that the position of the tail is due to a repulsive force emanating from the sun.

It is announced that the German government has determined upon the erection of an observatory at Potsdam devoted especially to the study of the sun. Telescopic, spectroscopic, and photographic work will be regularly maintained.

The question as to possible apparent changes in the apparent diameter of the sun, which has of late been discussed by various astronomers, has received further elucidation at the hands of Messrs. Newcomb and Holden, of the Washington Observatory; these gentlemen have compared the meridian observations made on the same days at Greenwich and Washington: 3639 corresponding observations have been employed by them; and by combining these together in such a way that they could detect any inequality of which the period ranges between a day and a half year, it became evident that no such period exists.

Shooting-stars form the subject of a valuable report by Mr. Glaisher, from which it appears that the catalogue of meteors observed by Captain Tupman has been combined by Mr. Gregg with the similar catalogues of himself and Schmidt, forming a nearly complete list of all known showers of meteors. In connection with this work Mr. Gregg has made certain computations relating to the orbits of comets, so as to show that many of these bodies, observed perhaps only once during the past history of the world, are now represented only by showers of meteors.

At the Toulouse Observatory an extraordinary passage of corpuscles across the sun's disk was observed on the 5th, 6th, and 7th of September.

Mr. Abbe, of the Weather Bureau, at Washington, states, as the result of studies among the nebulae, that the fifty or sixty nebulae which are recorded in Sir John Herschel's "General Catalogue" as "very much extended," or as "mere rays of light," may perhaps be considered as very flat rings and planes, or as very oblate spheroids, and that their medial or equatorial planes are so related to each other that they all intersect about a common axis, which is inclined sixty degrees to the plane of the Milky Way.

Professor Mayer contributes to *Acoustic Science* another series of researches, in which he determines the number of beats which for any given pitch causes the most dissonant sensation, and is led to the invention of a new method of sonorous analysis, which consists essentially in rotating a large perforated disk with great velocity before a reed pipe. On placing the ear close to the disk we shall at certain definite velocities of rotation perceive the fundamental note of the pipe, and its successive harmonics in so far as they are then sounding. In general and approximately he finds that as the optic nerve retains for a fraction of a second the impression of any light that falls upon it (an impression whose duration varies with the color and brightness of the light), so do the nerves of hearing retain for a short time the impression of

sound. Thus, after the vibrations of a  $UT_2$  reed pipe containing twenty harmonics have ceased, the residual sensation of the twentieth or highest harmonic disappears in the  $\frac{1}{337}$  of a second, but the sensation of the fundamental or lowest harmonic remains in the ear  $\frac{1}{30}$  of a second longer.

Bearing upon the theory of *Heat*, some very curious phenomena have been observed by Tresca during the forging of the great ingot of platinum-iridium. When it was at a dull red temperature one could observe upon the sides of the ingot luminous streaks accompanying each blow of the hammer. These brilliant streaks continued sufficiently long to allow six different ones, developed by six successive blows, to be simultaneously visible. Tresca affirms that the zone which becomes luminous is that along which the molecules flow when the change of form consequent upon the blow takes place.

Sarran endeavors to deduce from the well-known laws of chemistry and thermo-dynamics the laws of the action of an explosion of gases on the movements of a projectile while within the bore of the fire-arm. He is thus enabled to substitute rational for the empirical formulæ that have hitherto been used. He considers that a new and remarkable independent confirmation of the laws of thermo-dynamics is afforded by the agreement of his formulæ with the observations lately made by the French naval artillery committee.

Messrs. Abel and Nobel communicate to the French Academy of Sciences the results of their observations on the explosion of gunpowder. They find that when the volume of the powder equals that of the chamber wherein it is exploded, the tension of the confined gases equals 41.7 tons or 6400 atmospheres to the square inch. They give also the law of the variation of this pressure with the expansion of the gas. The permanent gases resulting from the explosion have a volume of only about 280 times the volume of the original solid powder. The decomposition of one gram of powder develops about 705 gram units of heat; the temperature at the moment of explosion is about 2200° C.

Dr. Krebs calls attention to the fact that the thermometers of even the best makers are liable to read too high to the extent of a whole degree in reference to the position of the freezing-point of water, and he shows that this is in great part due to the use of water derived from rain or melted snow, and containing in solution a quantity of air or other gases.

The curious electrical properties exhibited by some metals, and especially crystallized minerals, when they are gently heated have been investigated by Messrs. Schrauf and Dana. They conclude that an investigation of the thermo-electric properties is of value only when we know the exact chemical composition of the minerals; a minute admixture of foreign materials exerts a very decided influence, although they do not deny the apparently universal connection between changes in density and changes in thermo-electrical properties.

The perturbations produced in the mariner's compass by the rolling of the vessel have been theoretically investigated by Sir William Thomson, who concludes that it may be found necessary to use at sea long needles whose vibration period amounts to fifteen or twenty seconds.

In *Meteorological Science* the most interest attaches to the Conference for Maritime Meteorology, which concluded its session at the Meteorological Office in London on the 6th of September. Its proceedings have been published in advance, and it may be noted that besides adopting resolutions urging greater uniformity in the methods of observation at sea, and in the subsequent publication of the results, the Conference also urged that the organization of meteorological observations as regards the navies of all countries should be arranged in accordance with the principles laid down for the merchant marine, and that the same form of register should be used by both services. Special questions worthy of minute investigation are also recommended.

The English journal *The Colonies* has begun the publication of a monthly weather review for those portions of the world held as British colonies. The review is compiled by Symons, the well-known author of *British Rain-Fall*.

The superintendent of the Danish Meteorological Institute announces his intention to publish weather charts for the North Atlantic Ocean and Europe; these will cover the field of observation formerly embraced in the "Atlas of the General Movements of the Atmosphere," published by the Paris Observatory, and will furnish an extension eastward of the information given on the very complete maps published by our own Army Weather Bureau for the United States and Canada.

Cornelissen has compiled some very important maps, published by the Meteorological Institute of Holland, showing the frequency of the occurrence of storms in the neighborhood of the Cape of Good Hope. The data on which the maps are based are drawn from the records of Dutch vessels for many years past. It appears from these that during January, February, and March, or the summer season of the southern hemisphere, the storms in that neighborhood are comparatively rare and moderate. In the winter season, on the other hand, numerous violent westerly storms prevail south of the Cape, while southwesterly storms are more abundant to the eastward, and north or northwest storms to the westward of Southern Africa.

Mr. Meldrum has communicated to the British Scientific Association a continuation of his previous investigations on the connection between the frequency of sun spots and the cyclones and rain-fall of the Indian Ocean. During the twelve years between 1856 and 1867, comprising a complete sun-spot cycle, 113 cyclones have been recorded. Although the results are only approximations, yet it is beyond all doubt that both the number and the violence of the cyclones are far greater in the years of maximum than in the years of minimum sun spots.

The influence of forests on rain-fall has been studied by Fautrat and Sartiaux, who have added somewhat to our knowledge on this subject by examining the rain-fall observed near the extensive woods of the domain of Halatte. They find that twenty per cent. more rain falls there than in the neighboring cleared ground.

The first sheets of the new topographical map of France have been published. This work, begun in December, 1870, has been pushed forward with remarkable vigor, and the present sheets are remarkable for the finish of the lines

and the happy disposition of the colors. The scale of the chart is  $\frac{1}{500000}$ , and contour lines are given for every 100 meters of altitude. These delicately tinted charts are sold at a price that barely covers the cost, and the fifteen sheets of the complete set will cost but two dollars.

Under the head of *Economical Mineralogy* we record the announcement of the discovery of rich mines of nickel in Norway, a fact of much importance in view of the increasing demand for this metal.

The threatened diminution in the supply of sulphur from Sicily has called renewed attention to the existence of large beds of this substance in Iceland, where an Englishman has lately received a concession of a large tract of country for the purpose of mining this substance and bringing it to market. The occurrence of mountains almost of solid sulphur is reported.

Several new species of minerals have been announced since our last report, one of them, Guanovulite, occurring inside of the fossil eggs in the guano deposit in Peru.

Such of the geological surveys of the States as are now in progress have been conducted with energy during the season. Among these we may mention that of Pennsylvania, recently organized under Professor Lesley. At a recent meeting of the Board of Directors much satisfaction was expressed at the progress of the work. The survey of Wisconsin, under Professor Lapham, has also been in the field, as well as that of Indiana, under Professor Cox. No details have been received in regard to the geological surveys connected with the expeditions of Professor Hayden and Lieutenant Wheeler.

As might be expected, the record of *Geographical Discovery* is quite full, in consequence of the facilities afforded by the milder season of summer, at least in the more northern climes.

The leading foreign journals bring us additional accounts of the adventures and experiences of the Austrian polar expedition on the *Tegethoff*, which left Tromsøe July 14, 1872, and of which meagre information was lately received by telegraph. According to these, we learn that the expedition was frozen in at the north point of Nova Zembla in 1872, being driven with the pack ice fourteen months, first northeast to 73° east longitude, and then northwest, until October, 1873. The crew worked in vain, in the summer of 1873, to free the ship; and in August of that year new land was discovered, whose boundary line was not to be seen north and west. They were frozen in, and wintered in 79° north latitude and 59° east longitude. Sledge journeys were carried on, from the 9th of March to the 4th of May, 1874, a little beyond 82° north latitude, and land was seen to the eighty-third degree. This was called Francis Joseph Land, in honor of the Emperor of Austria. No animals were observed, but the geological structure was interesting, large dolomite mountains being seen. Formidable glaciers were met with, and a few floating pieces of wood were noticed.

On the 20th of May, 1874, the crew left the ship in four sledges, and after journeying ninety-six days, reached Nova Zembla, where they met with some Russian seamen, and were taken to Wardoe, in Norway. But one death occurred, that of the engineer, from consumption.

The participants in the expedition have re-

turned to Vienna, where they received a public ovation, having previously been lionized at Hamburg.

Nothing has appeared in regard to any other polar exploring party; but it is understood that the Austrian government will take up the exploration where the party of the *Tegethoff* left it, and will send out two expeditions next year; the first to examine more thoroughly Francis Joseph Land by way of Spitzbergen, and a second to attempt to reach the pole by way of Greenland.

A British arctic expedition for the coming season is also becoming more and more probable, the selection of the Smith Sound route being a foregone conclusion. It is much to be hoped that the United States will not be behindhand in this race for discovery, and that either under public or private auspices an expedition may be initiated. Already Dr. Hayes and several of the participants in the *Polaris* expedition, as Dr. Bessels, Captain Tyson, H. C. Chester, and others, have volunteered their services.

In this connection it may be remarked that the proprietor of the New York *Herald*, with his characteristic liberality, has offered to bear one-fourth of the cost of an American expedition.

As relating in a measure to arctic research we may refer to the fact of the destruction by the ice in Davis Straits, with a full cargo of oil, of the Dundee whaler *Arctic*, which, it may be remembered, brought the greater part of the *Polaris* crew to Dundee after their rescue by the *Ravensraig*.

The project of converting a portion of the Sahara Desert into an inland sea continues to find favor, and it is understood that thorough surveys with a view to determine the precise mode of accomplishing this object are under way by the French government. As to whether the result aimed at is desirable or not is at present a question of considerable discussion. On the one hand, the replacing of a large amount of desert waste by water, and making sea-ports of interior points in Algeria, and the expected restoration of an ample rain-fall to various parts of Northern Africa, are viewed with favorable anticipations. On the other hand, it is maintained that the sea will be simply an immense evaporation basin, which will soon be clogged up with salt; or that a serious interference will take place in the amount of heated air carried across the Mediterranean, which at present prevents the extension of the Alpine glaciers. Should this be interrupted, it is feared that increased glaciation will ensue, possibly restoring a large portion of Central Europe to its condition during the reindeer epoch. Whatever be the result of this great engineering operation, it is extremely probable that it will be attempted by the French authorities.

A survey is to be made by the Khedive of Egypt of a certain portion of the valley of the Nile, with a view of ascertaining whether a part of the river can not be diverted so as to occupy an ancient bed now closed, and thus add to the resources of the country.

The exploring expeditions under Professor Hayden and Lieutenant Wheeler, already referred to, have completed their labors for the season, and are for the most part on their way back to Washington, and we shall probably soon have some announcement of the general results.

Professor Hartt, who has devoted so much attention to exploration in Brazil, has returned to that country for the fourth time, and will remain there for a considerable period, engaged in determining some of the vexed questions in regard to the geology and archæology of the country.

Under the head of *Zoology* we have to record the successful prosecution of sundry zoological researches that have been in progress during the year. Among them we may mention the labors of the United States Fish Commission, which have been conducted at the village of Noank, in Connecticut, during the months of July, August, and September. Supplied by the Navy Department with the *Blue Light*, a steam-tug of about eighty-five tons, thoroughly equipped with a proper crew and every thing suitable for the operations of the commission, and under the command of Commander L. A. Beardslee, U.S.N., the work has been prosecuted over a radius of twenty miles from Noank in every direction, embracing in its extent the mouth of the Connecticut River to the west, Gardner's Island and Bay, Montauk Point, Block Island, and the region to the east of Watch Hill. As usual, the section of the marine invertebrates was conducted by Professor A. E. Verrill, of Yale College, assisted especially by Messrs. Smith and Clark, while that of the fishes was in charge of Mr. G. Brown Goode, of Middletown, assisted by Mr. T. H. Bean, the whole under the supervision of Professor Baird, the United States Fish Commissioner.

As in previous years, the facilities furnished by the commission were eagerly embraced by numerous specialists, who resorted to Noank, and filled the place to an unprecedented extent. Among those who may be mentioned in this connection are Professor A. Hyatt, of Boston, with his assistants, Messrs. Rathbun and Saltonstall; Professor Rice, of Middletown; Professor Eaton, of Yale; Dr. Farlow, of Cambridge; Professor Joseph Leidy and Dr. Henry Chapman, of Philadelphia; Mr. F. W. Putnam, of Salem, and many others.

Among the most interesting results of the summer's work was the discovery of the fact that the cold northern current which passes around Cape Cod to the south of Martha's Vineyard, and is cut off from Vineyard Sound and Buzzard's Bay by the warm belt of shore water, strikes into Fisher's Sound, bringing with it the characteristic northern animals; so that, quite contrary to the usual expectation, the general fauna of the vicinity of Noank and Watch Hill is more boreal than that of Newport and Wood's Hole.

The Anderson School at Penikese, which may also be considered as an establishment for zoological exploration, has had a successful season, as many persons of both sexes as could be accommodated availing themselves of its privileges. Numerous special researches were prosecuted by the students under the direction of the naturalists who had charge of the establishment during the summer, among them Professors Putnam, Morse, and Packard.

In a recently published letter from Professor Wyville Thompson, we have additional news from the *Challenger* and new discoveries in zoology. South of the Cape of Good Hope deep-sea life was abundant, and confirmed the notion

already entertained of the similarity of the antarctic to the arctic fauna. Many of the species dredged by the *Challenger* were identical with those on the coasts of Great Britain and Norway. The trawl was used with success in 1600 fathoms, when the well-known deep-sea genera *Euplectella*, *Hyalonema*, *Umbellularia*, and *Flabellum*, a coral, and two new genera of crinoids, some new echinoderms, and remarkable crustacea were obtained. The deepest trawling was done in 2600 fathoms, when holothurians were taken in abundance, with several star-fishes, actiniae, and an elegant brachiopod shell.

Among the zoological communications read at the last meeting of the French Association for the Advancement of Science was a paper on the embryology of ascidians, by Giard. He insists particularly on the existence of chitinous rays, especially abundant at the extremity of the dorsal cord, but also found along the entire length of this organ, as observed in *Cynthia* and *Polystyela*. The tail of the tadpole-like young of the ascidian, says Giard, can scarcely be distinguished from that of a young fish or even a young batrachian.

We referred some time ago to a parasitic worm found by Professor Macrady in the genital glands of the oyster in South Carolina. It seems that a similar species has for twenty years been known to exist in Europe in the genital glands of the oyster and cardium. Its sporocysts and the cercaria-like young were then known, but recently Mr. Giard has found that these young are encysted in the *Belone vulgaris*, a fish found on the French coast. Now what finally becomes of the encysted *Bucephalus haimeanus*? Giard does not know, but supposes that it passes into another fish of the genus *Gasterostomum*, the *Belone* serving as food for this latter large fish.

An important note on the habits of the army-worm, which is estimated to destroy annually nearly \$50,000,000 worth of cotton in the Southern States, is published by Mr. Grote in the *American Naturalist*. This moth was first described and named by Hübner, from Brazil, in 1822, under the name of *Aletia argillacea*. Mr. Grote shows that the insect hibernates as a moth, and that it dies out in the central and northern portions of the cotton belt every year, and is replaced the succeeding year by immigration from more southern localities, and where the cotton-plant is perennial. The worm never attacks the young cotton-plant in Central Alabama in the spring or early summer, but appears at its earliest at the end of June, and is invariably preceded by flights of the adult moth. Since in Central Alabama insect life becomes active as early as March (and before then the hibernated cotton-moth has disappeared), Mr. Grote asks, "What is the insect doing between that date and July, when the worm appears? and why is the young cotton not attacked in May by the worms from the eggs deposited by the 'hibernating' moths?" If the "hibernating" moths lay eggs, their progeny perish from lack of food. But many chrysalids, he adds, are killed by frost, and there is great irregularity about the completion of the final brood of moths, arising from the age of the insect and the approach of the winter.

According to Professor Semper, the embryos of the rays and sharks have segmentary organs like those of the annelides. Vogt regards this fact as

a further indication of a relationship between the vertebrates and invertebrates.

*La Revue Scientifique*, in its summary of the proceedings of the French Association for the Advancement of Science, states that M. Vaillant has studied the scales of the lateral line in certain fishes, and regards these scales as organs of special sense.

At the same meeting Professor Sabatier spoke on the circumvolutions of the hippocampus in the brains of mammals and man. He regards the hippocampus as a nervous ganglion, a ganglionic conductor placed between the anterior and the intermediate brain, and whose development is constantly proportional to the development of the olfactory lobes in the vertebrate series.

In boring Artesian wells in the Desert of Sahara very small fishes, resembling the white-bait, not unfrequently occur, which inhabit the waters of the subterranean bed of the desert. They are identical with a species from the waters of Biskra. The male differs from the female in being transversely barred, so that some authors have regarded it as a distinct species. The eyes are well formed, although these fishes live a part of the time in obscurity. It seems that as far back as 1849 the governor of the oases of Thebes and Gaibe, in Egypt, stated that an Artesian well, about 105 feet deep, which he had cleaned out, furnished for his table fishes which probably came from the Nile, as the sand which he had brought up from this Artesian well was identical with that of this river. In the Sahara, as in Egypt, these fishes were carried away by the waters, which filtered into the soil down to the subterranean sheet into which the Artesian wells open. Gervais claims to have established the fact that these subterranean fishes are essentially fluviatile, and that some like them are found in the rivers of Senegal and Mozambique, of Syria and Egypt, of the Iberian peninsula, and even America. Their fossil representatives are not found in deposits of marine origin, and all that we know occur in lacustrine formations. The existence of these fishes can not, then, serve as an argument for the former presence of the waters of the Mediterranean on the soil of the north of Africa.

M. Toussaint, in studying the cause of the regurgitation of the food in the process of rumination, thinks that he has demonstrated that the food, mixed with a great quantity of liquid, ascends to the mouth during rumination by the effects of atmospheric pressure.

Dr. Sclater announces the existence of a new species of cassowary from New Guinea, being the second known in that country.

Judge Caton, of Illinois, who has been paying much attention to the American deer, visited Europe the last summer for the express purpose of studying the species in life there, and, somewhat contrary to his former conclusions, based upon imperfect evidence, he is now satisfied that there is no specific difference whatever between the American and European caribou and moose, and that the American elk and the red deer or the stag of Europe are derivatives from a common stock. The corresponding forms of the two continents he however considers to be distinct branches.

Among matters of *Ethnological* moment, we may remark that Dr. Conto de Magalhaes has

just published at Rio Janeiro a work in Portuguese upon the anthropology of Brazil, consisting of a collection of papers and addresses before learned societies by the author. He concludes that man has existed in Brazil one hundred thousand years; that some of the native languages (the Quichua, for instance) have borrowed about two thousand roots from the Sanskrit. He makes the tall dark tribes, like the Guaicurù of Matto Grosso, to be the primitive stock, and derives the other shorter and lighter races from a mixture of these with white races in prehistoric times.

On August 7 the Archæological Congress met at Stockholm—the very day that Iceland celebrated her thousand years' festival. Count Henning Hamilton was chosen president. Many flattering compliments were paid to Sweden, the land of Linnaeus, Berzelius, Retzius, and Nilsson, for the conspicuous part she had borne in archæological researches. Among the questions discussed were, "What are the earliest traces of the presence of man in Sweden?" "Can the precise way in which the trade in amber was carried on in early times be pointed out?" (This subject elicited a considerable amount of lively discussion.) "What characterizes the age of the polished stone implements in Sweden? and can the remains of this age be referred to a single race, or are we to suppose that several peoples were inhabiting Sweden at the same time?" "The origin and history of the Bronze Age in Sweden." "The Iron Age in Sweden." "Björkö and other old prehistoric towns of Sweden and other parts of Europe." "What are the anatomical and ethnical features peculiar to the prehistoric man in Sweden?" Between three and four hundred distinguished ethnologists were present at the Congress from various parts of the world. The utmost harmony and enthusiasm prevailed. The next meeting will be held in Buda-Pesth, Hungary.

Mr. W. Peggely, F.R.S., read before Section C of the British Association the tenth report of the committee for exploring Kent's Cavern, Torquay, and Mr. R. H. Tiddeman read the report of the committee for assisting in the exploration of the Settle Victoria Caves, in both of which fresh evidence was adduced of the existence of human remains in connection with animals of the Drift.

On the 10th of August last the fourth exhibition of the "Union Centrale des Beaux-Arts Appliqués à l'Industrie" was opened at Paris by President M'Mahon. One of the objects of the Union is to give, in costumes, models, photographs, and other pictures, a comprehensive view of the history of dress from the earliest times until the end of the last century. Every object of clothing was well represented, and the whole affair is spoken of as being most entertaining and instructive.

The Congress of Orientalists convened in London September 14, with representatives from every continent. The opening address of the president was an exhaustive account both of the work already accomplished by Orientalists and of the fields of labor yet to be cultivated.

Under the head of *Botany* we may refer to the great interest that has lately been excited in regard to the physiological functions of the appendages of certain plants which possess a variety of means for attracting and securing insects,

this phenomenon being at one time regarded as incidental, but now believed to have a direct relation to nutrition, as it is maintained by many that the insects are actually absorbed into the substance of the plants and digested. Among those of special note in this connection are the various species of *Sarracenia*, or side-saddle flower; of *Drosera*, or sun-dew; *Nepenthes*, or pitcher-plant; possibly the *Azalea viscosa*, etc.

At the meetings both of the British Association and of the American special interest centred in communications on these subjects; on the one part by Dr. J. D. Hooker, and on the other by Dr. Gray and Dr. Mellichamp.

Agriculturists and horticulturists in France and elsewhere are troubled very much by the ravages of certain noxious insects, the *Phylloxera*, or grape-vine louse, in France being especially prominent, as shown by the large proportion of communications made on this subject to the Academy of Sciences in Paris. Corresponding in prominence in this country to the ravages of the *Phylloxera* in Europe, and of even greater magnitude, are those of the grasshopper, the cotton army-worm, and the potato-bug, and public ingenuity is constantly occupied in devising remedies for the pests. A large reward—some \$20,000—has been offered in France in connection with the *Phylloxera*, but as yet without any one being able to claim it.

At the meeting of the American Association for the Advancement of Science in Hartford last August Mr. H. F. Armsby presented a paper on the nitrogen of the soil. The results of a large number of experiments, chiefly by European chemists, upon the long-vexed question of the sources of the supply of nitrogen to plants were given, and followed by accounts of experiments by the author. The object of these latter was to throw light upon the gain and loss of nitrogen in the soil. The method adopted consisted in allowing organic matter containing a known amount of nitrogen to decay under circumstances in which all the nitrogen given off or accumulated could be measured. Barn-yard manure mixed with pulverized flesh, in some cases alone, in others mixed with caustic potash or gypsum, or both, was subjected in one series of experiments to the action of purified air, and in another to that of pure nitrogen. The results showed a loss of nitrogen in all cases except those in which caustic potash without gypsum was used. No trace of nitric acid was found, so that the gain in nitrogen could not be ascribed to nitrification. The fact of the fixation of nitrogen was demonstrated, but not explained. Gypsum seemed to prevent in part the loss of nitrogen.

The condition of our present knowledge of the fixation and loss of nitrogen in the soil is thus stated by Mr. Armsby: 1. The loss of free nitrogen during the decomposition of nitrogenous organic matter is generally due to oxidizing action. 2. An increase of combined nitrogen in soil may take place by oxidation of free nitrogen to nitric acid. 3. Some organic substances in the presence of a caustic alkali are able to fix free nitrogen without the agency of oxygen or the formation of nitric acid.

A new fodder plant, the *Symphytum caucasicum* (Caucasian comfrey), is exciting a great deal of attention in Europe, particularly in England.

The first authorities confirm accounts of crops fabulously large, and it is said that this must soon replace most other fodder plants. •

A German agricultural journal has lately published an article upon the protection of manure heaps from rain, by roofs, from reasoning based upon observations by Meister. So long as the manure heap is well protected from flowing and stationary surface water it will receive no injury from ordinary rain-falls.

Messrs. Lawes and Gilbert, of Rothamstead, England, have been making some experiments upon the value of Indian corn as food for pigs. The corn meal alone appeared to be a defective diet. With addition of mineral matters the increase in live weight was quite satisfactory in proportion to the amount of food consumed. It is recommended to mix Indian meal with food rich in nitrogen and mineral matters, in which form its use will be judicious.

In *Engineering* the most interesting item of intelligence is in connection with the Hoosac Tunnel. Although the actual perforation of the rock was completed in November, 1873, the tunnel route is not yet ready for traffic. It is now announced that it has been decided to lay steel instead of iron rails, and furthermore, the 1st of November has been fixed upon as the date for running the first train through. The running of regular trains may, however, be delayed a month longer, on account of the delay incident upon the construction of certain bridges west of the tunnel, one of which has but recently been contracted for. The grading of the new road west of the tunnel is very nearly finished, and the track-layers are only waiting for the completion of the bridges to begin their work.

In England the proposition to construct a new Thames tunnel, to facilitate intercourse between the northeast and southeastern districts of the metropolis, is being strongly urged.

A feature of much interest in connection with the recently constructed *City of Peking* is the remarkable speed which she displayed in her trial trip to Boston, and which proves her claim to the title of the fastest ocean-going steamer afloat. Commander R. W. Meade, U.S.N., in a published card, states that she made, under steam alone, eighteen knots in one hour and three and a half minutes—a record altogether unprecedented. The *City of Peking* has gone to San Francisco, via the Straits of Magellan, to take her position in the fleet of the Pacific Mail Steam-ship Company. The *City of Tokio*, a companion vessel both in hull and engines, and built by the same firm, will be ready for her trial trip before long. It is worthy of being placed upon record that during the year 1874 the Delaware River ship-builders have launched the two fastest steam-vessels afloat. The steel torpedo boat *Aerolite*, built by Neafie and Levy for the Egyptian government, made on her late trial trip, with a new engine, twenty-one miles an hour.

The organization of plans for the Centennial International Exposition appears to be quietly progressing. The administration has lately issued invitations for applications for space to intending exhibitors, in order that the commission may know how much space it can assign to foreign nations.

In connection with an interesting invention recorded in our summaries of last year, viz., that

of Mr. Loiseau, for utilizing waste coal, we may record the fact that the "Loiseau Pressed Fuel Company" has been formally organized during the past month, with a number of prominent coal men as managers. The erection of buildings will be at once commenced at Port Richmond, Philadelphia, and the new fuel is promised for the market in December. The machinery in course of construction will have a capacity of 100 tons per diem, and the new fuel will be offered for sale at \$1 per ton below the price of coal in lump.

The following estimate is given of the length of railway lines in course of operation and construction on the 1st day of July, 1874:

<i>In operation.</i>	
France.....	11,000 miles.
Great Britain.....	7,300 "
America.....	74,000 "
<i>In course of construction and projected.</i>	
France.....	5,100 miles.
Great Britain.....	3,500 "
America.....	12,000 "

The length of railways throughout the world exceeds two million miles, and the capital invested in them within the last thirty years is about four thousand millions of dollars.

A forty-mile conduit for piping petroleum to Pittsburg, connecting that city with Millerstown by a line of three-inch tubing, is now in course of construction, and when completed and in operation will in its character and uniqueness find no parallel in the world.

The points connected by this lengthy string of tubing are Millerstown, the centre of the deep-well region of Butler County, Pennsylvania, and Fairview Station, on the West Pennsylvania Railroad, about eight miles from the city. From the receiving tanks at the former place connections of inch pipe ramify to the producing regions adjacent, and collect the petroleum in two tanks of 25,000 barrels capacity, and at Fairview five immense tanks will be erected of 125,000 barrels capacity, from which the Pittsburg refiners will be supplied by a pipe laid across the Alleghany River.

As a matter connected with *Therapeutics* we may refer to the attempt frequently made to introduce medicines into the human system by the galvanic current, but until lately with little success. It is now stated that if the substance to be introduced is placed at both poles, and the current reversed every few minutes, an appreciable quantity can be transferred, quite enough in some cases to produce a serious toxic effect upon various animals, and it is confidently expected that human subjects may be treated beneficially.

Our *Necrology* for the month is, we regret to say, unusually full, embracing Dr. Jeffries Wyman, of Cambridge, Dr. J. H. Slack, of Bloomsbury, Mr. J. E. Gavit, of New York, and Mr. Louis Seeborn, in the United States; Dr. Charles T. Beke, the geographer, Sir John Rennie and Sir William Fairbairn, eminent engineers, and Mr. Robert Shuttleworth, in Great Britain; in Italy, Mr. Paul Rosa, the astronomer; in Sweden, Professor Angström; and in France, the travelers Dournaux-Dupréz and Joubert, the Comte de Pontécoulant, M. Teulieres, and Professor F. A. Pouchet, the eminent physiologist and microscopist.

expositor. In the past the Bible has been quite too much treated with a pseudo-reverence, which has impaired its power; it has been kept as a sacred relic in an unopened ark, separated from the companionship of other books, its poetry lifted above the realm of our common experience, and the heroes of its history translated by a pious but misleading imagination into a realm scarcely distinguishable from that of fairy-land. The reaction from this mental habit has been into one of irreverent criticism or of superficial realism. From treating the Psalms of David as oracles, we have lapsed into regarding them as semi-barbaric odes, at least in certain of their inflections of feeling; from reverencing Abraham as a saint, we have fallen to picturing him as a mere Arabian sheik. Dr. Taylor preserves what is good in both systems of interpretation, in both moods of thought. He is not so absorbed in the external life of the shepherd-boy as to be oblivious of the divine experiences of the soul, nor so absorbed in a canonizing of the Old Testament saint as to be oblivious that he was a man of

like passions with us all. His treatment of Scripture is, in brief, characterized by a reverent familiarity—it is that of a devout but not superstitious student. The other characteristic is the moral and spiritual fruitfulness of the author's exposition. He believes, evidently, that all Scripture is "profitable," and that it is the first duty of the expositor to discover the profit in Scripture, and to make all study and all exposition subordinate thereto. The life of David is not, therefore, to him like the life of a classic hero; it is not to be studied primarily for its historic interest; it is the record of a life written as an example or a warning, sometimes one, sometimes the other; and in every chapter he seeks to bring directly and immediately before the reader the lesson of the life. Thus the story of the shepherd-king is brought to bear directly upon our common experiences, both by the reverent realism of the exposition, and by the direct moral and spiritual purpose of the expositor. We commend the work heartily both to the student and to the reader, especially to the latter.

## Editor's Scientific Record.

### SUMMARY OF SCIENTIFIC PROGRESS.

THE month of October, like its predecessor, offers us no instance of the discovery of a new comet or asteroid, but, on the other hand, some interesting matters in connection with more abstruse studies have come to hand. Professor Purser presents an attempt at a solution of one of the most difficult points in theoretical astronomy. It seems probable, mainly from the researches of Delaunay, that that portion of the secular inequality in the moon's mean motion which is unexplained by the ordinary formulæ of celestial mechanics may possibly be accounted for as the effect of the friction of ocean tidal currents in retarding the rotation of the earth upon its axis. Professor Purser, on the other hand, examines the question as to how nearly the energy which is converted into heat in the movement of the tides is equivalent to the energy lost by the earth in its diminished rotation on its axis. He finds that these quantities are almost exactly equivalent, and furthermore that the energy is in fact merely transferred from the earth's rotation to the moon's orbit, so that the total energy of the system remains the same.

Professor D'Arrest, well known by his researches among the nebulae, and who has of late years undertaken the highly important work of a spectroscopic examination of all stars, states that now that the attempts to attach a direct chemical meaning to the metallic absorption lines in the spectra of certain stars have been given up, there, on the other hand, arises an unexpectedly great interest to the astronomer in the prismatic analysis of the light of the fixed stars. It appears, namely, that there is a plain connection between the occurrence of spectra with strongly marked absorption lines and the occurrence of red and variable stars. He himself cites twenty-three well-marked coincidences of this kind, and urges a further investigation of the subject.

In some remarks on the results accomplished

in connection with the Argentine Uranometry, Professor Gould suggests that we may be able to determine the position of our sun with reference to its own cluster, and the position of the cluster itself with reference to other portions of the universe, by considering on the one hand the fact of the existence of a well-marked zone of very bright stars inclined to the Milky Way, and on the other the hypothesis of an equable distribution of stars.

M. Champion, in a memoir on the tails of comets, shows that at the distance at which these commence to be seen the rays of the sun would not produce an appreciable elevation of temperature in such a highly rarefied substance.

A new calculation of the temperature of the sun is proposed by M. Violle, who concludes the true mean temperature of its surface to be about 2000° C.

The construction by Clark of the great refracting telescope for the Washington Observatory seems to have given some stimulus to similar attempts in Europe, if we may judge from the fact that a twenty-inch lens is nearly completed for the new observatory of Strasburg, while thirty-inch lenses are being made both for the Paris and the Vienna observatories; in addition to which a silvered glass mirror of four feet aperture is being erected in the grounds of the latter.

In *Meteorological* matters we note the appeal made by Colonel Strange, of the Trigonometrical Survey of India, and Mr. Balfour Stewart to astronomers and meteorologists in favor of a more rational way of treating meteorology. They seem to favor the idea that variable and to some extent unknown influences are exerted by the sun upon the earth, and that the study of the sun, both as regards its spots, radiation, etc., must form the true basis of rational physical meteorology.

The meteorological committee of the Royal Society have directed that forecasts of the weather be prepared daily in the office as experiment-



al studies, from which we gather that it may not be long ere Great Britain will enjoy the advantage of a system but little if at all inferior to the weather probabilities of the United States.

The steady growth of the facilities enjoyed by the Army Signal-office in the prosecution of meteorological researches is forcibly illustrated by the statement in its last monthly review, that 442 stations send in reports with sufficient expedition to enable the review to be issued promptly within two weeks after the close of the month.

So far as this publication of the Signal-office comes into the hands of scientific meteorologists, it appears to receive very general praise as being a concise summary of the principal atmospheric phenomena bearing upon storms. Of these latter thirteen were chronicled during September, five of which were well developed revolving storms. That which passed along the Carolina coast on the 28th of the month developed a force that has been very generally compared to the hurricane of 1854, and produced great destruction from Florida to Virginia. The map of rainfall for the month shows that Illinois, Indiana, and Ohio continued to experience the severe drought that has so greatly injured the harvests in those States.

In connection with this subject it is not improper in this place to record the terribly destructive typhoon that passed over Hong-Kong on the 23d of September, by which great damage to property was caused, attended by a loss of life estimated at 30,000. It will be remembered that on the 9th of August an equally destructive typhoon passed over Nagasaki. The latter storm was in a meteorological point of view even more interesting than the former, and we confidently look for some systematic investigation into these two storms. Coming as they do at a time when both the Chinese and Japanese nations are considering the propriety of telegraphic storm warnings, these occurrences can but tend to hasten the achievement of that which is now an indispensable portion of the machinery of every civilized nation—the storm bureau.

Professor Prestel, in tracing the history of the great storm that occurred in Europe on the 22d of November, 1873, concludes that on the 17th of the month this disturbance was central over North Carolina, and that during the five following days it passed northeastward over New Brunswick and thence over the Atlantic to the North Sea; the author thus adds one to the slowly increasing number of cases in which severe storms have been traced across the ocean; and himself announces in the following words his adhesion to one of the general principles that have gradually been gaining ground in Europe, and in accordance with which storm predictions have been made out in this country during the past four years: "The details of the path of any given storm are determined both as to space and time by the very variable position, form, and extent of the sub-tropical area of high barometer." In a further continuation of his work Professor Prestel, however, treads upon dangerous ground, in that he attributes to some lunar influence the fact that the severe storms of November, 1864 and 1873, pursued almost identical paths.

The Dutch Meteorological Institute has pub-

lished a valuable chart by Cornelissen, showing for each season of the year the mean barometric pressure, and the frequency of storms for each square degree of the ocean in the neighborhood of the Cape of Good Hope.

Those who have been accustomed for many years to admire the energy shown by Leverrier in the conduct of his International Meteorological Bulletin have been somewhat surprised to learn that the Minister of Public Instruction has ordered an inspection of the meteorological service of the Paris Observatory, and a report upon its present condition.

A posthumous paper by Rosa, whose death on the 11th of January last has already been announced, contains a further contribution to the study of the relation between terrestrial magnetism and solar phenomena. He endeavors to establish a connection between periodic changes in the diameter of the sun and the corresponding changes in the magnetic variation.

The formation of the American Electrical Society, having its head-quarters at Chicago, took place on the 21st of the month. General Anson Stager was chosen president. Although its membership is apparently confined at present to the practical telegraphers of the country, yet it is to be expected that by the addition of scientific investigators the society will seek a wide field of usefulness, and stimulate the prosecution of electrical research in our midst.

Professor Joseph Henry states that his own observations on the phenomena of sound in connection with efficiency of fog-signals do not confirm the deductions recently made by Professor Tyndall. The latter attributes the deadening of sounds produced by common fog-bells, the siren, etc., to the reflection and absorption of mixtures of hot and cold air; but Professor Henry concludes that the loss of sound is due principally to its refraction, whereby it is bent out of its course to such an extent as to pass above the observer's head.

Professor Clerk Maxwell, in commenting on the recent work of Van Der Waals on the gaseous and liquid states, applies Clausius's "theorem of the mean virials" to the experiments of Dr. Andrews on carbonic acid and other liquefiable gases, and demonstrates that the molecules repel each other when the gas is being compressed still further after having been reduced to the liquid state, but that before reaching the state of liquefaction they attract each other. These molecular forces of attraction and repulsion are, however, much inferior to the repulsive force due to the kinetic energy called heat, which produces the general force of expansion by means of which the gases resist the external forces holding them under compression. This conclusion is quite in accordance with the remarkable theory of atoms developed by Bosovich over a century ago.

Among the items of recent interest in connection with the subjects of *Mineralogy* and *Geology* that have come to our notice since our last summary, we may refer to the remarkable fall in the value of Brazilian amethysts in consequence of their discovery in immense numbers. Certain new mines were opened not a great while ago, the first transmissions from which brought large prices; but the rapid increase in the number taken out over a considerable area glutted the

market to such an extent that gems of fine quality bring but a trifle per hundred pounds.

Among the new minerals announced more or less recently we may mention Rivotite, Livingstonite, Foresite, and Veszelite.

The discovery of coal in Spitzbergen is announced as having been made during the past summer, although no special intimation of its commercial value is given. Mines of the same character have been detected on the Patagonian side of the Straits of Magellan, which promise to be of great importance in supplying the steamers passing through the straits. There are three principal veins, of which the largest is many feet in thickness, and all are quite accessible from the water's edge.

The great commercial value of the magnetic iron sands of New Zealand, worked to so much advantage in the manufacture of steel, has called attention to the very extensive deposits of the same substance on the coast of Labrador, and several establishments are now engaged in gathering this and forwarding it to England. At one place about thirty tons a day are extracted. The separation of this sand from other substances mixed mechanically with it is greatly facilitated by the use of a new magnetic ore separator, which has also been used to advantage in other localities, where the ore by roasting is converted into a magnetic oxide of iron, then pulverized, and the iron extracted.

Many communications have been made at the meetings of the various summer scientific associations in reference to subjects of geological interest, both local and general. So numerous are they, indeed, as to render it impossible for us to attempt any complete summary. We may refer, however, to one by Mr. Belt in reference to the formation of the Siberian steppes, which are closely related to corresponding formations in North America. This author takes the ground, as the result of careful examination, against their being of marine origin, as generally supposed. On the contrary, he thinks they are fresh-water deposits made during the ice period in consequence of the damming up of the waters by ice, causing an accumulation of sand, gravel, pebbles, and boulders over a vast area.

The determination of the occurrence of aluminium in certain plants has been the subject of investigation by Professor Church, who has found a notable percentage in several species.

We have already referred to the detection of vanilline in the inner bark of the pine-tree, or at least the possibility of converting coniferine into this substance. At the present time an establishment in Berlin is engaged in making this substance, which, by its greater cheapness and alleged equal excellence, promises to supersede the use of the natural vanilla bean. An ordinary tree is said to furnish about twenty dollars' worth of the substance, without injuring the wood for any practical uses.

The new dyes of Croissante and Bretonnière, so recently announced, are rapidly coming into favor, several establishments in France and Germany having undertaken their manufacture on a large scale. These are characterized by extreme cheapness of cost, being much less than that of the natural dye-stuffs, such as logwood, etc., while the variety of tints is very great, including nearly all colors excepting the reds, yellows, and greens.

These coloring matters have a remarkable affinity for organic substances, and can be fixed upon the tissues without the necessity of any mordant. They are obtained by the action of certain sulphides on a great variety of matters.

A new petroleum product, under the name of vaseline, has lately been introduced in the market. It presents itself in the form of a thick transparent jelly, and is said to be valuable for the manufacture of various emollients for surgical uses.

The movements of the *Challenger* continue to be of special interest in the *Geographical* record, the latest advices being to the middle of July, at which time she had been to the Feejees, and was about proceeding to the New Hebrides and Torres Straits. Seventy-five cases of zoological collections preserved in alcohol have recently been forwarded to England.

The various government expeditions that have been engaged during the past summer in exploring different portions of North America have either returned to Washington or are on their way, and we hope to give an account of the principal results accomplished in our next summary. Unusually rich material has been gathered by many of them in the lines of zoology and paleontology, and excellent geodetic and geological work has been done. Mr. Dall, who, under the Coast Survey, has been engaged in the exploration of the northern coast of Alaska, has returned to San Francisco. Among other discoveries made by him is that of an enormous glacier three or four miles wide and from twenty to thirty miles in length, being one of the largest known outside of Greenland. He also made some interesting observations upon the height of Mount St. Elias, which by trigonometric calculation he estimates at fully 19,000 feet, thus greatly exceeding in altitude any other peak in North America.

Under the head of *Microscopical Science* we notice in the Proceedings of the Academy of Science, Philadelphia, page 75, 1874, a paper by Professor Leidy upon the "Enemies of *Diffugia*." They were frequently found within the intestines of *nais*, *pristina*, *chaetogaster*, and *cesollosoma*, and the animalcule *Stentor polymorphus* seemed to be particularly fond of them. On one occasion a *stentor* was accidentally fixed by pressing down the cover of an animalcule cage on a *diffugia* which it had swallowed; after repeated elongations and contractions, the *stentor* liberated itself by splitting through three-fourths of the length of its body, and in the course of a few hours each half became separated as a distinct individual. In the same number of the Proceedings, page 88, are some interesting remarks also by Professor Leidy on the revivification of *Rotifer vulgaris*. In the first experiment the glass slides were dried in a room where the thermometer stood at 80°; twelve hours afterward the slides were examined, water was applied, a number of the apparently dead rotifers imbibed it, and in half an hour exhibited their usual movements. The same slides were again dried, and examined the next day. Several hours after moistening only two rotifers were noticed moving. In a subsequent experiment they were exposed to a hot sun during the afternoon, and an examination of the slides was made the following morning. After moistening the

rotifers continued motionless. These observations confirm what had been already stated by others, that when actually dried the rotifers are incapable of revivification. In the same number of the Proceedings Professor Leidy notices some new fresh-water *rhizopods*, which appear to be furnished with tufts of tail-like appendages, whence he concludes they belong to a new genus, and as they have all the essential characters of amœba, he proposes to name the genus *Oura-mæba*.

We call attention to Herr Möller's new Typenplatte of Diatomaceæ, which is a marvel of delicate microscopical manipulation, remarkable not alone for the beauty of the forms, but for their method of arrangement. The names are delicately photographed directly under each specimen, and the specimens themselves are placed in the centre of a circle, also photographed.

In a previous notice we mentioned Mr. Carter's opinions on the subject of *Eosoon canadense*. Dr. Carpenter has replied in the June number of the *Annals of Natural History*, 1874, very fully, and to that we must refer those interested in the question. He asserts that a true nummuline wall, not a layer of chrysolite acicula, as asserted by Professors Rowney and King, but a calcareous lamella, exists, in which the tubuli, straight and parallel, are easily distinguishable.

At a recent meeting of the Academy of Natural Sciences in Philadelphia, Dr. Leidy described a curious rhizopod found in a mill pond, and measuring  $\frac{1}{100}$  of an inch in length. It moves slowly with a snail-like motion, and protrudes numerous papillæ and processes which bristle with rigid spicules, which can be shortened or withdrawn—a peculiarity that separates the animal so widely from its nearest ally that it probably belongs to a distinct genus. It is therefore named by Dr. Leidy *Dinamæba mirabilis*. A very curious and interesting discovery of what appear to be fresh-water polycystinæ has lately been made, and a paper embodying all at present known with regard to them may soon be expected from Mr. George W. Morehouse; hitherto they have been considered exclusively marine, and are found in the deepest sea soundings, where, either from the solution of the carbonate of lime or other cause, the foraminifera have entirely disappeared. The lamented Professor H. J. Clark published in 1866 in *Silliman's Journal* a paper in which he maintained that the sponge was an aggregation of flagellate infusoria, a compound protozoan animal; the same view had been substantially announced a little before by Mr. Carter. Hæckel has more recently modified this view, contending that the flagellate monads of Clark are simply cells lining the general stomach cavity of the sponge, and that therefore it is not a compound infusorian, but a more highly organized animal related to the radiates. He regards the sponges and acalæphæ as having been evolved from a common ancestor, which he terms *Protascus*. In the September number of the *Monthly Microscopical Journal* are two papers well worthy the consideration of those physicians who consider the microscope as of little value in diagnosis. The first, upon the "Diagnosis of Blood Stains," is by Dr. Joseph G. Richardson, microscopist to the Pennsylvania Hospital; and he shows pretty conclusively that "we are now able, by the aid of high powers of the microscope,"

and under favorable circumstances, to positively distinguish stains produced by human blood from those caused by the blood of any of our ordinary domestic animals, and this even after the lapse of five years from the date of their primary production. The other paper is by Dr. Osler, "On the Organisms in the Liqueur Sanguinis;" it was read at a meeting of the Royal Society, and has elicited considerable notice. He was not able, however, to trace any organic continuity with any other recognized animal or vegetable form, or to show that they possessed power of reproduction, or were at all related to *Bacteria*.

Among the more important *Zoological* works that have been received during the past month is a volume in quarto on the centipedes and thousand-legs of Mexico and Central America, by De Saussure and Humbert, and published by the French government. It will be useful to American students of these animals.

In embryology we have a very fully illustrated memoir by Mr. Alexander Agassiz on the jelly-fishes known as ctenophora. The history of *Idyia roseola* and *Pleurobrachia rhododactyla* is given with remarkable fullness and with ample illustrations.

We are now quite well acquainted with the development in the egg of the six-footed insects and the spiders, but that of the third division of tracheate, or air-breathing insects, the *Myriopoda*, has hitherto remained unknown. The blank has been well filled out by the efforts of a Russian zoologist, Metznikoff. His paper appears in Siebold and Kölliker's *Zeitschrift*. It seems that the segmentation of the yolk is total in the *myriopods*, as it has been found to be in the *Podura* by Ulianin, another Russian. The development of the germ is in other respects almost identical with that of the *Podura*, as described by Packard, and suggests some interesting points in the classification of these two groups of insects.

P. Bertkau, in an article on the respiratory organs of the spiders, in the German *Archiv für Naturgeschichte*, confirms the discovery of Menge and Siebold that these creatures respire both by so-called lungs and tracheæ. It should be observed that these *quasi* lungs are in reality modified tracheæ, for which Bertkau suggests the name of "lamellate tracheæ."

We have received the first volume of a systematic work on the spiders of France, by the energetic naturalist, M. Simon, of Paris. The plates are beautifully executed. Meanwhile the Boston Society of Natural History are republishing, under the editorial care of Mr. Burgess, Hentz's illustrated papers on the spiders of North America. The volume will be issued soon.

The French government two years since sent M. G. Pouchet on a scientific mission to the laboratory of living animals at Concarneau. He applied himself to the study of the changes of color in fishes. In his report to the government he gives an account of the minute anatomy of the masses of pigment which are the seat of the colors displayed by fishes, reptiles, and batrachians, as well as some of the lower animals. These pigments are either liquid or solid, forming a granular mass. The cells in which they are contained he calls *chromoblasts*. During life these cells are dilated, but in death they are contracted, thus producing the lividity often seen

in dead fishes. This change in color is due to the influence of the nervous system; the facts that the chromatic functions of the chameleon are arrested during sleep, and that the colors of fishes, as the "seiches," change when we irritate them, are proofs. It sometimes happens that these changes of color are produced with extreme rapidity by the fish simply seeing some external object which gives a shock to the brain. It is difficult to say whether this change of color is voluntary or not. The means taken to test the action of the nervous system were to remove the eyes. When this was done the fish became intermediate in color between the dark hues it assumed when placed on a dark bottom and on a lighter sandy bottom, and this tint did not change whether the fish was placed on one or the other. He also proves that the great sympathetic nerve governs this change of color. In fine, then, the point of departure of this faculty is the retina, the impressions on which, communicated to the brain, react in the pigment cells of the skin, and the nerves regulate the action by the mediation of the great sympathetic. In this connection it is interesting to observe that in the eyeless blind fish of Mammoth and other caves there are no pigment cells, and consequently the fish is white; and the blind craw-fish and some eyeless insects are either white or much paler than allied forms out-of-doors.

The reptiles and batrachians of Mexico and Central America are being described and figured by MM. Dameril and Bocourt in a work published by the French government.

The blind snake, *cecilia*, it appears by the researches of a Russian naturalist, has, when young, before leaving the body of the mother—for this animal is, as he finds, sometimes viviparous—branchiae like the tailless batrachian of South America known as *Notodelphis orifera*. It follows that these young *ceciliae* are adapted for an aquatic life, and should be looked for in pools of water rather than damp earth, where the adults live.

Dr. H. C. Yarrow, of Wheeler's survey of the Territories, has published a "Report upon Ornithological Specimens collected in the Years 1871, 1872, and 1873," forming a pamphlet of 148 pages.

One of the most interesting papers on the mammals is by Sir Vincent Brooke, on the genus *Cervulus*, in which in a striking way, by word and figure, he considers its genealogy, and thinks that the two allied genera, *Cervus* and *Cervulus*, were differentiated "far into the geological past." *Cervulus* is a diminutive deer living in India and the adjacent islands.

In addition to the points above referred to of a zoological purport, we may refer to a valuable paper by Professor Huxley upon the American genus *Menobranchus*, which has been treated by him in his usual able manner, and published by the Zoological Society.

The views of Professor E. S. Morse in reference to the affinities of the brachiopod mollusks—namely, that they are actually annelids or worms—have been indorsed by Professor Kowalevsky, who at the time was unaware of the anticipation of his own views by Professor Morse in coming first to the same conclusion.

Professor Allman has announced what he considers a new form of the hydrozoa, made the

type of a special order, *Thecomedusae*, and believed to be in every respect distinct from the true hydrozoa.

Professor Seely mentions the discovery in the London clay of the island of Sheppey, so rich in vertebrate fossils, of a fossil bird, which he describes as being most closely allied to the emu, and to have at the same time certain relations to the apteryx of New Zealand.

A paper by Dufossé, published in the *Annales des Sciences Naturelles*, discusses the subject of sounds produced by fishes, especially those that are caused by means of the complicated air-bladders of certain species, particularly the sciænoïds.

Operations in the department of *Pisciculture* have been prosecuted during the past summer, both at home and abroad, on a large scale, those in behalf of the United States being of very great magnitude, and meeting with very gratifying success. Several millions of young shad were transferred from the hatching establishments at Castleton on the Hudson, and Holyoke on the Connecticut, to Western, Northern, and Eastern waters, the most distant shipment being to the Colorado and the Brazos of Texas. The United States salmon-breeding establishments on the Sacramento River and the Penobscot have also been conducted on a large scale, six millions of eggs having been actually obtained from the former, of which five millions were sent East, and one million were placed in the river. The spawn has not been taken from the salmon of the Penobscot establishment, but several millions are looked for.

Several specimens of the sterlet, a small Russian sturgeon highly valued as an article of food, have been successfully transferred from St. Petersburg to the Brighton Aquarium, where they attract much attention. Extensive preparations are being made to secure a satisfactory exhibition of the fisheries at the Centennial celebration, Norway having intimated its intention of furnishing a complete representation of those of Northern Europe. It is hoped that the exhibition on the part of the United States will not be behindhand in extent and completeness, in view of the many departments of the fisheries prosecuted in this country. Among these should, of course, be included every thing connected with the capture and treatment of the cetaceans and seals, both fur and hair, as well as the fishes proper, whether taken for food, for manure, for oil, or other purposes.

The enormous consumption of vegetable fibre for the manufacture of paper of different qualities has rendered it necessary to search for new sources of supply, the entire vegetable kingdom having been ransacked to furnish a suitable fibre that can be obtained in sufficient quantity for the wants of the day. It is now announced that the great desideratum can largely be met in the stock of wild rice (*Zizania aquatica*) of the Northern lakes, this having the special merit of being measurably free from silex, which interferes so greatly in the manufacture of many articles. It is announced that a hundred thousand tons can easily be gathered annually from the waters of Canada alone.

Among *Botanical* items of interest we mention that M. Heckel, of France, has successfully investigated the mode in which the movement of the stamens in the common barberry is ef-

fect. The irritable portion is here the inner surface of the filament, which, when touched by an insect in its search for honey, is thrown suddenly to the centre of the flower, at the same time discharging the pollen. By the aid of anaesthetics longitudinal sections were obtained of the sensitive portion in its normal unirritated condition, when the oblong cells were seen to be arranged in parallel rows, the yellow protoplasm within being uniformly diffused and applied to the walls. After irritation they were found contracted to two-thirds their original space, the contents collected to the centre, and the cell wall itself gathered into transverse ridges. The reverse was found to be the case in regard to the non-sensitive outer surface, the normal state of the cells being that of contraction, to which they return when the temporary excitement of the opposite side is at an end.

In connection with the expedition of H. M. S. *Challenger*, botanical collections, especially marine, were made at various points in the Atlantic (St. Thomas and the Bermudas, the Azores, Cape Verd Islands, St. Paul's Rocks, Tristan d'Acunha, Kerguelen Land, etc.), with some notable results. Of most interest is the discovery of a sea grass at St. Thomas, growing at a depth of five to fifteen fathoms, and of a genus previously known to occur only in the Red Sea and Indian and Pacific oceans; the account of fresh-water algæ growing in the Hot Springs, of high temperature, at Furnas in the Azores, and of the scanty flora of the St. Paul's Rocks. These lie near the equator, midway between South America and Africa, and over 500 miles from each, the whole group less than a fourth of a mile in extent, and rising but fifty to sixty feet above the sea. Careful search was made, but no trace of land vegetation, not even a lichen, was discovered, and the marine flora even was found to be remarkably poor. But one or two species of algæ were found in abundance, the rest, scarcely a dozen in number, being minute or rare; of these five are considered as new species, the remainder being identified with known forms of the Atlantic coasts of South America or the Eastern continent, though in one case only Australian, and in another belonging to the western coast of Mexico.

The botanical results of Lieutenant G. M. Wheeler's explorations west of the one hundredth meridian in 1871-73 are published by the United States Engineer Department in the form of a catalogue of the collections, anticipating the final fuller report. Several new species are described, mostly previously published.

In the New York *Tribune* has appeared an article by Mrs. Treat, of Vineland, New Jersey, describing her experiments during the past summer upon the insect-catching powers of the Venus's fly-trap (*Dionæa muscipula*), made at the request of Mr. Darwin. She finds that each healthy leaf is capable of capturing from three to five ordinary flies in succession, and that each insect is killed, enveloped in a mucilaginous fluid, dissolved, and the solution wholly absorbed before the re-opening of the leaf, when it is as sensitive as at first. The process occupies about three days, but in the case of larger insects, beetles and the like, the course of digestion, though as complete, requires more time, and can be less frequently repeated.

Observations upon the influence of forests on climate made during several years at Berne, Switzerland, show: 1, that the mean humidity of the atmosphere in forests is ten to twenty per cent. greater than in the open country, varying with the direction of the wind; 2, that the mean temperature of the air is lower in the forest; 3, that the mean temperature of the soil is also considerably lower in the forest; 4, that the depth of rain and snow is less in the forest; but, 5, that in the forest a much larger quantity of rain is absorbed by the soil.

In the field of *Engineering* a number of items of interest demand notice. Work upon the East River Bridge is progressing slowly. It is officially announced that the Brooklyn tower will shortly be completed. On October 24 a height of 259 feet had been attained, and there were seven more courses, about fourteen feet, of stone to be added. The anchorage on the Brooklyn side is likewise in a forward state. The bridge across the Missouri at Atchison, Kansas, is progressing favorably. The caisson for the pivot pier was recently launched, and a large force of men and seven boats are constantly employed upon the structure. From the Hoosac Tunnel there is nothing new to report. The commissioners appointed by the President to report upon the best plan of improving the mouth of the Mississippi sailed recently for Europe upon a tour of inspection. They propose to examine the deltas of the Danube, Rhine, and other rivers, and the nature of the works there adopted. A preliminary survey has been made for the proposed river tunnel at Buffalo. The point selected is just below Buffalo, and the length of the tunnel required will be 2940 feet, with a cutting 4900 feet long on the east side, and one 4000 feet long on the west side of the river. At its lowest point such a tunnel would be sixteen feet below the river-bed, with a grade of sixty feet to the mile each way to the entrance.

The Central Asian railway project, to which we have before made reference, is again on the tapis. One proposal is to go by Orenburg around the northern and eastern banks of the Sea of Aral; a second is a branch from the projected Siberian railway by Ekaterinburg. A bridge over the Volga and the crossing of the mountains to enter India would be requisite in any case.

The Severn Tunnel, which is to connect South Wales with the west of England by a continuous line of railway, is beginning to assume practical form. The preliminary shaft, sunk at great cost by the Great Western Railway, to ascertain the condition of the strata, having given satisfactory results, it has been decided to undertake the work, and the company now advertise for proposals for the construction of the first half mile. The tunnel will require several years to complete. Another English project is the construction of a canal which shall effect the junction of the rivers Humber and Mersey by cutting extensions of the heads of each until both meet. A proposition to tunnel the Mersey is likewise attracting considerable interest.

Iron ship-building on the Delaware shows commendable activity. Besides the fleet of iron steam-coaliers building for the Reading Railroad at Philadelphia, we may chronicle the fact that three new steam-ships are being built for the Pacific Mail Steam-ship Company at Chester.

The keels of all three vessels have been laid. No less than 2000 men are now engaged on the hulls and engines. The first of these vessels is to be completed in May next, and the two others respectively one and two months later.

The Bessemer anti-seasickness saloon steamer was recently launched at Hull, England, and will shortly go into service. Her speed is estimated at from eighteen to twenty miles per hour. The Bessemer vessel will, however, find a rival in the *Castalia*, recently constructed at great expense for the same traffic. The last-named is a twin ship, propelled by paddle-wheels placed between the connecting girders. By the latest advices she was lying at Dover for a heavy sea to thoroughly test her capabilities.

Although great improvements in operating railroads have been introduced within the past few years, there is still much room for improvement, and in no direction is this felt to be more desirable and necessary than upon the question of signals. Many efforts have been made from time to time to introduce uniformity in signaling practice, and in consequence of these efforts the Western and Southern Railway Association (now the Railway Association of America) adopted in 1872 a uniform code of signals, rules, and regulations for operating railways. Notwithstanding these efforts there still exists such diversity of practice upon the railways of the United States and Canada as to produce considerable confusion, and to lead at times to deplorable accidents. To secure reform in this important subject the American Society of Civil Engineers, at their recent convention, passed a resolution appointing a committee of three to inquire into it and report to the society with appropriate recommendations. In consequence of this action the committee have issued a letter of inquiry to the railroad managers of the country, requesting the fullest information in each instance of the practice which obtains with them.

So far as the Centennial Exposition is designed to represent the condition of American arts and manufactures its success seems to be assured from the fact just made public that the number of applications from intending American exhibitors already made call for more space than that set apart by the commissioners for American exhibits. The total amount of available space for exhibition purposes will be about 350,000 square feet, of which about 100,000 were thought sufficient for American exhibits. It appears, however, that applications are already in which call for no less than 150,000 square feet. These facts will of course necessitate much curtailment

of the space desired by many, who have doubtless asked for more than they actually require.

In *Technology* we can record the successful introduction of the Henderson process for purifying iron by the use of fluorine (fluor-spar being the agent) at the New Jersey Steel and Iron Company's works at Trenton. Some remarkable results of its employment are recorded in the English technical journals, which almost realize the claims of the inventor that, through its agency, the purest steel or wrought iron can be made from the most inferior pig, the silicon, phosphorus, and sulphur being thoroughly eliminated. In the trials reported from Trenton the most inferior cinder pig-iron that could be obtained was used to test the process, and it afforded bar-iron of the best quality. The introduction of the Henderson process in other quarters is announced to take place shortly.

Of general interest is the statement that steam is now being applied for the purpose of extinguishing the fires in the mines near Wilkesbarre, and, as far as learned, with success. It is worthy of note that the same agent has been successfully applied abroad where every other had failed.

Our *Necrology* for the month embraces several eminent names among the men of science and invention. In England we have Dr. F. E. Anstie, a distinguished physician and physiologist; Mr. T. Marr Johnson, Sir John Rennie, and Mr. Charles Fox, engineers; and Professor Robert E. Grant, the veteran comparative anatomist. In Belgium, Count du Bus de Guisignies, well known both as an ornithologist and statesman. In Germany, Dr. W. Lühders, who escaped all the perils of the German arctic expedition of the *Hansa* to fall a victim to African fever on the Cameroons. France has experienced a great loss in the death of the veteran geologist Élie de Beaumont. Sweden mourns the decease of Professor A. J. Angström. In our own country we have to mention Mr. Hiram G. Bloomer, the curator of the California Academy of Science, and Mr. Hardick, a well-known mechanical engineer.

#### CURING CROUP WITH BROMINE.

Dr. Schultz, of Prague, has, it is said, been very successful in treating croup with bromine; for which purpose he uses half a gram of purified bromine and half a gram of bromide of potassium in ninety parts of water. This is inhaled as well as applied by means of a brush. Dr. Gottwell also, who has repeated these experiments, thinks that by the use of bromine the diphtheritic membrane loses its consistence, and is readily removed.

## Editor's Historical Record.

OUR Record is closed on the 24th of November.—On the 3d of November elections were held in twenty-three States, the result indicating a reaction against the administration. In New York, on the vote for Governor, the Democratic majority was 50,309; the next Assembly will consist of 53 Republicans and 75 Democrats; of the members of Congress elected 15 are Republican, 1 Independent, and 17 Democrats; and the constitutional amendments sub-

mitted were ratified by a large majority. The purport of these amendments is, that new and stringent safeguards are provided against bribery at elections, and public officers are compelled to swear that they have used no money for the purpose of influencing votes; no person shall be eligible to the Legislature who holds other office; the compensation of members of the Legislature is fixed at \$1500 a year; various classes of special legislation are entirely prohibited; the term

our colleges, but the instructor of some of our ablest public men, and its lessons have re-appeared in the rostrum, the pulpit, and the press, before audiences that knew not the source of the wisdom which they applauded. The present edition, prepared by THEODORE D. WOOLSEY, does not differ materially from the second edition, published in 1859.—The alterations made by Mr. GEORGE P. MARSH in *Man and Nature* render it really a new book, and entitle it to its new name, *The Earth as modified by Human Action* (Scribner, Armstrong, and Co.). Its character is indicated by the motto on its title-page, "Not all the winds and storms and earthquakes and seas and seasons of the world have done so much to revolutionize the earth as man, the power of an endless life, has done since the day he came forth upon it, and received dominion over it." This assertion of Dr. Bushnell receives abundant demonstration and illustration in the volume, which is, indeed, overcrowded with suggestive facts, grouped upon philosophical principles, however, and burdensome only because the most retentive memory fails to retain them, or even fully the principles which they illustrate. Modern science has taught so much the dominion of nature over man that it is healthful to get the opposing truth so clearly put and so well fortified.

*Jack's Sister* (Harper and Brothers) is a story of a woman's fidelity to her trust, somewhat complicated in plot, not altogether attractive in the characters portrayed, but more than redeemed from any defect in these respects by the singular sweetness and power of Enid's character.—*Atherstone Priory*, by L. N. COMYN (Estes and Lauriat), reverses the most common course of novels. Generally it is the woman's love and patience which redeem the fitful, the imperious, or the headstrong man; in this story it is the strong, patient, and faithful love of the man which transforms the imperious and willful woman. His one lapse sets in the stronger contrast the strength of his patient love that restrained a temper which could be hot and impetuous.—*The King of No-Land*, by B. L. FAR-

JEON (Harper and Brothers), is a Christmas story, full of queer, quaint fancies, woven into a fabric of sweet love. Its political moral does not indicate any inclination on the part of the author for the republican movement in Great Britain.—*The Treasure Hunters*, by the author of *Ship Ahoy* (Harper and Brothers), is of much the same character as its predecessor; its interest consists in the liveliness of its movement and the variety and rapid succession of its exciting incidents.—*Toinette*, by HENRY CHURTON (J. B. Ford and Co.), is a book of considerable power, but power not wisely employed, and turns too much on sensual passion to be a thoroughly healthy book. The scene is in the Southern States; the incidents grow out of the late war, and the relations between the freed people and the whites. The lesson, if we read it aright, is one which the power neither of philosophy nor of fiction can commend to the common sentiment of mankind.—*The Little Classics* (J. R. Osgood and Co.) comprise four little pocket volumes, each containing a number of selections of short stories, such as have become classical. The editor, ROSSITER JOHNSON, has exercised excellent discrimination in his selection; and the series is commendable especially to the traveler, who often wants a readable book in a convenient form for easy carriage.—*More Bedtime Stories*, by LOUISE CHANDLER MOULTON (Roberts Brothers), keeps up the reputation of its author. There are fifteen stories in the volume; they all appeal to the younger class of readers.—Equally good in a different way is SUSAN COOLIDGE's last volume, *Mischief's Thanksgiving* (Roberts Brothers). The first story gives title to the volume.—Mr. ROSSITER RAYMOND is in the habit of reading every Christmas a story, prepared for the occasion, to the Sabbath-school of Plymouth Church. If we mistake not, this is the genesis of *The Man in the Moon, and other People* (J. B. Ford and Co.). In that case Plymouth Sabbath-school is to be congratulated on its good fortune. Mr. Raymond is a rare story-teller, and in his best mood when he is telling stories to children.

## Editor's Scientific Record.

### SUMMARY OF SCIENTIFIC PROGRESS.

**A**STRONOMICAL news has been remarkably uninteresting during the month of November, but we are happily able to announce that telegraphic dispatches from the Eastern hemisphere state that the observations of the transit of Venus on the 8th of December were completely successful. The partial failures at Nagasaki and Hobart-Town, caused by cloudiness, will, it is hoped, not appreciably affect the result.

The Hamburg Observatory, established over thirty years ago, has lately sent forth the first number of its official publications, in the shape of a memoir by Helmholtz on the stars of the cluster in Sobieski's Shield. The principal works of a similar character that have been published consist of Bessel's observations of the Pleiades, Hall's observations of the cluster in Persens, and Lamont's observations of the same cluster that has been now studied a second time by Helmholtz.

Works of this class are considered by astronomers to be of great value in laying the foundation for the future study of the relative movements of the individual members of these groups of stars; and Professor Helmholtz has, by comparison of his own observations with those made in 1836 by Lamont, been able to develop any changes in the relative positions of the stars that may have occurred during the interval between 1836 and 1870. This comparison in general confirms the earlier observations of Lamont, and only a few discordances are to be noticed; and at some future time, when it becomes desirable to renew these observations, Helmholtz will be considered as having made a valuable contribution to the study, in that he has, with a large refractor, so closely examined the stars recorded in the present work.

A physical observatory is to be established in Paris, probably under the superintendence of Janssen. In the scope of its labors it will prob-

ably be similar to the new observatories in Germany and India.

Professor Ferrel has presented to the world the results of many years' investigation into the subject of the tides. This memoir, developed in part at the expense of the United States Coast Survey, will probably for a long time remain the most comprehensive and the most practically useful work on the subject. The whole subject has been treated concisely, and yet with the greatest generality, and the formulæ given by Professor Ferrel are of especial value in the discussion of the long series of accurate tidal observations accumulated by the Coast Survey. The whole subject of shallow-water tides is almost entirely new, and may be regarded as the most interesting and important part of the work. The careful consideration of the influence of friction has allowed Professor Ferrel to determine the moon's mass with an accuracy equal to that of any other method, and he has, on the other hand, been enabled by the same considerations to explain away a large part of the so-called secular acceleration of the moon's motion, his demonstration of which preceded by a year that of Delaunay.

In connection with the same subject we notice a paper communicated to the Mathematical Society of London on tidal retardation, in which Mr. Rohrs discusses the problem of the maximum retardation on a globe covered entirely by a sea whose depth is constant for all points in the same latitude, but varies from the equator to the poles.

Mr. Schwendler, in some remarks before the Asiatic Society of Bengal, states that all telegraph lines in India are affected by natural or earth currents, which, in fact, permanently exist, their general drift, as shown by ten thousand observations, being from east to west, and that we are now justified in establishing a special system for the purpose of observing them according to a uniform plan and with improved methods of testing. Mr. Schwendler has for the past six years systematically tested the telegraph lines of India for the purpose of securing all the data necessary for the thorough investigation of the subject, in which he has been so much interested, and his labors constitute the first investigations of the subject at all worthy of its scientific and practical importance. It is intimated that in consequence of his earnest representations the Indian government will institute an improved system of measurement of earth currents.

The determination of altitudes by means of the barometer has always been subject to very serious uncertainties by reason of the periodical, and still more of the non-periodical, variations in the condition of the earth's atmosphere. Professor Whitney, State Geologist for California, has endeavored to diminish the uncertainties in the use of the barometer by preparing tables specially adapted to California which should give empirical corrections for each hour of the day and throughout the year. These are based upon observations taken at Sacramento, Colfax, and Summit; and the application of Whitney's tables to other stations situated under very different circumstances seems justified by the examples which he gives.

Dr. Hann calls attention to the fact that in the theory of the rain there is still needed some explanation of the fact that the greatest quantity

of rain often falls while the barometer is rising, and not when it is falling, as would necessarily be the case if certain theories were correct. In fact, he announces himself compelled to believe that the condensation of atmospheric vapor has no noticeable influence on the change of atmospheric pressure. In following up the investigations of Zeuner, Hirn, Reye, and Peslin, he then proceeds to show that the loss of heat sustained by ascending and descending currents of air suffices to explain the anomaly in question.

The careful study by Hildebrandsson of the movements of the upper or cirrus clouds over the surface of Europe has enabled him to conclude that these follow the law predicted by Ferrel in 1859, and confirmed by Abbe, 1871, and Ley, 1872, viz., that the higher currents of air are always directed toward points to the right hand of the lower currents.

The curious fact has been observed by Sevor that iron wire heated to redness and drawn out while immersed in dilute sulphuric acid absorbs a large quantity of some gas whose constitution has not yet been definitely ascertained.

A subject of special interest in connection with *Geography* is the fact that the British government has finally concluded to send out a naval expedition during the coming season for polar search, the Smith Sound route having been selected as decidedly the most promising and practicable. The expedition will not start, however, until quite late in the summer, so as to take advantage of the disappearance of the drift ice, which usually occurs after the middle of the summer. There will be two vessels, one of them probably a steam-whaler and the other taken from the British navy, both, of course, thoroughly equipped for the duty in question. It is stated that Captain Nares, of the *Challenger*, will be in charge of the expedition, and that it is probable Captain Alfred Markham will command one of the vessels. Captain Markham, it may be remembered, visited the arctic regions on board of a steam-whaler in 1873 for the purpose of familiarizing himself with the duties of arctic search and life, and in the vessel on which Dr. Bessel and some of his companions of the *Polaris* were brought back to Dundee after their rescue by the *Ravensraig*. It is understood that every thing will be done by the British expedition to secure the amplest results in all branches of science, and it is hoped that enough facts in regard even to the pole itself may be brought away to warrant the outlay.

It is also stated that the Austrian government will send out one and perhaps two expeditions with the same object, but that their route will be either by way of Spitzbergen or of Behring Straits, or both.

It has been strongly urged upon the American government to take part in this scientific crusade by sending one or more vessels through Behring Straits. The condition of the ice in the arctic seas in that part of the world is said to warrant great expectations of interesting results, from the fact that the quantity of ice has been greatly diminished within the last few years, so much so, indeed, that a whaling captain in the summer of 1874 passed within two or three miles of Wrangell Land, and could readily have landed had he been so inclined, there being an entire absence of the barrier which has for many years past pre-



vented any near approach. Vessels also proceeded without interruption to the mouth of the Mackenzie—an almost unheard of event.

The latest news from the *Challenger* was in the form of a dispatch announcing her arrival at Hong-Kong, from which point she will probably proceed to Japan, in accordance with her published programme. What effect the transfer of Captain Nares from her command to that of the polar expedition will have remains to be seen.

The first series of operations of the American steamer *Tuscarora* in the way of soundings for a Pacific cable has been completed by her return to San Francisco, and the detachment of Commander Belknap on other duty. The vessel has, however, started out again to make a line of soundings direct from San Francisco to the Sandwich Islands, the first line having been drawn from San Diego to the same point. This new route is considered preferable for a Pacific cable to China and Japan, if practicable, as being so much the more direct.

The various expeditions that started out from different parts of the world to take observations of the transit of Venus reached their destinations in due season, with the exception of that for Crozet Island, the American party at least being unable to disembark, in consequence of the strong sea. Advices from the Kerguelen Island party, written a few days after their arrival, gave much promise of interesting results in the direction of collections of natural history, quite a number of species of birds having been met with, and their nesting period having just commenced. All of the American parties in the antarctic portion of the world are accompanied by gentlemen interested in natural history, and provided with the necessary apparatus and material for making collections, and a rich harvest is expected from their labors.

Telegraphic advices announce a satisfactory observation of the transit of Venus at most of the stations, at a few only the intervening cloudiness or other causes preventing full success. It is believed, however, that enough data have been gathered to permit the practical solution of all the astronomical problems involved, whenever they can be collated. According to Professor Newcomb, much depends upon the observations at Peking, from which place no advices have yet been received.

The Palestine Exploration Societies of Great Britain and America appear to be meeting with much success in their labors, the reports recently made showing good progress in topographical and ethnological surveys of the country. Strenuous efforts are being made to secure funds for the expansion of observations by the American division, which it is hoped will be successful.

Among *Microscopical* notes we may mention that Mr. H. J. Carter contributes the first portion of a paper on the "Development of Marine Sponges" to the November number of *Annals and Magazine of Natural History*, in which he discusses at considerable length the following four periods of the sponge's developmental history, viz., 1, that from its earliest appearance to the commencement of the duplicative division of the yolk; 2, that from the duplicative division to the ultimate duplicative subdivision; 3, that from the formation of an embryo to its fixation or stationary position; 4, that from the station-

ary position of the embryo to the development of the perfect sponge. The first and second stages were taken from *Halisarca lobularis*, the third and fourth from *Halichondria simulans*.

Professor Betz publishes, according to the *Medical Times*, an able paper in *Centralblatt*, giving a *résumé* of the results of some preliminary investigations he has made into the structure of the superficial layers of the brain. The object of his research was to discover whether it is possible to determine from the quantity and quality of the histological elements whether similar parts are present or absent in men and animals. We recommend the paper to the attention of histological and physiological students.

The artificial production of silica films, with a view of adding to our knowledge of high power definition, and possibly throwing light upon questions of crystallization and organization, has received a new impulse in Mr. Slack's discovery that the gas escaping from a heated mixture of powdered glass, powdered fluor-spar, and sulphuric acid (and which, when received into pure water, deposits the silica suddenly and violently in amorphous particles), gives delicate films with definite forms, exhibiting remarkable regularity of size and arrangement when conducted through a mixture of glycerine and water. Some of the films produce the beautiful polychromatic effects so often noticed in beaded diatoms and scales.

In a very able paper on the "Embryology of the Ctenophora," by Alexander Agassiz, published in the *Memoirs of the American Academy of Arts and Sciences*, August, 1874, the author effectually disposes of Ernst Haeckel's *gastrea* theory. He says: "That the time for embryological classifications has not yet come the attempts of Haeckel plainly show, for they are in no ways in advance of the other embryological classifications which have preceded them. We get new names for somewhat different combinations, but a truly scientific basis for a classification, based upon the value of embryonic layers, is at present impossible. Such attempts can be only speculations, to be proved or disproved on the morrow."

An interesting contribution to *Ethnological* science will be found in an account of Lieutenant Wheeler's expedition of 1873 in Petermann's *Mittheilungen*, xi., 1874, by O. Löw, upon the Moquis, Apaches, and other tribes of New Mexico and Arizona.

*Das Ausland*, November 9, 1874, has a carefully prepared article on the linguistic researches of Dr. C. Herman Berendt in Central America. This gentleman has spent many years in these regions, and designs to publish a complete Maya grammar and dictionary.

Mr. Henry Hague has recently sent to the National Museum at Washington the instruments constituting the sarabanda, or band of music of the Tactic Indians of Central America, consisting of a drum, a mandoline, and a marimba or Indian piano. The latter consists of a rectangular frame four feet long by fourteen inches wide, on four legs about two feet high. On the under side of the frame hang sixteen oblong gourds of graded sizes. Immediately over the mouths of the gourds are bars of hard sonorous wood supported by tense cords. The music is produced by striking on these wooden keys with two drumsticks tipped with little India rubber balls. Chev-

alier Arthur Morelet says of this instrument: "Few days pass consecutively in Flores without the sound of the marimba inviting its inhabitants to some new festivity. No other form of invitation is extended. The door is open for all. There you see the alcalde or the corregidor alternating in the same fandango with the meanest citizen. Persons giving parties do the honors of the house in the most unpretentious manner possible. A dozen candles, a supply of chairs collected from a dozen neighboring houses, a few homely refreshments, and the engagement of one or two performers on the marimba constitute the entire preparation."

The Birmingham "National Museum of Arms," embracing objects of all times and lands, has been thrown open to the public.

The British survey of Palestine, interrupted by the heat of summer, by Lieutenant Conder's return to England, and by Mr. Tyrwhitt-Drake's death, has been resumed. Lieutenant H. H. Kitchener, R.E., has been added to the party.

The excavations now being carried on among the ruins of Anurādhapura, in Ceylon, have brought to light a number of sculptures belonging to the best period of ancient Indian art.

The work of Dr. Gerhard Rohlfs, entitled *Quer durch Africa*, in which he conducts us across the African continent from coast to coast, will hold a prominent place among the contributions to ethnology for the year.

Dr. Hanny read a paper before the Geographical Society, London, October 21, upon the result of his researches on the geographical distribution of the human race in Eastern Melanesia. He showed that the penetration of the Papuan population by the Polynesians is much less exceptional than has been hitherto believed. It has long been known that there has been a considerable immigration of Tongans into Viti. Ouvéi, in the Loyalty Islands, was invaded at the beginning of this century by the Kanakas from the Wallis Island, the eastern coast of New Caledonia containing a very large number of Melano-Polynesians, the yellow variety of Bongaul, who perhaps found them on Isabella Island, in the Solomon group.

Among items of general anthropological interest, we may mention the recent discovery near Athens of an extensive heap of refuse shells, which was at first supposed to be a true kitchen-midden, but upon further investigation was shown to consist almost entirely of a species of murex, and other shells furnishing coloring matters, and it was therefore concluded that the shell heap in question is the site of an ancient manufactory of the celebrated Tyrian purple dye. The dyes obtained from these mollusks are remarkably constant, several different tints being readily procurable.

Several wells have lately been discovered near Ashill, in England, partly filled with earthen Roman vases of very great beauty, some of them supposed to have contained the ashes of the dead.

An international congress of "Americanists" has been called by the American Society of Paris, to be held during the coming spring in that city, the object being to bring together all persons who are interested in the ante-Columbian history of America and the character and distribution of its modern native tribes. A museum

of American antiquities will also be opened on the occasion.

Considerable amusement has been excited among scholars in the United States by the attention which has lately been paid to the subject of the Cardiff Giant in Germany, Dr. Schlottmann, an eminent Orientalist, having announced his belief in its being of true Phœnician origin, and intended to represent Adonis!

The younger Sars is, in *Zoological* science, fully sustaining the high estimation placed on the works of Norwegian zoologists, especially of his father, the late distinguished Professor Michael Sars. In a paper just received on the hydroid polyps of Norway he enumerates all the known species, gives a list of those common to the Norwegian and Northeastern American coasts, and in addition describes some remarkable forms dredged by himself on the coast of Norway, and which are likely to occur on our coast. In another paper he describes and figures some remarkable polyzoa.

But the most important contribution made by Mr. Sars is a short paper on a dimorphic form, with alternation of generation, in a fresh-water flea, or entomostracan, a species of *Leptodora*. He shows that while the young born from the normal summer eggs attain their full growth without any metamorphosis, as had been previously stated by P. E. Müller, of Denmark, the young hatched from the winter eggs are in the nauplius stage, and are provided with a set of provisional organs wholly wanting in the adult. On the other hand, the simple cyclopean eye of the nauplius-like young persists in the adult.

The brilliant researches and results of Professor E. S. Morse on the position in nature of the Brachiopods tend to show that they are not shell-fish, but really worms. In striking confirmation of this position assumed by Professor Morse is a series of similar researches by Koualevsky, of Russia, on the Brachiopods belonging to a different genus from the one studied by Morse. Mr. A. Agassiz publishes a note in the *American Journal of Science and Arts* indorsing this novel view, that the Brachiopods are worms. It is also held by the leading Scandinavian naturalists.

Lacaze-Duthier's *Archives* contain two papers of very high interest, one by Villot on the embryology of the hair-worm, or *Gordius*, and the other by the editor, on the anatomy of the simple ascidians of the coast of France. There are also two short communications of much interest on the acoustic nerve in the dentanium, by the editor, and a note on the differences in dentition presented by the two sexes of the skates of the coast of Denmark, by Dr. Lütken.

The *Fourth Annual Report on the Noxious and Beneficial Insects of Illinois*, by Dr. Le Baron, is a bulky pamphlet, replete with information and illustrations regarding the beetles. Its dissemination among the farmers and youth of the State of Illinois will do great good in awakening the attention of the people to the interest and value of the study of the habits and structure of insects. A brief report by Professor A. J. Cook on the injurious insects of Michigan points in the same direction.

Complaints against and advocacy of the good done by the English sparrow appear in the *American Naturalist*. It seems, on the whole, that these birds are very useful.

Remarks on the ornithology of Northern Norway, by Robert Collett, written in English, though published in the proceedings of the Natural History Society of Christiania, will greatly interest the American student, so many of these birds are common to Norway and arctic and boreal America. One would have supposed that the subject of Norwegian ornithology was worn threadbare, but Collett shows how much remains still to be done. He finds that in the valley of the Maalselv and in Alten not a few species of the Central European fauna occur, "which, owing to the influence of the Gulf Stream on the climate, are enabled to range to a latitude in Norway far exceeding their limits in the eastern interior portions of the European continent." The total number of species actually belonging to the Norwegian fauna is 250. Of these 174 have been observed within the polar circle, and of this number 160 have ranged as far north as within the limits of Tromsøe Amt, while 150 species belong to the fauna of Finmark proper.

The anatomy of the doves is treated of in the Proceedings of the Zoological Society of London, in a paper by Mr. Garrod.

Professor A. Newton publishes in the same Proceedings copies of two interesting letters relative to a dodo shipped for England in the year 1628.

In the same journal Dr. Murie gives an illustrated paper on the skeleton and lineage of a supposed extinct bird of Madagascar, the *Fregilupus varius*. While resembling several groups of birds, as the starling family, the orioles, and *Sturnus*, it seems more closely related to the genus *Pastor*.

In a note on the animals of Savage Island Dr. Günther states that the fauna and flora are of peculiar interest from the isolated position of this coral island. The only mammals as yet found on it are a bat and a small rodent "of a size between a water-rat and a mouse." There are also a few birds, some lizards and insects, and three species of land snails.

Dr. Günther, in some researches upon the fossil tortoises of the Mauritius, draws attention to the very great resemblance of certain of the species to the giant land tortoises of other parts of the world, especially of the Galapagos, and he is quite at a loss to explain their close connection, separated as they are by so many miles of space and by many forms of this group of reptiles.

The subject of the migration of birds has lately attracted considerable attention in England, quite a lively correspondence having sprung up in regard to certain hypotheses on the subject. Professor Alfred Newton, one of our best authorities, frankly confesses ignorance of the causes of this migration, and invites a series of critical investigations that may tend to throw some light on the question. One of the most plausible views is that of Middendorf, who maintains that migrations take place to a considerable extent along the magnetic meridian, and thinks that the magnetism of the earth may have somewhat to do in the matter.

The existence of barnacles on marine animals, especially whales and tortoises, has been frequently adverted to in our articles. It is somewhat surprising, however, to learn that they not unfrequently exist on oceanic birds, such as the

albatross, the petrel, and the like, specimens having been lately obtained by Italian explorers.

Dareste has lately published a paper on the eels, in which he greatly reduces the number of species heretofore supposed to exist. Thus he allows but four species of the *Anguilla* or true eel, one of them being common to both Europe and America. Of the conger, too, he admits but four species, two of them found associated in both continents. No new light has been thrown on the natural history of the reproduction of the eel, though the theory of some naturalists that this animal is hermaphrodite, and lays its eggs in the winter season, has been accepted, in the absence of any absolute proof to the contrary.

In *Agricultural* science the most interesting event in this country which we have to record for the month is the appearance of the third part of the first Bulletin of the Bussey Institution. This pamphlet of one hundred pages contains three articles by Professor F. H. Storer. The first is on "The Valuation of the Soluble Phosphoric Acid in Superphosphate of Lime." The second is an account of investigations "On the Average Amounts of Potash and Phosphoric Acid contained in Wood Ashes from Household Fires." The third describes experiments "On the Importance as Plant Food of the Nitrogen in Vegetable Mould."

Professor Storer concludes that the value assumed by many chemists of this country of sixteen and a quarter cents per pound for soluble phosphoric acid in fertilizers is too high. He is led to this opinion from some estimates of the "Cost of importing Superphosphates from Europe," published in a former part of the *Bulletin*, "whence it appears that soluble phosphoric acid may be imported into Boston from England at a cost of twelve and a half cents per pound currency;" from the offer of a responsible dealer to sell superphosphate at such rates as to make the price of soluble phosphoric acid the same; and from practical experience as to the cost of making superphosphate on a farm twelve miles from Boston, which makes it plain that with spent bone-black at twenty-five dollars per ton and sulphuric acid at two and three-eighths cents per pound, soluble phosphoric acid may be made at a cost per pound of thirteen cents or less on any farm to which the cost of transportation would be no greater than to the one referred to.

Professor Storer's analyses of wood ashes from domestic fires reveal a fact of considerable importance to farmers, namely, that these contain considerably less phosphoric acid than has ordinarily been supposed. As wood is commonly burned, a portion of the phosphoric acid is lost. This loss is explained in part by the escape of phosphates with the draught, and in part by the formation of an insoluble phosphide of iron or other metal in the ash. The analyses from which calculations of the percentage of phosphoric acid in wood ashes have usually been based were made, for the most part, from ashes carefully prepared in the laboratory, so that this loss did not occur.

The experiments on the nitrogen of vegetable mould are believed by Professor Storer to show conclusively that the soil nitrogen is useful to plants under certain conditions such as are found in nature, and to illustrate the fact, which Wolff had proved before, that soils devoid of vegetable

mould or some other compound of nitrogen can not compare in power of supporting crops with soils which contain peat or loam or some other nitrogenous material.

Bente has lately performed some experiments in water-culture, on the effect of asparagin and acetamide as sources of supply of nitrogen to maize. He concludes that they are capable of furnishing the nitrogen needful for the growth of the plant, though whether they are capable of doing so directly, or must be previously decomposed, is not yet decided.

Dr. Märcker, of the experiment station at Halle, announces a very interesting observation upon the necessity of carefulness in selecting samples of fertilizers for analyses. A portion was taken from a bag before and another after two hours' transport, during which some of the finer particles had settled downward, while the coarser had worked to the top. Analysis showed a difference of two per cent. in the amount of soluble phosphoric acid in the two samples.

Dr. Wagner, director of the station at Darmstadt, has reported a case of poisoning a grain field by an ammoniated superphosphate. This was found to be due to the sulpho-cyanide of ammonium. The ammonia salts used for ammoniating the superphosphate were doubtless a by-product from the manufacture of coal gas, which would account for the presence of the sulpho-cyanide. This latter is very seldom found in fertilizers. It can be easily detected by the red color imparted to its solution on addition of sesquichloride of iron.

The Russian black earth called *Tschornosjom*, which is so celebrated for its fertility, and covers about one-third of the territory of European Russia, has been lately investigated by Dr. Reichardt, of Jena. Ten samples were examined. They contained large percentages of sand and humus, and were quite rich in potash, phosphoric acid, and nitrogen, the substances most apt to be lacking in ordinary soils. The large content of these and of humus, whose value for the growth of crops has been shown by Storer, Johnson, and others, accounts for the great and lasting fertility of this soil.

The subject of *Fish-culture* continues to attract the public attention, and especially in view of the success of the operations on the part of the United States in the introduction of salmon into its waters. The United States establishment on the Sacramento River, under the charge of Mr. Livingston Stone, has yielded this season 6,000,000 eggs, and the number collected at Bucksport, on the Penobscot, by Mr. Charles G. Atkins, is over 3,000,000, or more than 9,000,000 in all. If half of these be hatched and placed in the streams of the country, it will make a large addition to the population of the waters, especially when we bear in mind the fact that these are planted after the yolk-bag is absorbed, and when the fish is able to feed and care for itself. According to the estimates of reliable fish-culturists, in the case of natural spawning not more than one fish of the age referred to is obtained from 1000 eggs; so that the number supposed to be derived from the labors of the Fish Commission during the year would be equivalent to the yield from five thousand millions of eggs.

The California eggs were sent as soon as suffi-

ciently ripe to the fish-hatching stations throughout the Middle and Eastern United States. Such of them as were hatched successfully and reared are now being distributed in appropriate waters. All the Northern and Eastern States have shared in this distribution, as well as Texas, North Carolina, Virginia, West Virginia, Kentucky, etc. The eggs from the Bucksport establishment are not sufficiently mature for distribution.

An ample warrant for the introduction of fish into localities strange to them is seen in the success of the attempts to supply Tasmania and New Zealand with species of British trout and perch, these having already become more abundant than the native fish, the perch being now captured by the ton in their new abode, and of very large size.

So far there is no satisfactory evidence of a successful experiment with the salmon sent to New Zealand, and the effort is to be renewed during the coming winter by sending the eggs from Great Britain.

As a contribution to the subject of the effect of pollution of water upon the life of the fish therein we may refer to the experiments of Professor Wagner, of Munich, upon the influence of gas tar, in which he ascertained that a very slight percentage in the water, even unappreciable to the taste, is sufficient to produce great distress to the fish and ultimate death.

In *Engineering* we may record little save the progress of work upon certain important enterprises familiar to our readers.

On the East River Bridge the engineers have prepared plans and specifications of the massive iron saddles upon which the cables are to rest, and bids for their construction will soon be called for. Each of these saddles will weigh about 25,000 pounds, and will be provided at its summit with a rounded groove nineteen and a half inches wide, through which the cable will pass. It is estimated that it will require four years to complete the bridge.

The twin steamer, *Castalia*, designed by Captain Dicey for the Channel traffic, and which was expected to prove a formidable rival to Bessemer's swinging saloon vessel, has proved a failure upon her trial trip. She is now undergoing alterations of her machinery preparatory to a second experiment. The Bessemer steamer has not yet made her trial trip. In the same connection it may be of interest to note the fact that M. Tellier has advanced a new plan for the same purpose. Instead of two, M. Tellier joins together four large vessels, united by a common deck. He proposes even to lay a line of rails on the deck, so that a whole train may be run upon it and be transported across the Channel.

The exhibition fever appears to be widening its boundaries. The Dutch colony of Java announces the second "Exhibition of the Works of certain Industries of all Nations," to be opened at Diocjakarta in April, 1875. It is the desire of the promoters of this scheme to introduce to the teeming population of this and neighboring islands labor-saving tools and machinery of every description. It may be worthy of mention that books, machinery, and metals (raw and manufactured) are admitted to these islands free of duty. Mr. L. W. Morris, of 50 Broadway, New York, is named as the agent of the enterprise for the United States.

The Centennial authorities have just announced the following allotments of space among the thirty-four nations and their colonies:

	Square feet.
Siam.....	3,946
Persia.....	7,776
Egypt.....	7,776
Turkey.....	7,776
Russia.....	10,044
Sweden and Norway.....	10,044
Austria.....	23,328
German Empire.....	27,264
Netherlands and Denmark.....	7,776
Switzerland.....	6,156
Italy.....	11,664
Spain and colonies.....	15,552
France, Algeria, and other colonies.....	27,264
Great Britain, Canada, India, Australia, and other colonies.....	46,748
United States.....	123,160
Reserved space.....	21,408
Mexico.....	11,664
Honduras.....	3,888
Guatemala.....	5,508
San Salvador.....	4,536
Nicaragua.....	4,536
Venezuela.....	5,508
Ecuador.....	3,888
United States of Colombia.....	7,776
Peru.....	11,664
Chile.....	9,744
Brazil.....	17,520
Argentine Republic.....	15,552
Hayti.....	3,888
Sandwich Islands.....	3,888
Liberia.....	2,268
Japan.....	7,290
China.....	7,290
Total.....	484,090

The total area of the building will be twenty acres, and that appropriated to exhibitors about eleven acres.

From the annual report of the late Commissioner of Patents, for the period extending from October 1, 1873, to September 30, 1874, we extract the following statements:

Number of applications for patents from October 1, 1873, to September 30, 1874.....	21,077
Number of patents issued, including re-issues and designs.....	13,545
Applications for extensions of patents.....	229
Patents extended.....	308
Caveats filed.....	3,129
Patents expired.....	5,287
Patents allowed, but not issued for want of the final fee.....	2,680
Applications for registration of trade-marks.....	589
Trade-marks registered.....	524
Applications for registration of labels.....	107
Labels registered (since August, 1874).....	50

The number of applications and of patents granted shows a slight increase upon the figures of the preceding twelvemonth.

The number of miles of new railroad completed in this country during the year 1874 to date (November 28) is 1664, as compared with 3276 miles in 1873 and 6202 in 1872.

Among the *Mechanical* novelties an "air-brake" for steam-ships is worthy of notice. Its object is to prevent the "racing" of the engines when, in a heavy sea, the propeller of a steamer is lifted out of the water, and its revolutions, for want of a resisting medium, are greatly increased, to the imminent danger of breaking the working parts of the machinery. This engine governor is automatic in its operation, and cuts off the steam from the engines the instant a heavy sea lifts the propeller from the water.

Mr. Robert W. Newbery, of New York, has lately patented an improvement consisting in the construction of the rails of vessels in sections,

and of such materials that such sections when detached will answer for life-rafts. He has likewise devised a simple and efficient method of detaching the rail sections in case of sudden emergency. The invention appears eminently simple and practical.

In the direction of *Domestic Economy* we may refer to the practice now coming into vogue of accelerating the drying of plaster walls by burning charcoal in the open air of the room. It is known that this lime dressing of walls is a hydrate, containing a certain amount of water, and that as this lime is changed into a carbonate by the carbonic acid of the air the water is evolved, which causes continual dampness for a considerable period. By keeping up a continuous supply of carbonic acid in the atmosphere of the room this process is accelerated, so that what might otherwise require several months is brought about in a few days.

The regulation of the time of the hatching out of silk-worms' eggs, so as to make it more convenient for the manufacturer, is now carried on in France on a large scale, the large store-houses being kept cool by artificial means, so that the eggs are kept unhatched until a convenient season. They are then removed and hatched out in the ordinary way. Incidentally, this new method is a great security against destruction by parasitic fungi and insects.

The very rapid expansion of the manufacture of olive-oil in Tunis threatens to greatly depreciate the price of this substance, and will probably extend its use considerably, especially in the preparation of fish, such as sardines, small mackerel, etc., as put up in oil. It is well known that America abounds in species of herring equally fitted with the European sardine for the purpose referred to, but that competition is scarcely possible in view of the cost of the oil required for their treatment. Should the California enterprise be successful, or the price be reduced by the great production from abroad, it will be possible to use olive-oil to a much greater degree than at present.

In *Technology* we notice the fact of the invention of a new explosive by Captain Björkman. The inventor names it Vigorite. Extraordinary accounts of its energy are made from some experimental trials recently made with it at Stockholm. A charge of about eight ounces, in five cartridges, and deposited in a drill hole five feet deep, removed, on its explosion, a mass of rock over one hundred cubic feet in volume. It was estimated that nearly double the weight (fifteen ounces) of dynamite would have been necessary to produce the same effect.

At one of the recent meetings of the French Academy of Sciences, Professor Hoffmann announced that two of his pupils, Messrs. Tiemann and Haarmann, had succeeded in producing vanilline (the aromatic principle of the vanilla bean) from pine sap, and stated furthermore that they proposed to manufacture this substance on a large scale. The sap of a tree of medium height furnishes vanilline to the amount of twenty dollars.

Miss Kate Crane proposes to test the purity of various oils by examining the cohesion figures produced by permitting a single drop of the oil to be tested to fall from a burette on a clean surface of water. She has experimentally determined quite a variety of such figures, and

finds them to be quite constant with the same oil.

Nothing especially new has presented itself in the department of *Therapeutics and Hygiene* since our last report, although considerable stress is laid upon the value of intra-venous injection of chloral for the purpose of producing anaesthesia. It is said that it is practicable, without the slightest injury to the patient, to produce absolute unconsciousness for a period of even twenty-four hours without any of the ill effects which some-

times follow when anaesthesia is only maintained during the limited period of a surgical operation.

Among the *Deaths* that have been announced since the last report we may mention those of Leger de Libessant, of France; Dr. F. Hesseberg and Dr. E. M. Dingler, of Germany; Mr. Bryce M. Wright, Mr. John Grantham, Dr. Thomas Anderson, Dr. Edwin Lankester, Rev. W. H. Hawker, Commander R. M. Kester, R. N., and Mr. C. F. Tyrwhitt-Drake, of England; and of the veteran Dr. Gideon Lincecum, of Texas.

## Editor's Historical Record.

OUR Record is closed on the 22d of December.—The final session of the Forty-third Congress was opened December 7, 1874. In the House four new members took their seats, viz., Richard Schell, *vice* D. B. Mellish, deceased; S. B. Chittenden, *vice* Stewart L. Woodford, resigned; Wm. E. Finck, of Ohio, *vice* H. J. Jewett, resigned; and L. Cass Carpenter, of South Carolina, *vice* R. B. Elliott, recently elected Speaker of the State House of Representatives. The standing committees of the Senate were announced December 9, and those of the House on the 10th. No material changes were made in either.

On the 7th the President sent to the Senate the nomination of Hon. Marshall Jewell to be Postmaster-General. The choice was confirmed on the 15th. S. B. Axtell was confirmed as Governor of Utah Territory December 21.

The bill to amend the customs laws, known as the "Little Tariff Bill," which comes over from the last session, was taken up in the Senate December 14, and a committee of conference was appointed. It provides for a commission of seven—one Senator, two Representatives in the next House, two officers of the customs service, and two citizens familiar with the customs laws—to report to Congress before December, 1875, a revised system of customs laws. The commissioners are to be allowed necessary traveling expenses, but no compensation.

Several financial bills were introduced into the House and referred to committee. Mr. Kelley, of Pennsylvania, on the 8th offered a bill for the exchange of greenbacks into 3.65 convertible bonds. The proposition was discussed on the 10th, when Mr. Willard offered an amendment to the effect that greenbacks should not be a legal tender in payment of debts contracted after July 1, 1875. No definite action was taken. Mr. Roberts, of New York, proposed to amend the Constitution so that Congress shall not make any thing but gold and silver coin a tender in payment of individual debts, and shall pass no law impairing the obligations of contracts. Mr. Farwell introduced a bill removing all limitations on the number and circulation of national banks, and allowing bank-notes to be issued to the extent of ninety per cent. of the full value of bonds deposited, that from the 1st of July next a million a month of greenbacks shall be withdrawn and canceled, to continue until the greenback is at par with gold, and that the Secretary of the Treasury may sell bonds to get funds for retiring the greenbacks. On December 21 Senator Sher-

man from the Finance Committee introduced a bill for the resumption of specie payments. It provides for the redemption of legal-tender notes, beginning January 1, 1879, silver coin being meanwhile substituted for fractional currency. Free banking is authorized and legal tenders retired to the amount of eighty per cent. of the new bank-notes issued till the legal-tender circulation is reduced to \$300,000,000. The Secretary of the Treasury may sell bonds in 1879 for gold if he has not enough of a surplus to meet demands for specie. Bill read twice, and placed on calendar.

The House Committee on Appropriations reported, December 7, in favor of the following sums: Legislative, \$19,653,434; Navy, \$16,976,000; Army, \$27,701,500; Indians, \$4,881,507; Fortifications, \$850,000. The first item was passed by the House on the 18th.

The postal telegraph scheme came up before the House on the 8th in a new form. Mr. West introduced a bill for the construction of a government telegraph line from Washington to Boston, *via* Baltimore, Philadelphia, New York, and Hartford, to be operated in the post-offices of those cities, under the charge of the Postmaster-General, and to be open to all at a uniform rate. The bill was ordered to be printed.

A supplementary Civil Rights Bill was reported by the House Judiciary Committee on the 16th, and recommitted. It is substantially the bill passed by the Senate at the last session, but with a compromise clause striking out the mixed school section and substituting a requirement for equal school facilities for the children of both races. The penalty may be enforced by either civil or criminal suit.

Representative M'Crary on the 8th presented a bill to extinguish the Indian title to the Black Hills reservation in Dakota.

The first step taken this year toward increasing the public revenues was the introduction of a bill into the House by Mr. Dawes on the 8th restoring the duties on tea and coffee to the old rates existing before the repeal of March, 1872.

The Senate on the 14th, and the House on the 18th, passed a bill for the relief of settlers on the public lands who were obliged by the ravages of the grasshoppers to leave their homes in 1874, and those who may be obliged to vacate in 1875 for the same reason.

Senator Conkling proposed an amendment to the Geneva Award Bill, December 14, allowing insurance claimants excluded by the present law to present and prove their claims.

the discussion which he has been the occasion, not the cause, of provoking will do something toward driving from the boards the prurient dramas of late so successful is a consummation devoutly to be wished for. As a means to this end this little volume will be welcomed even by those who dissent from its extreme conclusions, and whose literary taste is outraged by its sometimes too vigorous rhetoric.—Whether *Modern Christianity a Civilized Heathenism*, by the author of *A Fight at Dame Europa's School* (William F. Gill and Co.), is intended as a satire on Christianity, or on its corruptions and the worldliness and selfishness which assume the profession of Christianity as a cover, is not clear. As a satire on the shams and hypocrisies of society it is trenchant, and at least some justification is made out for the assumption of the title of the book, that modern Christianity is a civilized heathenism. But in depicting the life which he satirizes the author exhibits much greater power than in comprehending the life which Christ came to inspire, or in setting forth the principles which should govern the professed disciples of Christ in maintaining it. That the Hindoo heathen should utterly pervert the teachings of Jesus Christ is not strange; that he should accept for his theory of life the crude philosophy and cruder rhetoric of some of the less intelligent of Christ's

followers is quite according to the natural order of things. But the author does so in his preface; and this, on the part of a man who assumes to set the world right in its misapprehensions of Christianity, is inexcusable.—*Christianity and Science* (Robert Carter and Brothers) is an unfortunate misnomer of the book which it entitles, which is a series of lectures delivered in New York by Dr. A. P. PEABODY on the Ely foundation of the Union Theological Seminary, the object of the lectures being to set forth the authenticity and credibility of the Scripture miracles and prophecy. The relations of Christianity to modern science are not discussed. While not presenting any thing especially new, these lectures put the arguments for historical Christianity in a clear and compact form, relieved from the burden of a minute scholasticism which they are too often compelled to carry.

*John Paul's Book* (Columbian Book Company) is avowedly made up of his previous contributions to the newspaper press, put together with little or no pretense of arrangement. They are labeled on the title-page, "moral and instructive," but this must be because they are not immoral nor debasing. The volume is really 600 pages of fun, most of it belonging to the order of burlesque, and a good deal of it to the order of grotesque, but all of it good-natured and hearty.

## Editor's Scientific Record.

### SUMMARY OF SCIENTIFIC PROGRESS.

IN *Astronomy* we have to note during December the gratifying success of most of the parties dispatched to observe the transit of Venus. Many of these have not been heard from, but, thanks to the great extension of telegraphic communication, enough is known to warrant astronomers in expecting most satisfactory results when the observations shall have been finally discussed. The exact amount of work done at each station is not yet known, but only that of the eight American stations. All those heard from have had weather good enough to obtain at least fair observations. Professor Hall, U.S.N., at Wladivostok, Siberia, observed all of the contacts, and obtained a small number of photographs; Mr. Davidson, United States Coast Survey, at Nagasaki, Japan, observed three of the contacts (both the internal contacts), and obtained photographs; Professor Watson, of Michigan University, at Pekin, China, has not been heard from, but no fears are entertained for the success of his party on account of clouds, as Pekin has an unusually clear winter atmosphere. If one of the dust-storms which occasionally occur at this point has not interfered with the work, we may count on good results from Pekin. Professor C. A. Young, of Dartmouth College, is attached to this party, and is the only American who will attempt the observation of the spectroscopic contacts. It may be noted that Professor Watson in his leisure moments resumed his accustomed habit of discovering asteroids, and on October 10 found one of the eleventh magnitude, observations of which he has transmitted to America. This undoubtedly is the first asteroid discovered in China, and will receive the

number 138. The English parties in Egypt and India seem to have had good success, and we may infer from the meagre telegrams which have reached us that only five out of the twenty-seven Russian parties have been wholly unsuccessful. Of the French and German expeditions little is known. The observations in the southern hemisphere seem to have been generally more full than was expected, Professor Harkness, U.S.N., having taken at Hobart-Town, Tasmania, 113 photographs, while Professor Peters secured 247. It is not known whether he obtained observations of the contacts or not. From the American, English, and German parties on Kerguelen Island nothing will be heard until their arrival at some port homeward bound.

M. Violle has recently published the results of some further researches on the effective temperature of the sun and upon the true mean temperature of the solar surface. His results are of much interest, in view of the widely varying conclusions at which various astronomers and physicists have arrived. He defines the true temperature of the sun to be "the temperature which must be possessed by a body of the same apparent diameter as the sun, in order that, endowed with an emissive power equal to the mean emissive power of the solar surface, it may emit in the same time the same quantity of heat as the sun." Allowing the assumption that the mean emissive power of the sun is sensibly equal to that of steel in fusion, M. Violle concludes that the true temperature of the sun is 2000°.

The last bright comet (Coggia's) has likewise been attentively observed, and Mr. A. Cowper Ranyard, F.R.A.S., from his observations has been led to the inference that this comet is cer-

tainly not entirely composed of incandescent gas. If it were merely a fine dust dispersing the sun's rays, we should expect its light to be strongly polarized. From the absence of polarization Mr. Ranyard concludes that either the fine dust is incandescent, or that the individual particles, be they solid or liquid, which go to make up the continuous spectrum of portions of the tail, are large compared with the wave length of the light.

Mr. Christie, first assistant in the Royal Observatory at Greenwich, has also published his spectroscopic observations on Coggia's comet. He has compared its spectrum with that of dioxide of carbon, in the manner first adopted by Huggins. The spark was obtained from an induction coil, without the use of a Leyden-jar, and under these conditions the spectra of the carbon and of the comet were very similar. In the spectrum of the comet two bright bands were found on every occasion to be sensibly coincident with the two brighter bands of the dioxide of carbon. On the 7th of July the coma gave in addition to these bands a faint continuous spectrum. The spectrum of the nucleus was continuous, but it appeared to contain numerous bright bands, and three or four dark lines were seen on several occasions. Of these one appeared to lie between D and E, another on the blue side of *b*, and a third near F.

As a contribution to physical astronomy, Mr. Knobel gives a series of twenty-four drawings of Jupiter, made between February 17 and June 1, 1874. It is understood that Dr. Lohse, assistant at the observatory at Bothkamp, is making a similar series, and that he intends to submit all published drawings to a thorough discussion, with a view to determining the laws of the winds which must produce the rapid changes observed on the surface of Jupiter.

In *Nature* for December 3, 1874, we find an account of the Proceedings of the Royal Society of Victoria for 1870, 1871, and 1872, from which it appears that Australia is taking an active part in astronomical research. Mr. Ellery, the director of the Melbourne Observatory, gives an account of the great reflector (four feet speculum) mounted there, and says that although his hopes were not fully realized in regard to it, it equals, if it does not excel, any other of its size.

The nebula in Argús, which has been supposed to be variable, has been examined by both Ellery and his predecessor, Le Sueur, and although a comparison of the drawings of these gentlemen indicates a vast change in it, yet there are reasons for supposing the change to have been not so enormous. Mr. Ellery's original report will be looked for with eagerness, as the whole question of the change in this or any other nebula appears to be, as yet, unsettled.

Mr. Macgeorge has given in this volume of Proceedings a diagram of the small stars near Sirius. He finds eight small companions within eighty-two seconds of arc (estimated from a copy of his drawings) of the large star.

We shall look to the large telescopes of this country to confirm or controvert this discovery. We have at least four which should show some of these faint companions.

One of the most famous of the binary stars of short period is 70 *Ophiuchi*, and its orbit has been frequently calculated, not without showing annoying discrepancies between theory and

observation. Sir John Herschel, Encke, Bessel, Powell, Jacob, and others have published elements of this orbit, differing largely in the most interesting element, viz., the time of revolution, which varies from 73 years (Encke) to 112 years (Jacob).

M. Flammarion has recently published his researches on this orbit, which were undertaken at a fortunate time, as the star has completed a whole revolution since its discovery by Sir William Herschel in 1779, and he finds its period to be 92.77 years. Admitting the parallax of this star to have been exactly determined (0.168"), its distance from the earth is 1,400,000 times that of the sun; the distance between the two components of the binary star is a little less than the distance of Neptune from the sun; the velocity of the star in its orbit is about 30,000 feet per second (nearly six miles), which is about one and one-half times greater than Neptune's orbit velocity; and the mass of the two stars is about three times that of our sun. These results are probably good approximations to the truth, and they show that our double-star observers may well give some of their attention to making a few good measures each year of this binary.

Dr. Carl Behrmann has recently had published his atlas of the stars visible to the naked eye between the south pole and twenty degrees of south declination, including 2344 stars. It contains 7 stars of the first magnitude, 21 of the second, 56 of the third, 123 of the fourth, 463 of the fifth, 1654 of the sixth, with 20 nebulae, cumuli, and variable stars. The whole work was completed, so far as observation was concerned, in less than ten months, and it is largely compiled from the older star catalogues. One evidence of the short time spent on its preparation is that the author notes but four variable stars. It is, however, valuable as the best southern atlas extant.

The Smithsonian Institution has just published a most important research in theoretical astronomy, by Professor Newcomb, U.S.N., "on the general integrals of planetary motion," which is an elaboration of novel methods first proposed by him in two papers previously published. It is a general and fundamental statement of the position of theoretical astronomy in regard to its most important problems, and leads to several general theorems of the greatest value.

We may mention in this connection that Professor Newcomb is now in Europe for the purpose of making experiments on various kinds of optical glass, with the view of selecting the most fit to be used in the construction of the great telescope to be erected on some elevated point in the Sierra Nevada of California. The great liberality of Mr. Lick, of San Francisco, appears to be supplemented with scientific caution on the part of his advisers, and the astronomical world can reasonably hope that science may receive great benefits from his magnificent gift.

The attention of all interested in *Geology* has been directed within the last two months to the explorations of Professor Marsh in the Mauvais Terres, south of the Black Hills. The account of the professor's intercourse with the Indians, and the exposures endured by his party in their search for "bones," has already been given by the daily papers, and forms really a most interesting and, in some features, amusing story. Of



the scientific results of the expedition we have as yet only the general account (*American Journal of Science*) of the immense lake basins of tertiary age extending far to the south and east of the Black Hills. A description of the extinct fauna of this region, including most conspicuously the huge Brontotheriidae, can be given only when the large amount of material accumulated, and now in New Haven, has been thoroughly studied.

The geological occurrence of the diamonds of South Africa has been often described, but some new points of interest are brought out in a recent paper read before the Geological Society of London by Professor Maskelyne and Dr. Flight. They have found the rock at Du Toit's Pan and other similar diggings to have a soft, decomposed character, consisting of a soapy steatite-like magma, with a hydrated bronzite, crystals of new vermiculite mineral, called Vaalite, opaline silica, and other non-essential constituents. This rock has been extensively metamorphosed and fractured, and in many places broken through by dikes of an igneous diorite. It is asserted that "the diamonds occur more plentifully, if not exclusively," in the neighborhood of these dikes, or near them in the strata of the hydrous rock through which the igneous material has been ejected. In confirmation of this view the writers urge the distinctive character of the diamonds in different localities, and their sharp, unabrased character. How the diamonds have been formed can hardly be explained, though it is a point of considerable interest, if it may be accepted, that the metamorphosed bronzite rock, possibly at places of its contact with carbonaceous shales, was the original home of the diamond.

Geologists as well as metallurgists are much interested in the announcement of the discovery of a rich deposit of copper ore in New Mexico, principally in the vicinity of the White Mountain Indian Reservation, the mass being apparently almost inexhaustible, while the ease of smelting and reducing is very great.

The geological surveys of States continue to be prosecuted, although field work in most of them is suspended for the winter. A valuable document has lately been published by Mr. G. C. Brodhead, State Geologist of Missouri, containing a great deal of information in reference to the industrial resources of that State, which, as is well known, is very rich in many valuable minerals.

*Geography.*—Nothing of special importance in this department has come to light since our last record, although public interest continues to be excited by the vigorous preparations under way on the part of the British government in fitting out an expedition for polar research. The arrangements, well advanced under the direction of Admiral Osborne, render it likely that at as early a period as practicable in the coming summer two vessels will set out on their mission. One of these is to be a steam whaler originally built for arctic navigation, and will be strengthened and improved in every practicable way. The British government has made application to the United States for permission to use the stores which were deposited by the *Polaris* party, and it is probable that the request will be granted.

As already announced, Captain Nares, of the *Challenger*, is to be in command of the polar

expedition, his claim to the position consisting not only in the experience he has had during the *Challenger* exploration, but also in the fact that he was a member of the British arctic party on board the *Resolute*, under command of Captain M'Clintock, when he did excellent service. Of the preparations for the new Austrian polar exploration but little has been announced.

In connection with matters related to the arctic regions, we may refer to a new view presented by Professor Karsten in reference to the cause of the mildness of the climate of Norway during the winter season. This, in his opinion, is not the result of the superficial action of the Gulf Stream, according to Dr. Petermann, or even of the general movement of the ocean to the north-east, as maintained by Dr. Carpenter, but is produced by a current of warm water which leaves the Baltic at the approach of winter.

The United States steamer *Tuscarora* has again reached Honolulu, having completed the line of soundings recently undertaken between San Francisco and the Sandwich Islands, and finding that line to be even better adapted to the purpose of a telegraphic cable than the route from San Diego to the same point. At a considerable distance to the east of the Sandwich Islands a submarine conical mountain was met with, which, with a base of scarcely more than five miles in diameter, rose abruptly from several thousand fathoms to within 320 fathoms of the surface.

The various parties which have been occupied during the past summer in the exploration of the Western Territories, principally under the charge of Professor Hayden, Lieutenant Wheeler, and Major Powell, have all returned to Washington, and are busily engaged in making up their reports. It is understood that many interesting facts have been developed in regard to the physical and natural history of the regions visited.

A recent number of *Petermann's Journal* contains a notice by Dr. Loew of the explorations of Lieutenant Wheeler in 1873, with a map of the same.

Some interesting items of news in regard to explorations in Africa have recently been announced, the most important being those from the Cameron expedition, under date of May 16. Lieutenant Cameron states that he has definitely ascertained that Lake Tanganyika really empties into the Lualaba of Livingstone, and that it is certainly identical with the Congo.

Colonel Gordon has pushed forward his work in connection with the exploration of the Albert Nyanza very efficiently, having at the date of September 5 reached Gondokoro, his sectional steamer having been carried to the foot of the falls below the lake.

The details of the "Forrest" exploration in Australia are also announced, this gentleman having succeeded in making a journey of 2000 miles across a portion of that continent, near the parallel of 26°. He finds the greater part of the country to be an unmitigated desert, involving very great labor and hardships in passing over it. Other portions, however, were well adapted to European immigration.

*Ethnology.*—Mr. William H. Dall sends to the National Museum a finer collection than ever of prehistoric and historic material gathered during his last trip to Alaska. Among them

lar interest, if not in gaining the entire commendation of students of science as new and accurate investigation. This meeting was one of unusual interest and usefulness.

The same may be said of the annual convention of the Connecticut Board of Agriculture, December 16-18. The chief theme of discussion was the production and management of milk. Addresses were made by Secretary Gold and Mr. Hart on the Production and Treatment of Milk, Hon. X. A. Willard on Dairy Management, T. D. Douglass on Butter-making, Dr. Sturtevant on the Milk Product as affected by Feed, Professor Atwater on Results of European Experiments upon the Effect of Fodder on Milk Production, Hon. Francis Gillette, on the Immortality of Animals, and by Mr. P. M. Augur on Fruit-culture.

The establishment of an experiment station in Connecticut, a movement toward which had been initiated in the previous annual meeting, was discussed with considerable enthusiasm. The committee appointed a year previously for furthering the project reported that meetings had been held in various parts of the State to bring the subject before the people, who had responded with hearty approbation. Petitions with some seven or eight hundred signers had been presented to the State Legislature asking for favorable action. A bill providing for an annual appropriation of \$8000 for the establishment and maintenance of an experiment station had been brought before the Legislature, and after a debate had been laid over for further consideration until the next session, which convenes in May, 1875.

Pending this action of the Legislature, the members of the convention showed their earnestness in the matter by subscribing nearly \$400, which sum it was proposed to increase to \$1000, to be devoted to investigations in agricultural chemistry, and particularly to the analyses of fertilizers, in the interests of the farmers of the State of Connecticut. Mr. Orange Judd, as one of the trustees of the Wesleyan University, assured for this work the free use of the chemical laboratory of that institution, which offer was seconded by one on the part of Professor Atwater to devote gratuitously his own services, aided by those of Professor Johnson, to the superintendence and execution of the work.

Apropos of the subject of fertilizer analysis, an interesting bit of experience is reported from the Massachusetts Agricultural College. A potash fertilizer purchased of a dealer in Boston was certified to contain thirty-two per cent. of potash. An analysis by Professor Goessmann showed an actual content of only eight per cent.

The article by Professor Storer, "On the Importance as Plant Food of the Nitrogen of Vegetable Mould," published in the third part of the Bulletin of the Bussey Institution, to which brief reference has been already made in these columns, is one of great scientific value. The object of this paper is to enforce and, in part, to explain the fact that the nitrogen of vegetable mould, as in loam and peat, which in the process of decomposition of the latter has not yet reached the form of ammonia or nitric acid—in other words, the organic nitrogen of the soil—is, under certain conditions, in a measure, at least, available as plant food. This fact is supported by a large number

of experiments on the growth of plants in pots containing various kinds and mixtures of soils, carried out during the past three years by Professor Storer, as well as by numerous others, which he cites from various authorities. Professor Storer discusses the circumstances under which the soil nitrogen becomes available to the plant, and throws out suggestions which have a very important bearing upon the much-vexed question of nitrification, and go far to explain and harmonize the conflicting views and results of experiments upon the weighty subject of the sources of supply of nitrogen to plants. These labors of Professor Storer are among the most valuable contributions to agricultural science ever made on this side of the Atlantic.

An important advance has lately been made in regard to the history of the potato disease by Professor Du Bary, which, it is thought, may be of importance in suggesting measures for preventing the propagation of this pest. The matter of the potato fungus has been well worked out for some years past, with the exception of its resting-place during the winter, and the possible manner by which it can make its appearance in the spring or summer. It is now believed that its nidus during the season in question is to be found in clover or certain other fodder plants which enter into the composition of manures, and that by a proper microscopic criticism of such manures the danger of introducing the germs of the disease in any particular region may be greatly obviated.

Mr. Grote, of Buffalo, makes an important suggestion in regard to the natural history of the cotton-worm which does so much damage to the cotton crop in the South. He is of the opinion that it does not originate in the United States, but comes from South and Central America in great flights. These settle upon the growing plants, and lay eggs, which develop into the caterpillar so destructive to the cotton interest. He believes that the eggs laid by the progeny of this brood all perish in the winter with the plants themselves, and that the renewal can only occur by a new flight from the South. The occurrence of this pest in connection with the cotton plant in the United States, in his opinion, dates back only to a short period before the late war.

The continued spread of the phylloxera in France excites the gravest apprehensions on account of the momentous consequences involved to the grape culture of the country. Every number of the *Comptes Rendus* is occupied very largely by propositions looking toward a claim for the \$20,000 offered by the government for an efficient method of preventing its ravages. A recent writer gives it as his opinion that the trouble is caused largely by the practical extermination of small birds in France on the part of the so-called sportsmen of that country. It is not, perhaps, that the phylloxera itself is devoured by the birds, but that other insects, which are more accessible to them, and which, in consequence of their diminution, can prosecute their ravages undisturbed, and thus weaken and exhaust the vine plant, and render it a more easy prey to the parasite.

Under the head of *Pisciculture* and the *Fisheries* we have to record the great success experienced by the United States authorities in securing spawn of the salmon in California and Maine, in

hatching out that obtained from the former, of which a large percentage of the young fish has already been deposited in the waters of the United States. A successful transfer of the living young has been made to the waters of the Colorado River in Texas and to those of Lake Pontchartrain, Louisiana, in addition to many points in Ohio, Indiana, Illinois, Michigan, Iowa, Wisconsin, Minnesota, Utah, and all the Northern and Middle States, as well as in Maryland, West Virginia, Virginia, and North Carolina.

A curious fact in connection with the artificial culture of salmon has lately come to light, as related by Mr. Dousman, of Wisconsin. This gentleman received some years ago some salmon eggs from the United States establishment in Maine to be hatched by him and distributed in the waters of Wisconsin. In transferring them a few of the fry were left behind, and in the past autumn, while securing the eggs from his spawning trout, Mr. Dousman found three salmon, one female and two males. From the female, which was only five inches in length, he obtained 200 apparently fertile eggs, which were impregnated by the milt of the male (seven inches long), and placed in a hatching box. The result of the experiment will be looked for with great interest for the purpose of ascertaining whether a new and diminutive race of salmon may not thereby be obtained.

In this connection we may refer to the experiments by Fitzinger upon the eggs of hybrid salmon as obtained in Europe by crossing the salmon and the trout. These have been subjected by him to a critical investigation, and it was found that they develop quite satisfactorily up to the stage when the eye-specks show, but do not go beyond this point, and consequently no fertile hybrid race can be expected. The successive generations may, however, be kept up advantageously, as the hybrids do not leave the rivers, and grow with much greater rapidity on the same amount of food than the parent species.

A movement has lately been initiated for the transfer of trout and salmon to the Cape of Good Hope, as also to renew experiments in transporting salmon eggs to Australia and New Zealand. The trout thus transferred have succeeded admirably in the last-mentioned countries, while the result of the salmon experiments is not at all satisfactory. It is somewhat questionable whether the temperature of the water at the Cape of Good Hope is such as to permit a successful result, but its initiators sagaciously maintain that if this be secured, the benefits will warrant any reasonable amount of expense, while the loss will be trifling if the effort fail.

Something may be learned of the importance of the measures now being taken on the part of the United States and the States themselves looking toward stocking the rivers of this country with salmon, shad, and other useful food fishes, from the report of the Food Inspector of the city of Washington for the year ending October 1, 1874. This gentleman, Mr. C. Ludington, informs us that the total inspections of fish offered for sale in the markets of Washington alone amounted in that year to no less than 11,000,000 pounds, of which a large proportion consisted of herring and shad. Of the latter there were 628,000, and 6,500,000 of the former, besides

large numbers of striped bass and other river fishes.

After several years of unsuccessful effort in France to restore the oyster fisheries, we are informed that the results of the last season have been quite satisfactory. The oyster, as is well known, produces a great number of young during its spawning season. The great difficulty, however, is to retain these on the oyster beds where they are produced. A concurrence of favorable circumstances appears to be necessary, particularly with reference to the oceanic currents, and an abundance of objects to which they may adhere, a perfect cleanness of the surface for adherence, and other more or less uncertain conditions. It is now stated that this problem has been solved by introducing to the beds at about the time of spawning a number of sticks or other objects coated with an adhesive substance, to which the spat may attach itself. Much less trouble is experienced in the United States in this connection, the object being accomplished by throwing upon the beds clean oyster-shells at the critical time.

The practical failure of the fur-seal fisheries in the North Atlantic during 1874 has induced action on the part of European governments looking toward some international arrangement for the protection of this interest, and it is probable that the period of capture will be changed to the time between the beginning or middle of April and the middle of May or the beginning of June, and that a fine of many thousands of dollars will be imposed by each government upon such of its citizens as shall violate the order on this subject.

In the field of *Engineering* we may record for the month several noteworthy items. The 16th of December witnessed the completion of the Brooklyn tower of the East River Bridge. Its total height is placed at 268 feet.

The tunnel through the Musconetcong Mountain, which has been in progress for over two years, is reported as upon the eve of completion. The final blast in the headings was made on the 16th of December, effecting the connection between the two parts of the tunnel. The work is located in Northern New Jersey, on the line of the Easton and Perth Amboy Railroad—a continuation of the Lehigh Valley Railroad—the line, when completed, constituting a connecting link between the Lehigh Valley and its northern prolongation, on the one hand, and tide-water, on the other. The tunnel proper is about a mile in length, not including the long open cuts at either end.

The company engaged in the construction of the St. Gothard Tunnel has laid before the Swiss Federal Council its estimates for the third year's work, which commenced on the 1st of October, 1874. This estimate, which has been approved, fixes the progress to be made during this period at 1922 meters, which, added to the 2453 meters driven the first two years, will make a total of 4375 meters by the 30th of September, 1875.

The Cheap Transportation Convention, which met during the present month at Richmond, afforded the opportunity of bringing out a vast amount of information concerning rail and water lines, the best routes from North to South, and West to East. The feature of the meeting was the able and interesting report of Mr. Southall, of Virginia, on the James River and Kanawha

Canal, connecting the waters of the Mississippi Valley with those of the Atlantic, a scheme which has already been descanted upon in these columns. In an address on existing railroads the president of the convention pointed out a number of abuses incident to the general management of lines in this country, and urged that the most effectual remedy for the existing evils is competition, and this would be found in the construction of an exclusive freight road from the grain-growing sections of the West to the seaboard, which, inasmuch as it would demonstrate how cheaply freight could be carried by rail, would compel existing roads to abolish the abuses which are absorbing the revenues of the present system.

Upon the most reliable information we may record to date the completion of 1808 miles of new railroads in the United States during the year 1874, against 3925 miles completed in 1873, and 7340 miles in 1872. Complete returns up to the close of the year will doubtless slightly swell the figures for 1874. The increase is estimated to be about 2.6 per cent., the number of miles of our railroad at the beginning of the year being 70,650.

Experiments have been in progress at Sandy Hook, with the purpose of determining the practicability of altering a number of smooth-bore guns into rifled pieces of smaller bore, by the insertion of a wrought-iron core. If successful, it is understood that some 4000 smooth-bore guns now in government hands will be so altered, and thus greatly improved in efficiency.

The annual statement of the Keeper of the Mining Records of the United Kingdom for 1873 has just appeared, from which we present the accompanying figures, showing the mineral produce of the United Kingdom during the period named.

	Tons.	Value.
Coal .....	121,016,747	£47,631,280
Iron ore.....	15,577,499	7,573,676
Copper ore.....	80,188.5	342,708
Tin ore.....	14,884.8	1,056,835
Lead ore.....	73,500.5	1,131,907
Zinc ore.....	15,969	61,166
Iron pyrites.....	58,924	35,485
Arsenic.....	5,448.8	22,854
Clay (fine and fire) and shale	1,758,000	656,300
Salt.....	1,758,000	892,500

The total value of the minerals produced in the United Kingdom in 1873 equals £59,479,486. From the above there were manufactured, pig-iron, 6,566,451 tons; tin, 9972 tons; copper, 5240 tons; lead, 54,235 tons; zinc, 4471 tons; other metals to the value of £136,077—making the total value of metals produced from British ores in 1873 £21,409,878, showing a decrease of £660,000 on the figures of 1872.

In *Technology* we may note that much interest is at present aroused by the system of Ponsard for making steel direct from the ore. The process is effected by the employment of a gas furnace of peculiar construction, which is susceptible of a great variety of uses. The foreign journals likewise contain very favorable comments on the efficiency of the process of freeing cast iron from phosphorus, first suggested, we believe, by Professor Scheerer, of Freiberg, by the application of a fused mixture of chloride of calcium and common salt to the molten iron in the puddling furnace. The process is represented to yield a superior bar-iron from phosphureted cast iron at practically no increase of cost.

In connection with the future of the Bessemer steel industry of this country we note with much interest from a leading iron paper that the existence in Virginia of large deposits of iron ores of great purity and richness, fully equaling if not surpassing those of Lake Superior, has been fully established. These deposits, moreover, are said to be readily and cheaply accessible to the iron-works east of the Alleghanies. The great difficulty with which the Bessemer industry of this country has had to contend is that of securing ores of sufficient purity at reasonable price, and thus far it has been dependent partly upon foreign sources, though chiefly upon the ores of Lake Superior and Missouri.

A new industry that, besides utilizing one of the waste products of the mills, gives employment to quite a number of men has lately sprung up in Pittsburg. The article is called "breeze coke," and is obtained from the ashes of the furnace ash-pits. The coarse particles are first separated from the fine ashes with a rake, and the lumps thrown into a tank of water, when the coke that is fit for use floats on its surface, the heavy ash and cinder sinking to the bottom. It is eagerly sought after by the forge-men, who use it largely.

*Bronces incrustes* is the name given to a new style of bronze or copper work ornamented with gold and silver, and manufactured by the celebrated house of Christofle and Co., in Paris.

Dingler publishes the fact that an artificial animal charcoal possessing very fair decolorizing power can be prepared by saturating lumps of pumice-stone with fresh ox blood, and then heating the mass in a closed vessel until the evolution of combustible gases ceases. Before using this substitute, however, it is recommended that it be washed in water to remove certain soluble salts that are contained therein.

Some recent improvements in photography are of great interest. A process of reproducing negatives has been devised, by which a plate is coated in the dark with dextrin 4 parts, glucose 4, bichromate of potassa 2, and water 100, and, when dry, exposed to light under the negative to be copied. After a few seconds' exposure, it is removed again to the dark room and dusted with finely powdered graphite, which brings out the picture. If the plate after exposure is sprinkled with emery of different grades, beginning with the coarsest, the more viscous portions are covered by the larger particles, while the parts most acted on by the light retain only the finest. The plate is then hardened by exposure to light, and an impression taken from it in soft metal, which yields an electrotype possessing the proper grain for copper-plate printing.

In a similar connection we must notice that MM. Delachanal and Mermet have designed a continuous light for photographic purposes by the combustion of nitric oxide and bisulphide of carbon, the eminent actinic value of which has long been familiar to physicists.

A very remarkable fact, if verified, is the observation of M. Choquart, lately communicated to the French Academy, that the magnet exercises a decided influence upon the spectra of various substances. The spectra of sulphur and selenium under the magnetic influence are said to become quite pale, and finally to disappear, while the opposite effect is produced in the case of

chlorine and bromine. The effect, the author says, is so rapid as to seem magical.

Under the head of *Materia Medica, Therapeutics, and Hygiene* we may refer to the statement of Dr. Schmidt in reference to the well-known and much-dreaded disease known as *diabetes mellitus*, and the result of a disorganization of the brain—a condition to which students are particularly liable. It is maintained by Dr. Schmidt that in no case coming within the scope of his extended experience and study has this disease been developed excepting as hereditary, and that in every instance a predisposition existed, as the inheritance from some ancestor who had been affected by it within one or two generations.

Laségue, in a paper on therapeutics and hot baths, informs us that the beneficial results of such applications may be secured, without any of the evils sometimes arising, by the precaution of having the bath warmer at the end of the operation than at the beginning, the temperature in no case to exceed 115° to 118°, and the time of exposure limited to a few minutes.

Napier mentions what he considers to be a new process in dental surgery. Taking the ground that the extirpation of the nerve is very objec-

tionable in preparing the stumps for the insertion of artificial teeth, he files down the teeth, with an occasional application of nitric acid to the surface, for the purpose of deadening the nerve. He has found as the result of several experiments that teeth cauterized in this way retain the vitality of the nerve, greatly to the improvement of their general health and condition.

*Necrology.*—Among the deaths since our last Summary we have to record, for the United States, those of Dr. J. V. Z. Blaney, of Chicago, and Dr. Gideon Lincecum, of Texas; Mr. F. Von Kittlitz and Dr. Friedrich Rochleder, for Germany; Sir William Jardine, Lady Hooker, Dr. Edwin Smith, and Dr. Archibald Campbell, for England; and Ferdinand Bayan and L. P. Rousseau, for France.

We desire to correct an error which through oversight crept into the Editor's Scientific Record published in our December issue. It was there stated that the length of railways throughout the world exceeds 2,000,000 miles. The correct statement would read, "The number of miles of railway throughout the world exceeds 200,000."

## Editor's Historical Record.

### POLITICAL.

OUR Record is closed on the 22d of January. —Congress, after the holiday recess, met January 5. On the 19th of January Senator Sherman submitted a report from the committee of conference to amend the existing customs and revenue laws. The report, which was agreed to by the Senate, was substantially the same as that presented last session, except that the duty on hops had been raised to eight cents per pound, and that the sections relating to tobacco and the sales of bonds had been stricken out. The report was agreed to by the House January 21.

The House, January 7, passed, by a vote of 136 to 99, the Senate bill for the resumption of specie payments, the provisions of which were given in our last Record. The bill has received the President's signature. On the 12th a bill was passed by the House removing the limitation restricting the capital of gold banks to \$1,000,000.

The Naval Appropriation Bill from the House was passed by the Senate January 18. It appropriates a little over \$16,000,000.

The House Committee on Elections, January 19, reported a resolution recommending the expulsion of George Q. Cannon, Delegate from the Territory of Utah.

A resolution was adopted by the House, December 18, permitting the select committee on the condition of the South to proceed either as a committee or sub-committee to Louisiana to make investigations. In accordance with this resolution, the select committee appointed a sub-committee, consisting of Charles Foster, William Walter Phelps, and Clarkson N. Potter. The committee left Washington on the 26th of December, and were in New Orleans January 4, when the Louisiana Legislature attempted to organize itself. The State-house was guarded directly by the police, and more remotely by United States

troops, under the command of General De Trobriand. The Returning Board had returned fifty-three Republicans and fifty Democrats, leaving five contested seats, the proper occupants of which were to be decided by the Legislature. After the roll-call of members there was an irregular organization attempted by the Conservatives, who, by an informal vote, placed L. A. Wiltz in the chair. The five Conservative members whose seats were contested were in like manner admitted to seats. L. A. Wiltz was then elected permanent Speaker. Some confusion ensuing, the Speaker called upon General De Trobriand to clear the lobby, which the general did. Shortly afterward General De Trobriand received orders from Governor Kellogg to eject the five Conservatives whose names had not been returned by the Returning Board. He ejected these members. The Democrats then retired from the hall in a body. At 9 p.m. General Sheridan assumed command of the Department of the Gulf.

The Congressional investigating committee returned to Washington shortly after the events just narrated, and on the 15th their report was submitted to the House. During their eight days' stay in New Orleans they examined over ninety-five witnesses. The committee report that the acting members of the Returning Board were all Republicans. The returns of the last election made by the Commissioners of Elections gave the Conservatives a majority of twenty-nine members in the Legislature. In three instances there were protests accompanying the returns. The Returning Board, after a session of several weeks, returned fifty-three Republicans and fifty Democrats. In one parish (Rapides) three Conservatives were elected, and the returns were accompanied by an affidavit of the United States Supervisors that the election was in all re-

and photographs. The book is, indeed, in an art point of view, one of the handsomest books of travel of the year.

Dr. JOHN W. DRAPER'S *History of the Conflict between Religion and Science* (D. Appleton and Co.) has this much to commend it, that it undertakes to supply a widely felt want in literature, and that its author is a man of extensive erudition, though not always sound scholarship, and of scientific attainments, though not of religious sympathies. But he certainly does not possess that rare impartiality of mind which could alone enable an author to write a successful history of this conflict, and the work which he has written will be satisfactory only to the most extreme partisans in the controversy. It is, indeed, doubtful whether such a history can be written as yet, at least by any one writer—whether for its successful production we must not have the history of religion written from the one standpoint, and that of science from the other. Dr. Draper's language is always moderate and respectful, but he does not indicate that he understands what religion is, what function it assumes to fulfill, or what its most intelligent advocates claim it has accomplished. If he had entitled it "Romanism and Science," his title would have been more just, though less attractive. Indeed, he tells us in his preface with great frankness that he has had little to say respecting those two great Christian confessions, the Protestant and Greek Churches, and this because they have never arrayed themselves against the advancement of knowledge. On the same principle, he should have omitted from his history all mention of science, which has not arrayed itself against the development of man's moral and spiritual nature. There is as little reason for attributing religion exclusively to the Romish Church as there would

be for confining science to the investigations and hypotheses of a purely materialistic and atheistical philosophy. But even as a history of the conflict between Romanism and science it is impossible to accredit this volume with that impartiality which the author claims for it in his preface. We expect the brilliant advocate to close his own eyes and turn the eyes of the jury away from the evidence which is adverse to the verdict for which he pleads, but we have a right to expect that the historian of so important an issue as that indicated by the title of this book will not forget to mention that Copernicus, to whom more perhaps than to any other man the revolution in astronomical science is due, was a Roman Catholic ecclesiastic—canon of Frauenburg—and dedicated his great work to Pope Paul III.; and that to the Benedictines, the most important of the Roman Catholic orders of monks, we owe the preservation of learning, literature, and the fine arts during several centuries of ignorance; the guardianship not only of the Scriptures, but also of the works of such writers as Pliny, Sallust, and Cicero; the creation of Gothic architecture, and the invention of modern music, and the practical application, if not the invention, of scientific agriculture. Dr. Draper sees in religion only an impediment to the intellectual development of man, as some of the fathers, whom he so justly condemns, saw in science only an impediment to man's spiritual development. The true history of the conflict between science and religion can only be written by one who recognizes the truth that each has contributed to the progress of the race, and that the conflict between the two has grown out of the fact that the wisest men are partialists, and by their fears and their prejudices have created a conflict where there was no occasion for one.

## Editor's Scientific Record.

### SUMMARY OF SCIENTIFIC PROGRESS.

IN *Astronomy* we have the announcement during the month of January of the discovery of asteroids Nos. 139 and 140, the former found in October, by Professor Watson during his sojourn in Pekin, and the discovery of which has but just been published; the latter, No. 140, was found at Berlin on the last day of the month. The rediscovery of asteroid No. 104, Clymene, by Dr. Leuther, is also equally worthy of mention, as the increasing number of these small planets renders it exceedingly difficult to keep track of them all; it is to be hoped that American astronomers will take an active part in this labor, which indeed specially devolves upon them, inasmuch as two of their number, Messrs. Watson and Peters, take so prominent a part in the discovery of new members of the asteroid group.

One of the most valuable contributions to the literature of the subject of auroras consists in the new general catalogue of Fritz of Zurich. This author having had the advantage of the use of the great catalogue of Lovering, and of the smaller works of other authors, has added to these other later documents, some now for the first time rendered accessible, and has employed the same with a praiseworthy critical skill that

renders his catalogue invaluable to the student of these as yet unexplained phenomena. We have already spoken of his investigation into the geographical distribution of the aurora, and anticipate still further contributions from him.

To the study of earthquakes Suess of Vienna has contributed a valuable memoir on the earthquake of Southern Austria. He has in this paper given a careful study of three special earthquakes, and finally a collection of all available data referring to the phenomena in past history. Most highly interesting is his map, showing that the centres of earthquakes are in that country all arranged along certain straight lines or belts of country, which in one remarkable instance coincides with a river valley so perfectly as to afford a basis for very plausible speculations as to the dependence of the shock upon the infiltration of surface water.

In this connection we note that the Prussian government has authorized La Saulls to establish a large number of seismometric stations in the volcanic region near Bonn.

*Mineralogical* progress since our last has reference chiefly to the announcement of new species of minerals. The first to be mentioned is *miriquidite*, a name recently given by Frenzel to

a new mineral species found with chalcocite, pyromorphite, and other minerals at Schneeberg. It occurs in minute rhombohedral (R and  $-\frac{1}{2}R$ ) crystals, and thus far no analysis has been made, owing to want of sufficient material, but qualitative experiments show it to be a hydrous basic compound of lead and iron with arsenic and phosphoric acids. It has the hardness of fluorite (4), and a dark yellowish to reddish-brown color.

Frenzel has shown that the little tufted or globular forms of silicate of bismuth occurring at Schneeberg and Johanngeorgenstadt are not isometric, but monoclinic, in crystalline form, and consequently he separates them from the old eulytite (isometric), and gives them the new name, *Agricolite*.

*Allophite* is a new hydrous silicate of alumina and magnesia, much resembling pseudophite, which Websky has found at Langenbielan, in Silesia. It occurs in dense microcrystalline masses, and it might perhaps be questioned whether it deserved a place as a new mineral species.

*Etringite* is a new hydrous sulphate of alumina and lime described by Lehmann. In appearance and occurrence it resembles the new *chalcocorphite* of Vom Rath, but has a very different composition (chalcocorphite is a hydrous silicate of alumina and lime). *Etringite* is found in minute needle-like crystals (hexagonal system) filling cavities in masses of limestone inclosed in the lava of Etringen, not far from the famous Laacher See.

M. Ducloux has recently described in the *Comptes Rendus* a new mineral under the name of *rivotite*. It contains antimony, copper, carbonic acid, with a little silver, and the describer looks upon it as a compound of antimoniac acid with carbonate of copper and silver. It is amorphous and compact, and of a yellowish or grayish-green color. It was found disseminated through a white limestone in the province of Lerida, France.

Another new mineral is the *meymacite* of Carnot. It is a hydrated tungstic acid (tungstite), and is supposed to have been made from the decomposition of tungstate of lime, scheelite. In some cases it preserves the form and even the structure of the original scheelite. Its characters are not very well defined, and it may hardly deserve an independent position. It is named from the locality, Meymac, where other minerals containing tungstic acid have been found.

In this connection it may be well to mention a related mineral, described some time since by Domeyko, and called cupro-tungstite. It is a true tungstate of copper, and is interesting in its relation to the cupro-scheelite of Whitney, found in California, and which was a scheelite containing considerable copper. The cupro-tungstite was found near Santiago, Chili.

The progress which is now being made in *Geology*, and the interest which is generally felt in it, are shown by nothing more clearly than by the large number of independent surveys which are now being carried forward in this country.

In addition to the several surveys of the Territories, prosecuted by the general government either through the Interior Department or the War Department, many of the older States are carrying on the same work for themselves. The novelties of the work in the latter case are few,

and the chances for surprising discoveries in the investigation of ground already pretty well known are smaller, and yet the general importance of such thorough work, both for science and for the economical interests of the State itself, can hardly be overestimated.

The geological survey of New Hampshire is now about completed, and the first volume of the final report has just appeared. The work has been carried on for some years under the charge of Professor Hitchcock, and has been and will be the means of bringing out many important facts in regard to the older crystalline rocks of New England—perhaps the most difficult of all problems in American geology. The finding of Helderberg fossils at Littleton, New Hampshire, which we owe to Professor Hitchcock, taken in connection with the locality of the same age long known at Bernardston, Massachusetts, of itself alone throws great light upon the condition of this portion of the country in those remote times. This same subject of the crystalline rocks will be still more elucidated in case the proposition for a new survey of Massachusetts, now before the Legislature, is decided favorably. The thoroughness which is contemplated for this survey will be seen from the fact that it is, as proposed, to continue for fifteen years, and to include not only geology, but also the several departments of biology. Those who have the subject in charge have suggested \$387,000 as about the amount which will be required to accomplish all that is proposed, including the preparation of the results of the work for the press.

In regard to the surveys of other States, that of Pennsylvania, under the charge of Professor Lesley, may be mentioned. It has now completed its first year of field work.

A State with such a wonderful store of mineral wealth may well afford a resurvey of its territory, especially in view of the great progress made in the science since its first survey was completed, in which, by-the-way, Professor Lesley himself took an active part. Missouri has recently published a geological report in 734 pages, containing many valuable facts, particularly in regard to her extensive lead mines. One probable conclusion drawn by Mr. Schmidt from the facts observed is especially important—that the occurrence of lead ore is not exclusively dependent upon the geological formation, but its deposition may have taken place simultaneously in similar rocks of different geological periods. This would make the origin of all the galenite later than the subcarboniferous.

A first report of the geology and agriculture of Texas has been made by Professor Buckley, State geologist, in which a general outline is given of what may be expected from a further prosecution of his labors. Professor Buckley is well known as an active botanist, and he embraces the occasion of his report to reply to some criticisms by Professor Asa Gray in regard to the validity of certain species of plants described by himself many years ago as new in the Proceedings of the Philadelphia Academy of Natural Science.

A meeting of the Board of Directors of the Geological Survey of New Jersey was recently held, in which Professor Cook presented his annual report.

The geologists accompanying the government

expeditions in the West are all in Washington, engaged respectively in making up their reports. Messrs. Gilbert and Howell, who have been connected with the survey of Lieutenant Wheeler, last year accompanied Major Powell. No material change in the corps connected with Dr. Hayden's labors has taken place. A report by Dr. Hayden of his explorations, geological and otherwise, in 1873, is about making its appearance from the government printing-office, and constitutes a very large volume, profusely illustrated with maps and sections, as well as representations of recent and fossil species of animals and plants, the whole making a work of extreme value.

The record of *Geographical Progress* since our last report is, as might be expected, quite meagre, especially in the United States, in view of the difficulties attendant upon such operations during the winter season.

Mr. Dall, to whose labors in Alaska we have referred on many occasions, is now in Washington, engaged in preparing his report, under the direction of the Coast Survey.

Dr. Emil Bessels, chief of the scientific corps of the *Polaris*, has nearly completed a first volume of his report, embracing the physical results of the Hall expedition, and it will probably be laid before Congress in a short time.

The report of the German arctic expedition, in which the *Germania* and the *Hansa* took part, has been completed, forming a series of volumes of much interest.

The scientific corps of the Austrian expedition under Payer and Weyprecht, whose safe return during the past autumn has been chronicled, is also occupied in preparing a report of their labors.

The note of preparation continues to be heard in regard to polar expeditions for the coming season. Of these, that to be undertaken by the English government is the most important, and no pains are being spared to make it a complete success. The vessels that have been selected for the purpose are now being fitted up with every appliance for the safety and comfort of the party; and officered, as they will be, by the most experienced members of the British naval service, accompanied by eminent scientific civilians, and having the experience of all previous expeditions, especially those of the *Polaris* and the *Tegethoff*, for their guidance, we may confidently look forward to a speedy solution of the remaining problems of polar search.

The German government also, it is understood, is fitting out an expedition for the same goal, but will attempt to reach it by a different route. The preparations in Austria toward a similar end have already been referred to.

It is much to be regretted that in this friendly rivalry America as yet shows no intention of taking part. It is, however, by no means too late to carry into effect the suggestion already made from many quarters of an American polar expedition by way of Behring Straits. With several government steamers already on the west coast, either in the service of the Coast Survey, the revenue department, or the navy, and with San Francisco as a suitable point for fitting out one or more of these for this mission, a fair chance still remains for a successful effort.

The opportunity could also be embraced of

exploring the comparatively little known region of Northern Alaska, and of solving the problems which exist in reference to Wrangell's Land. We have previously referred to the fact that the Arctic Ocean north of Behring Straits has for several years been remarkably free from ice, and that an American whaling captain has stated that he skirted along the coast of Wrangell's Land for many miles, and could readily have landed if it had been his business to do so.

Some details have recently been received from the *Challenger*, especially of her voyage from Melbourne to Hong-Kong, during which, as usual, the opportunity was embraced to prosecute the scientific inquiries intrusted to her corps. The most important result of her later movements was the discovery of several isolated basins in the ocean having a great depth in the centre (of between two and three thousand fathoms), with an unbroken rim rising sometimes to within a few hundred fathoms of the surface. This condition was found to produce a peculiar effect upon the deep-sea temperature. In nearly every instance the ocean temperature on the top of the ridges was found to continue, with very little change, to the very bottom, so that instead of a registry of 33° to 36° F., there was found even at a depth of 2000 fathoms or more a temperature sometimes as high as 50°. The explanation of this is of course very simple. The rims of the basins constitute a barrier to the entrance of the antarctic cold water flowing along the main floor of the ocean, and isolate their contents from its influence. Wherever the barrier was broken through, so as to permit the main current to penetrate, indications were found corresponding to those which generally accompany a great depth.

A second report of the operations of the *Challenger*, by Captain Nares, has lately been published by the Admiralty, detailing the observations made during the voyage between South Africa and Melbourne.

Reference has already been made to the starting out of the United States steamer *Tuscarora* for the purpose of making a second series of soundings for an ocean cable, this time between San Francisco and the Sandwich Islands. The *Hawaiian Gazette* of December 2 announces her arrival at Honolulu, and remarks that, in all, sixty-two casts of the sounding-line were made, the first near the Farallones, the water gradually deepening from that point to 2500 fathoms. In latitude 33° 10' and longitude 132° the depth began rapidly to diminish, showing 1417, 435, 413, and finally 385 fathoms in latitude 32° 58'. Numerous observations were made, which showed that there was a submarine peak rising about 2200 fathoms from the ocean bed. Beyond this, for a circuit of five miles around this peak, deep water was found in every direction, and a few miles from the peak 2500 fathoms were reached. From this the depth gradually increased, until in latitude 24°, longitude 152°, the depth was 3115 fathoms. This was only about four hundred miles from Honolulu.

The soundings brought up from the peak showed a mixture of lava and coral, which is supposed to be indicative of a submarine volcano. The temperature at the bottom was found to vary but little from 35° to 36° F.

The results of the survey, according to the



*Gazette*, are satisfactory, showing, if any thing, a better line between Honolulu and San Francisco than that from San Diego.

Among the more important recent American geographical publications is the report of Captain Jones, of the United States Engineers, of a reconnaissance in 1873 from Cheyenne, through Northern Wyoming, for the purpose of opening a shorter route from the line of the Union Pacific Railroad to Wyoming and Montana. This he discovered in the form of a natural pass in the Wind River Mountains, by which a railroad can readily be extended from Point of Rocks on the railroad, by way of the Yellowstone National Park to Fort Ellis, in Montana, shortening by many hundred miles the line of travel into Montana, and making perfectly easy a journey to the wonderful regions of the Yellowstone geysers and hot springs.

The report by General Comstock of his labors on the Northern lakes during the past year has also made its appearance.

*Ethnology*.—Mr. Charles C. Abbott figures and describes in *Nature*, January 7, two very striking examples of flame-shaped arrow or spear heads from New Jersey.

On the 22d of December, 1874, Colonel Lane Fox continued his interesting account of his classification of the objects of culture on the basis of evolution. The subject this time was "Early Modes of Navigation." Beginning with the simplest float or dug-out, the author traced the progress of boat-building through the "stitched-plank canoes, bark canoes, outrigger boats, double canoes, up to the more complex craft. The various parts of sailing apparatus were arranged and discussed. Colonel Fox inclines to the view that in its rudest condition the mind of man possesses little of subjective or inventive power, and that he has risen from step to step following the leading-strings of nature.

The last quarterly review of the progress of natural science, theoretical and practical, published by the editors of *Gaea*, Leipsic, 1875, is devoted to prehistoric times entirely.

There is a very interesting article in *Nature* of December 17, 1874, by Mr. E. B. Tylor, on the relation of race to species. The author very ingeniously applies the dotted diagrams of Mr. Francis Galton to illustrate the hypothetical and actual separation of a single race of animals into a species made up of several races, and thence into any number of separate species. One is forcibly reminded, in looking at the clusters of dots, of the process of reproduction by cell multiplication.

The *Geographical Magazine* of January, 1875, gives a very interesting account of the adventures of M. Miklucho Maklay, the indefatigable young Russian traveler, in New Guinea. He was sent out under the patronage of the Grand Duchess Helen. On the 2d of September he was landed on the island with two servants, a man and a boy. The natives fled in dismay, but afterward returned, bringing gifts of hogs, dogs, bananas, cocoa-nuts, sweet-potatoes, and other products, as soon as they became aware of his friendly intentions. The Russians returned the compliment by placing calico, gold paper, empty bottles, buttons, etc., on the shore, but the natives were too courteous to touch them (Mirab. dict.!). On the 9th of September the

ship left our traveler to his fate. For more than a year nothing was heard of him. At last, his friends becoming alarmed, a ship was ordered to look him up. He was found almost emaciated by fevers, his boy dead, and altogether about in despair. He has collected a fine lot of anthropological material, which is not yet published. From New Guinea he journeyed to the Moluccas and Philippines, thence to China and Batavia. At the end of 1873 he had made all his preparations to accompany a Dutch expedition to New Guinea, but was disappointed. When Captain Moersby met him in Amboina last June he was preparing to visit the Malay peninsula to study a race called Sunay, and supposed to be Papuans.

M. Gabriel de Mortillet furnishes the following elaborate scheme of the French stone age. The paleolithic age he divides into four epochs—St. Acheul, the oldest (type, almond-shaped flaked axe), Moustier (type, flint arrow-heads and scrapers, bilateral flake), Solutré (type, bay-leaf shaped arrow-head, bilateral chip), Madelaine (type, barbed bone arrows and flint knives). The neolithic age he calls the epoch of Robenhausen (type, polished stone axes, flint arrow-heads chipped serrate). The St. Acheul epoch is found in the lowland drift at St. Acheul, Abbeville, Thenné (Somme), Sotteville le Rouen (Lower Seine), Vaudricourt (Pas-de-Calais), San Isidor (Madrid), and on the upland plateaux at Beaumont (Wien), Tilly (Allier), La Gaoterie (Côtes-du-Nord), Valées de la Sause et de la Gulonne (Haute Garonne). The climate was preglacial and moderate. The fauna embraced the hippopotamus, *Elephas antiquus*, and men of the lowest type, *e. g.*, at Neanderthal, Engisheim, Naulette, Denise. The Moustier epoch is found in remains of caves and open places at Moustier (Dordogne), Chez Poure (Corrèze), La Martinière et l'Ermitage (Vienne), La Mère Grande (Saône-et-Loire), Buoux (Vaucluse), Néron (Ardèche), Goudenins-les-Moulins (Doubs), Cœuvres (Aisne), Breches de Genay et Menetreux-le-Pitois (Côte d'Or), in the upper drift at Grenelle, Levallois, Clivichy (Seine), Le Peq (Seine-et-Oise), Montgouillain (Oise). The climate was glacial, cold, and moist. Cave-bears begin to abound, and rhinoceros. Dolichocephalic men of low type, *e. g.*, at Engis and L'Olmo. The Solutré epoch is found in remains of open places, shelters, and caves at Solutré (Saône-et-Loire), Laugerie Haute, Badegols, St. Martin d'Exedeuil (Dordogne). The climate was cold and dry. Brachycephalic and mesocephalic races of men are represented at La Lesse, Cro-Magnon, Laugerie Basse, Baoussé-Roussé, and Solutré. The Madelaine epoch is found in caves and rock shelters at La Madelaine, Les Byzies, Laugerie Basse (Dordogne), Bruniqnel (Tarn-et-Garonne), Massat (Ariège), Montrejeau (Haute Garonne), Aurensan (Hautes Pyrénées), Marceint (Lot), Les Morts, Champs et Puy de Lacan (Corrèze), Le Placard (Charente), Arcy (Tonné), Salève (Haute Savoie), Le Sci (Vaud), Baoussé-Roussé (Viatimille), Furfooz (Dinault). The climate was post-glacial; in France reindeer, aurochs, and urus abounded; in Belgium mammoths, hyenas, and lions. The epoch of Robenhausen is found in the Swiss lake dwellings at Robenhausen and Meileu (Zurich), Mooscedorf (Bern), St. Aubin (Neuchâtel), Concise (Baud), Clair-

vaux (Jura), Wangen (Lake Constance); in dolmens at Morbilan and over the whole of Bretagne, at Argenteuil and La Justice (Seine-et-Oise). Workshops or remains of industrial pursuits are found at Grand Pressigny (Indre-et-Loire), Camp Barbet (Oise), Londinières (Lower Seine), Spienne (Mons), Vibrata (Ascoli); of camps or oppida, at Chassey (Saône-et-Loire), Hastodon (Namur). The climate was very similar to that now existing. Brachycephalic and dolichocephalic races strongly intermixed.

Among recent discoveries in *Zoology* may be mentioned the "new" sea-worms (*Annelida*) discovered by the *Porcupine* expedition at great depths in the Atlantic Ocean, which are being examined and described by Mr. McIntosh.

At the last meeting of the National Academy of Sciences, held at Philadelphia, a paper by Dr. Packard was read regarding a new organ discovered in the king-crab (*Limulus*), and supposed to be renal in its nature, and the homologue of the "green gland" in the lobster, and possibly of the segmental organs of the worms.

Dr. Leconte has published in the *American Naturalist* an additional note regarding the weevils and their classification, read by him at the Philadelphia meeting of the National Academy. He has also published in the *Canadian Entomologist* some judicious remarks on the subject of nomenclature, a matter on which entomologists as well as naturalists generally are much divided.

Another contribution to the subject of mimicry in insects has been afforded by Mrs. Barber, of South Africa, especially as regards the color of the pupa of *Papilio ninus* in connection with the objects on which it was placed, as it appeared to assume a protective resemblance to the leaves or other adjacent organs. The question being raised as to whether some photographic influences had been at work, Mr. Meldola stated that no known substances retained permanently the color reflected on it by adjacent objects, but that there was no difficulty in believing that larvæ might become affected in color by the coloring matter of the food plant, since chlorophyll in an unaltered condition had been found in the tissues of green larvæ. (The remarks were made at a late meeting of the Entomological Society of London.)

In the ninth of a series of valuable papers, communicated by Hermann Müller on the fertilization of flowers by insects, to *Nature*, he shows that butterflies effect the cross-fertilization of Alpine orchids. It seems that from twelve to fifteen per cent. of the orchids of the lowlands are fertilized by Lepidoptera, while from sixty to eighty per cent. of Alpine orchids are fertilized by the same kind of insects. This corroborates, he says, his view that the predominant frequency of butterflies in the Alpine region must have influenced the adaptations of Alpine flowers.

Müller has also shown the wonderful modification brought about in the legs and mouth parts of bees by their efforts in fertilizing flowers.

Lubbock's charming little book on *British Wild Flowers considered in Relation to Insects* has just appeared. He says that while from time immemorial we have known that flowers are of great importance to insects, it is only comparatively late that we have realized how important insects are to flowers. "For it is not too much to say that if, on the one hand, flowers

are in many cases necessary to the existence of insects, insects, on the other hand, are still more indispensable to the very existence of flowers.... There has thus been an interaction of insects upon flowers and of flowers upon insects, resulting in the gradual modification of both."

In another place he adopts the startling and probably correct view that to bees and other insects "we owe the beauty of our gardens, the sweetness of our fields. To them flowers are indebted for their scent and color—nay, for their very existence, in its present form. Not only have the present shape and outlines, the brilliant colors, the sweet scent, and the honey of flowers been gradually developed through the unconscious selection exercised by insects, but the very arrangement of the colors, the circular bands and radiating lines, the form, size, and position of the petals, the relative situations of the stamens and pistil, are all arranged with reference to the visits of insects, and in such a manner as to insure the grand object which these visits are destined to effect."

Lubbock has also continued his observations on the intelligence of insects. He confirms his conclusions presented last year to the Linnæan Society that bees can distinguish colors. He then recounts some experiments on the sense of smell possessed by bees, on the power of recognizing their own companions, and on the different occupations of different bees, mentioning observations which seem to show that the bees act as nurses during the first few weeks of their life, and only subsequently take to collecting honey and pollen. He also records a number of experiments on ants, which certainly seemed to show that whatever may be the case with bees, ants do possess the power of communicating detailed facts to one another.

M. Daresté, in continuing his researches on double or twin monsters, says that after submitting nearly 8000 hens' eggs to the process of artificial incubation, he obtained nearly 4000 monstrosities, but of these only about thirty were double embryos or twin monstrosities. A similar result has been obtained in the case of osseous fishes.

Mr. Mivart has been studying the skeletons of the family of ostriches. He points out that the *Emeu* differs the least from the type of the family, while *Rhea* diverges most on the one side and *Apteryx* on the other, and the axial skeleton of *Dinornis* is intermediate between that of *Cassuaris* and *Apteryx*, with predominating affinities to the existing New Zealand form. A paper on North American mice (*Muridae*) has been published by Dr. Coues.

A not uninteresting zoological fact is the discovery, on the Funk Islands, off the coast of Newfoundland, of bones of the great auk, a species which, although at one time extremely abundant on the northeastern coast of North America, has been extinct for many years. These specimens were found in a guano deposit, but unfortunately are not as well preserved as two skeletons obtained in the same locality a few years ago, one of which passed into the possession of the Museum of Comparative Zoology at Cambridge, and the other into that of the British Museum.

Even more than the usual progress has been made in the subject of *Fish-culture* since our last

reference to it, especially in the better appreciation of the method which is gradually developing itself of hatching the eggs of fish on a very large scale with a very small amount of water. For a number of years past it has been an established principle that it is improper to attempt the transfer of the eggs of fish from one point to another until the embryonic development of the fish has proceeded so far as to permit the eyes to be seen through the egg-shell as two dark specks. After this they can be packed in damp moss (especially eggs of trout and salmon), and kept out of running water, either in a hatching house or in transit, until the full period of development is complete, and the young fish bursts from its envelope. Should this happen while packed in moss or other material, the death of the fish would speedily follow; but if transferred to the water just previously, all the necessary requirements will be met. Indeed, the development would seem to be more certain and entire under the conditions referred to.

To retard the development of eggs, so as to secure their arrival at destination before hatching, it has been customary to keep the mass cool by the application of ice to the top of the box containing them, the melting ice trickling through the interior and maintaining a depression of temperature.

Until recently this method of manipulation has only been made use of for the special purpose of the transportation of eggs, but the idea of employing the principle for general hatching purposes has suggested itself both to Mr. N. W. Clarke, of Northville, Michigan, and to Mr. Seth Green, both of them well known and accomplished pisciculturists. A patent for the device was granted to Mr. Clarke in March, 1874. It is quite probable that in future the method of what may be called "moist development" of eggs will be very extensively employed, since the furnishing of a considerable supply of cold spring water will no longer be required. Indeed, ordinary hydrant water can be used, provided such a quantity of ice be employed as is requisite to keep the eggs at a proper temperature.

The arrangement indicated by Mr. Clarke consists in placing the eggs in layers in trays having either gauze bottoms or those of perforated metal, and arranging these one above the other in a box, perhaps with layers of moss or sponge between, care being taken that there be no undue pressure upon the trays or eggs. Melting ice kept in the top of the boxes, or a small quantity of cold water allowed to trickle from the top, after passing through the moss and over the eggs, drops off below. By varying the temperature the development can be accelerated or retarded, so that, should it be deemed expedient, the hatching of the eggs may be deferred for a month or more beyond the usual time. The practicability of such a retardation has been shown in the experiment of shipping salmon eggs to New Zealand, in which, by arranging the eggs as mentioned, in layers, with moss between, and placing boxes and masses of ice two feet thick alternately in a large ice chest, the whole containing from thirty to forty tons of ice, the eggs were transported successfully, a refrigeration being produced which continued while the ice remained unmelted; and in one instance, after a voyage of six months, the eggs were still

undeveloped and in good condition, hatching soon after being transferred to the hatching troughs in New Zealand.

A further experiment of this kind has just been made, in the shipment of 250,000 salmon eggs, together with a number of those of the trout and char, from Glasgow to New Zealand in the ship *Timaru*, which left the Clyde on the 14th of January last. A similar transmission has also been made to the Cape of Good Hope.

*Botany.*—A valuable paper on the distribution of ferns in North America has just been published by Mr. John H. Redfield in the Bulletin of the Torrey Botanical Club, in which the proportion of species peculiar to one or another part of North America, and those common to certain portions of North America and other parts of the world, are indicated. One important result is the confirmation of Professor Gray's generalization in regard to the close relationship of the plants of Western North America to those of Central and Eastern Asia, this being much more intimate than that which exists between the plants of Eastern North America and Western Europe.

Mrs. Mary Treat has published an account of her investigations upon the bladderwort, a species of the genus *Utricularia*, floating or submerged plants characterized by the attachment of little bladders along the stem, which at one time were believed to be floats to sustain the plant in the water. Mrs. Treat now considers them to be sacs for entrapping various forms of larvæ and other animal forms, digesting them, and converting them into food, as is now believed to be done by plants of the genus *Sarracenia*, *Nepenthes*, *Drosera*, etc.

Chicago has followed the lead of older cities in establishing a botanic garden, the Commissioners of Parks having granted sixty acres for the purpose, and placed the enterprise under competent scientific supervision. It is hoped that in time a large collection of living plants will be brought together, especially of those indigenous to North America. The Royal Gardens at Kew, near London, have been taken as a model for this establishment, and, as at Kew, a herbarium and specimens of the products of the vegetable kingdom will also be brought together.

In the field of *Engineering* the events of the past month are quite noteworthy as bearing an important relation to a number of prominent projects of internal improvement.

The Senate Committee on Transportation, which have been for some time considering the merits of the two rival schemes for opening the mouths of the Mississippi, viz., the Fort St. Philip ship-canal project and Captain Eads's plan for the building of jetties, it is understood, have finally decided in favor of the latter. This decision was doubtless influenced by the report of the board of engineers, appointed some time since to examine the subject, which was an almost unanimous indorsement and recommendation of the jetty system, based upon a careful observation of its operations in Europe, where it has been introduced at the mouths of nearly all the great rivers. Captain Eads has proposed to execute and guarantee the work for \$11,000,000.

Opposed to projects of this nature are the several schemes for hastening the completion of the several unfinished transcontinental railways, the advocates of which are likewise desirous of aid

from the Federal government. Thus far, however, no definite action has been taken by Congress.

Schemes for improving the facilities for water navigation appear just now to be in high favor. The so-called Cape Cod ship-canal, a project that has been mooted since the year 1862, is again on the tapis. The proposed canal is designed to cut the peninsula of Barnstable from the main-land of Massachusetts, and to establish a water communication across Cape Cod between Barnstable and Buzzard's bays. The completion of this work, it is claimed, would cut off a long stretch (about a hundred miles) of dangerous navigation on an exposed coast to vessels bound to or from Boston. The length of the proposed channel would be about eight miles.

Another mooted enterprise is the Maryland and Delaware ship-canal, which is designed to connect the waters of the Delaware and Chesapeake bays by utilizing the Sassafras River. The length of the proposed cut is about seventeen miles, and it is claimed that an open route is practicable, without the use of locks, the waters of the two bays being at about the same level.

While upon this subject it is of interest to note the fact that the government appears to be still intent upon the solution of the problem of an interoceanic water-way across the isthmus that joins North and South America. Two surveying parties under government patronage are now *en route* to this field of action. One of them will survey a tract of land on the Isthmus of Darien, and the other a portion of the Isthmus of Panama. When these are completed, six surveys of the isthmus will have been made.

The Suez Canal Company is lengthening the western mole of Port Said, and clearing away the deposit which on that side of the entrance was fast encroaching upon the somewhat narrow channel leading into the port. It is intended to carry the breakwater on that side out into six fathoms of water. The entire work of improvement will not be completed for some years.

The rapid transit problem is just now attracting much attention in New York. The committee lately appointed by the American Society of Civil Engineers to examine and report upon the merits of this question have had no less than seventy plans presented to them, of which they pronounce all but six to be impracticable. Several meetings of citizens have lately been held for the furtherance of this object. One of the most complete of these projects is the so-called marginal railway upon each side of the city, which would facilitate the removal of freights as well as passengers. This plan appears to find many supporters, but it is objected to it that it is costly, and that it can not be realized until the stone docks, now in course of completion, are finished. A committee of the Civil Engineers' Society have submitted to the Mayor of the city a plan and report on this urgent subject, in which they favor the above-named rapid transit routes along the two rivers, either above or under ground, but consider that until it shall be found feasible to construct them the elevated railway along Greenwich Street and Ninth Avenue should be extended to Harlem, and furnished with a double track.

It will not be amiss to note also the recent establishment of another iron ship yard on the Delaware. The new enterprise is styled the

New York and Philadelphia Engineering and Iron Ship-building Works, and is located at Bordertown, twenty-seven miles above Philadelphia.

An important gathering of parties interested in the construction of a New England line to the coal-fields was lately held at Pine Bush, on the New Jersey Midland Railroad. The proposed new road is designed to connect Boston and New England with the coal-fields and the West, by way of Poughkeepsie. The result of the conference is understood to have been favorable to the enterprise, and it is anticipated that the construction of the necessary links between existing roads will be speedily taken in hand.

It is reported that work has already been inaugurated upon a new railway tunnel under the Hudson River, between New York and Jersey City. The vertical shaft has already reached a considerable depth, and is located near the river shore at the foot of Fifteenth Street, Jersey City, from which point the tunnel will extend across under the Hudson, to or near the foot of Canal Street, New York, and thence up Canal Street to a connection with the Broadway Under-ground Railway. The actual length of the tunnel will, according to the statements of the local press, not be less than 6000 feet. The tunneling work will be attempted upon a plan invented by Mr. D. C. Haskin, the distinguishing novelty of which resides in that, instead of using temporary facings of timber or other rigid material, an air pressure (which may be varied, according to the exigencies of the case, up to fifty pounds to the square inch) alone is relied upon to resist the caving in of the wall or the infiltration of water until the masonry wall is completed.

The statement is made that a contract has been effected to build a railroad on the Crew prismoidal one-track system, described some months since in these columns, from the *dépôt* in Austin, Texas, to some quarries near that city. In a similar connection we glean from foreign sources that a system of steam towage is about to be established on the Bourgogne Canal, in Belgium, over a distance of 150 miles. A single-rail system will be adopted, which possesses many peculiar features. The locomotives will weigh about four tons each, and are expected to draw boats laden with a cargo of 150 tons at the rate of not less than three miles per hour. The system is said to have already been satisfactorily experimented upon for short distances, and the inventor, M. Larmangat, has obtained a concession for its extended introduction for a period of years.

Another interesting trial of the Henderson hydraulic car brake was made a few days since on the Philadelphia and Westchester Railroad, with a special train carrying a large party of engineers and gentlemen prominent in railway matters. The results of the trial tests are said to have been quite satisfactory. The advocates of the hydraulic system for train brakes, it may be noted, claim decided advantages in point of simplicity and economy over the atmospheric systems which are now largely employed.

The railroad journals report the construction of twenty-one and a half miles of railroad for the month of January, 1875. From abroad we have, in connection with railway news, the in-

formation that the Shah of Persia has granted a railway concession to the Russian General Falkenhagen, notwithstanding his existing concession to the Baron Reuter. A protest has been lodged by the last-named gentleman at Teheran, which, it is stated, will be formally supported by the British minister to Persia, under instructions from his government.

The *Engineering and Mining Journal*, which appears to have been at much pains to obtain correct information, gives the following as the production of anthracite coal in 1874:

	Tons.
Total out-put of Wyoming region.....	10,204,764
“ “ Lehigh “ .....	4,712,280
“ “ Schuylkill “ .....	6,714,074
“ “ Sullivan “ .....	36,268
Total production of all the regions .....	21,607,386

These figures show but a slight falling off from those of 1873, notwithstanding the great depression which prevailed during the year in the iron and manufacturing trades that usually consume so large a proportion of anthracite.

The following table, given on the authority of Mr. J. J. Valentine, general superintendent of Wells, Fargo, and Co., is a statement of the value of the precious metals produced in the States and Territories west of the Missouri River, including British Columbia, during the year 1874. The figures show an excess of \$2,142,302 over 1873:

States and Territories.	Value produced.
California .....	\$20,500,581
Nevada .....	35,452,233
Oregon .....	609,070
Washington .....	155,535
Idaho .....	1,880,004
Montana .....	3,439,493
Utah .....	5,911,273
Arizona .....	26,066
Colorado .....	4,191,405
Mexico .....	798,873
British Columbia .....	1,636,557
Grand total .....	\$74,401,055

The following current items in *Mechanics and Technology* are noteworthy:

The Messrs. Baird, of Gartsherrie, Scotland, have built a large establishment exclusively for

the manufacture of coal-cutting machinery. This phase of the coal question appears to be making slow but certain progress abroad.

The experimental trial at Sandy Hook of the altered piece of ordnance, to which subject we made reference in our last month's summary, appears to have terminated satisfactorily. A late message from the President to Congress makes the following allusion: "I herewith inclose copies of a report of the Chief of Ordnance and of a board of ordnance officers on the trial of an eight-inch rifled cannon converted from a ten-inch smooth-bore, which shows very conclusively an economical means of utilizing these useless pieces by making them into eight-inch rifles capable of piercing seven inches of iron. The 1294 ten-inch Rodman guns should, in my opinion, be so utilized."

The Edinson electro-motograph was lately explained and exhibited in operation at a meeting of the Society of Telegraphic Engineers in London, where it produced a marked sensation.

M. Gramme, in a communication to the French Academy, claims to have effected substantial improvements in the electric machines that bear his name, by the employment of the new thin plate magnets of M. Jamin. The new electro-galvanic machines have only one central ring instead of two, and two electro-magnets in place of four in the former machines. They weigh only 390 pounds instead of 1650 pounds.

The discovery of a great *bonanza*, or body of ore, of altogether unprecedented richness is just now the theme of all who are interested in *Mining*. The new developments were made on the famous Comstock lode, and have created a perfect furor in the San Francisco stock market.

Among the deaths of men of science, or of those interested in its advancement, since our last report are those of Professor Zetterstedt, of Sweden, an indefatigable entomologist; Mr. Francis Walker, of the British Museum; Mr. Henry Leste, Mr. H. J. Burkhart, and Mr. Johan H. Platt, known in geographical circles; and Mr. Israel S. Diehl and James S. Roome, in the United States.

## Editor's Historical Record.

### POLITICAL.

OUR Record is closed on the 23d of February. —The business actually accomplished by Congress during the month may be very briefly summarized. The Legislative, Executive, and Judicial Appropriation Bill, appropriating nearly \$19,000,000, was passed by the Senate January 18; also, the same day, the Fortification Bill, appropriating \$750,000, which is the smallest sum devoted to that purpose since the war. The House, February 9, passed the Indian Appropriation Bill, with the Choctaw claim stricken out. The Army Bill, appropriating \$27,000,000, was passed by the House February 19. On the 18th the House passed a bill for the improvement, by the jetty system, of the mouths of the Mississippi River. The Post-office Bill, appropriating \$37,524,361, was reported in the House February 10, an amendment thereto being unanimately adopted repealing the law of 1872 for

additional mail steam-ship service to China and Japan. The Portland, Dallas, and Salt Lake Railroad and Telegraph Bill was rejected by the Senate February 12. The River and Harbor Appropriation Bill was passed by the House February 22.

The new tax bill for the increase of revenues was reported to the House by the Committee of Ways and Means February 10. It proposes to tax all distilled spirits, on which the existing tax shall not be paid at the date of the passage of the bill, \$1 per gallon, whether in distilleries or bonded warehouses or not, and an additional tax of fifteen cents a gallon on all spirits in warehouses, etc., on which the existing tax shall be paid between now and the passage of this act. The tax on imported liquors is to be \$2 50 a gallon. The tax on tobacco is to be increased from twenty to twenty-four cents a pound. The ten per cent. horizontal reduction on manufactured goods is

of this story, which has two positive attractions, of themselves no mean recommendation—it is short and simple. In addition to this, it is dramatic, and even highly wrought; and though some of the incidents in other hands would seem too melodramatic to be natural, they do not produce

this impression in the author's skillful narration. The substructure of the story is one common to both fiction and the drama of real life: it is the story of Elsie's finding her true soul in an experience of bitter sorrow, the fruit of her own willful and wayward temper.

## Editor's Scientific Record.

### SUMMARY OF SCIENTIFIC PROGRESS.

OUR astronomical record begins with a list of two new members of the solar system, *i. e.*, asteroids Nos. 141 and 142, discovered respectively by Paul Henry at Paris and J. Palisa at Pola, Austria, and comets (1875) Nos. I. and II., discovered respectively by Holden at Washington and by Stephan at Marseilles. Of these comets the first is the famous Encke's comet, whose motions were for a long time supposed to be retarded by an ethereal medium; the latter is the comet known as Winnecke's, whose short period of revolution entitles it to special distinction.

The continuation of the great star charts begun by the Paris Observatory, and generally known as Chacornac's, has been undertaken by Leverrier, who recently presented to the Paris Academy the first of the seventy maps that will complete the work. Astronomers will be pleased to learn that the donation of seven thousand dollars made by the banker Bischofsheim to the Paris Observatory for the purpose of securing a new meridian instrument has at length been paid into the hands of the maker (Eichens) as a first installment of the full price.

The expeditions for the observations in India and Siam of the total eclipse of the sun have already arrived at their destinations, and valuable results are anticipated, owing to the unusually long duration of the totality.

The gold medal of the Royal Astronomical Society has been awarded to Professor D'Arrest, of Copenhagen, for his researches among the nebulae.

We are now in possession of accurate information from all the American parties for the observation of the transit of Venus. At Pekin Professor Watson and Professor Young observed through a cloudy sky the first and second contacts, and made forty-four photographs during the first part of the transit. Operations were then interrupted by clouds until about an hour before the end, when the photographic work was resumed, and fifty more pictures taken. The third and fourth contacts were also observed, and measures of cusps taken with the double-image micrometer.

The first contact was sixty-eight seconds later and the second contact was seventy-five seconds later than the computed times, while the third and fourth contacts were forty-three and sixty-five seconds earlier than the predictions. This indicates for the solar diameter a smaller value than the one used in the predictions, and agrees nearly with that deduced by Leverrier from previous transits.

It was pointed out by Mr. Hill, of the American Nautical Almanac office, in his memoir on the transit, that the English predictions would be "considerably in error," on account of the adoption of an apparent diameter for the sun

which was deduced from meridian observations only, and we may note that nearly all the English observers have reported an error in the neighborhood of two minutes in their predicted times of first contact. It seems to be finally settled, if indeed there was any doubt about it previously, that different apparent diameters must be used for the sun in reducing meridian observations, and for such observations as eclipses and transits of the inferior planets. This is quite analogous to the fact that the moon's diameter from occultations is considerably smaller than that derived from meridian observations. Professor Watson also notes certain evidences of an atmosphere surrounding Venus, and from his observations at third contact obtains an approximate value for its depth.

The American party at Kerguelen Land, under Lieutenant-Commanders Ryan and Train, has been only partially successful. Neither of the internal contacts was observed, but some photographs were taken. The English party on the same island observed the ingress and egress, the latter observation being satisfactory. All the English photographs were poor. The day was generally cloudy, but enough have been secured to compensate the observers for their devotion, as this station is peculiarly valuable. From the party at Chatham Island, under Assistant Edwin Smith, of the Coast Survey, we learn that nothing valuable in the way of observations of the transit could be obtained, on account of clouds. It must be remembered, however, that each of the parties has made important geographical, magnetic, and other determinations, and that no one of our expeditions will return without completing its work of this kind, which work has a value quite independent of its bearing on the main question of the sun's parallax.

On the whole, the success has been marked; and although only one party (Professor Watson's) observed *all* the contacts, and although only one (Professor Peters's) obtained a very complete set of photographs, yet the *ensemble* of the observations of the Americans alone would suffice for an extremely accurate determination of the parallax.

The experience gained in these expeditions will be turned to good account in 1878 and in 1882, in which years transits of Mercury and Venus occur, both being visible in America. The reports of all the parties indicate satisfaction with the apparatus provided for them; and in the matter of photographic arrangements the American outfits were particularly good, both theoretically and practically, and this perfection reflects great credit on the gentlemen who had these preparations in charge. The highest testimonial has been offered by the Transit of Venus Commission to Dr. Henry Draper as an

acknowledgment of his great (and gratuitous) services in perfecting the practical details of the photographic processes—a charge for which he was peculiarly fitted by his long experience in such researches.

Detailed accounts of the physical phenomena of the transit will not be available for some time; but we note the remarkable observations of Janssen in Japan and De la Grye at Campbell Island, which declare Venus to have been seen projected against the sun's corona while yet some distance from the sun's disk. Preliminary reports indicate that Professor Watson's account of the atmosphere of Venus will be corroborated by several good observers. It may likewise be noted that the question as to the existence of a satellite to Venus is now finally settled in the negative.

We desire to call the attention of astronomers to the ephemeris of twelve close circumpolar stars for 1875 published in the *Monthly Notices of the Royal Astronomical Society* for January, 1875, by Professor Pritchard, Director of the Oxford Observatory.

These are selected for the determination of the azimuthal error of meridian instruments, and their use will be a convenience to observers, and a step in advance in observatory work. Leverrier has presented to the French Academy of Sciences an account of his researches on the theories of the eight principal planets, which he has now perfected. His tables of Saturn are nearly completed, and the tables of Uranus and Neptune will be constructed as soon as the theory is compared with observations. Thus in a few years M. Leverrier will have presented to astronomy the theories and the tables of all the major planets, the whole forming a larger contribution to theoretical astronomy than it is given to a less industrious astronomer than M. Leverrier to make.

Encke's comet was detected with the great refractor of the Naval Observatory on January 26 by Professor Holden and Mr. Tuttle, and with the Marseilles reflector by Stephan on January 27. It is extremely faint, and was not to be seen by small instruments. The theory of this comet, on which Encke spent so much labor, is in a surprising state of perfection, Von Asten's ephemeris being in error less than 15 seconds of arc. Winnecke's comet has also been successfully sought for, and observed at the Harvard College Observatory. Mr. Burnham, of Chicago, the industrious observer of double stars, has given a new proof of his assiduity in the discovery of a companion to  $\beta$  Leporis, which is a very difficult object. Mr. Burnham's six-inch equatorial bids fair to become as famous as Mr. Dawes's eight-inch.

In *Physics* some noteworthy papers have appeared. Among these may be mentioned Professor Nipher's elaborate investigation upon the mechanical work done by a muscle before exhaustion, the data given being more accurately determined than those published by him three or four years ago, and adopted as a basis for calculation by Professor Haughton, of Dublin.—Cornu's description of a new measuring instrument for minute quantities, called a reflection lever, which consists of a beam like a balance beam standing on four points, two on the line where the knife edge is usually placed, the other two at

the ends of the beam, all four being accurately in one plane. To the centre of the beam is attached transversely a mirror, by means of which any displacement from the horizontal may be detected and measured by the reflected image of a distant scale. The readings are made with a telescope.—Terquem's historical note, in which he calls attention to the fact that the generally received notion that Faraday was the first to liquefy the gases is incorrect, since Guyton de Morveau in 1799 liquefied ammonia gas in a bath of calcium chloride and snow.—Lubarsch's paper on fluorescence, in which he concludes from his investigations (1) that for each fluorescent substance there are only certain rays of light causing fluorescence; (2) that the color of the fluorescent light depends on the rays of incidence, and follows Stokes's law; and (3) that the most refrangible fluorescent rays produced by sunlight correspond to that place in the spectrum where the liquid shows its maximum of absorption, providing its fluorescence proves a simple one when examined by prismatic analysis of the linear spectrum.—Riche and Bary's, upon the sources of illumination utilizable in photography, in which they give the results of their examination of eight different sources of light, viz., the oxyhydrogen light, the Drummond or lime light, zinc burning in oxygen, magnesium in air, a current of nitric oxide gas burning in a globe of carbon disulphide vapor, a jet of nitric oxide on a test tube containing carbon disulphide, a jet of oxygen on the same, and a jet of oxygen on a test tube containing sulphur. The eight lights were photographically intense in the order above mentioned, the last being eight times as strong as the first.—Cornu's valuable paper on the velocity of light, in which he gives the results of the new measurements made between the Paris Observatory and the tower of Montlithéry, twenty-three kilometers distant, under the direction of the council of the observatory. As a mean of 504 experiments, he finds the velocity of light *in vacuo* to be 300,400 kilometers, or 186,700 English miles, with a probable error below one-thousandth in relative value. This gives for the solar parallax, as found by the equation of light,  $8.878''$ , and by the phenomena of aberration,  $8.881''$ .—Lockyer's paper before the Royal Society upon his new map of the solar spectrum, the portion now presented being that extending from wavelengths 39 to 41. It is constructed on four times the scale of Angstrom's "Spectre Normale," the number of lines being increased—over this, which contains but 39—to 518, of which 416 have been actually identified, and the largest number of these, 163, assigned to cerium.—Huggins's note on the spectrum of Coggia's comet, which presented in the spectroscope three distinct spectra: (1) a continuous spectrum coming from the light of the nucleus; (2) a spectrum consisting of bright bands; and (3) a continuous spectrum accompanying the gaseous spectrum on the coma, and representing almost entirely the light of the tail.—Pole's experimental determination of the change in the pitch of a note which takes place when the sounding body is moving: a repetition of the experiment of Buys-Ballot. He used for the purpose locomotive whistles, and concludes that the most common interval by which the tone is lowered

when two trains pass each other is a third, either major or minor, corresponding to a speed for each of between thirty-five and forty miles an hour.—Tyndall's communication to the Royal Society on acoustic reversibility, in which he discusses the curious results obtained at Villejuif and Montlhéry in 1822, when cannonading at the latter station was heard at the former, but not the reverse, and concludes that Montlhéry must have been surrounded by a highly diacoustic atmosphere, while Villejuif was in an atmosphere acoustically opaque. He supports this position by ingenious experimental evidence.—Mercadier's, upon the law of the influence of the variation of the dimensions of a tuning-fork upon its vibrations, in which he shows that the number of vibrations is independent of the breadth, is directly proportional to the thickness, and is inversely proportional to the square of the length. From these laws it becomes possible to calculate within one or two per cent. the dimensions of a fork necessary to give any required number of vibrations.—Guthrie's curious paper upon hydrates (or hydrated salts) formed at a low temperature, which he calls cryohydrates. He shows, contrary to the generally received opinion, that the minimum temperature attainable by mixing ice with a salt is very independent of the ratio of the two, and of their temperature, and of the state of division of the ice. The temperature of a mixture of ice and a salt is as constant and precise as the melting-point of ice. He observes that the cryohydrates of the nine salts which potassium, sodium, and ammonium severally form with chlorine, bromine, and iodine are formed at temperatures ranging from  $-28^{\circ}$  to  $-11^{\circ}$ . Thirty-five salts were examined in this way, and it was found that the temperature at which the cryohydrate is formed is precisely that obtained by mixing the given salt with ice.—Edlund's complete paper on the nature of electricity, in which he maintains with great ability the theory that electricity is identical with the luminiferous ether, and in which he deduces most, if not all, electrical phenomena from this supposition.—And Mixer's note, calling attention to the remarkable increase in length of the spark of the Holtz machine by placing a minute gas jet between the balls affording the sparks. In this way the spark which before was less than ten inches became more than twelve, a brass ball having only a trifling influence of the same sort. In this connection may be mentioned the large Gramme magneto-electric machine recently received from Paris by the University of Pennsylvania, at Philadelphia, and which gives very remarkable results when used for producing the electric light.

The *Chemistry* of the month has been active, as is usual during the winter. Michaelis and Wagner have shown that while two bodies having the empirical constitution of ethyl sulphite are known, yet only one of these is the true sulphurous ether, as proved by its mode of preparation. In this latter compound the ethyl groups are both united to the thionyl by oxygen, and hence the sulphur in the radical must be a tetrad. Zimmermann has made a similar research on ethyl phosphite, and comes to the conclusion that phosphorous acid is a trihydroxyl derivative of phosphorus, and that in the ether neither of the ethyl groups is directly united to

the phosphorus, since in that case ethyl-phosphinic acid would appear as a decomposition product. From this theoretical position the author proceeded to prepare tri-sodium phosphite, which he obtained only as a thick sirup, but in which the ratio of the phosphorus and the sodium could be determined.—Terreil has proposed a new method of producing pure nickel salts on a commercial scale without the employment of either hydrogen sulphide or ammonia. His process consists of four operations: 1st, solution of the nickel in acid; 2d, precipitation of the copper by iron; 3d, peroxidation of the iron, and transformation of the metals into sulphates; and 4th, precipitation of the iron by barium carbonate and crystallization of the pure nickel sulphate.—Godeffroy has discovered that cesium salts give precipitates readily with quite a number of metallic chlorides, thus making the reaction with antimonous chloride previously observed by him quite general. The reaction he has observed with chlorides of the following metals, all the precipitates being crystalline: iron, bismuth, zinc, cadmium, mercury, copper, manganese, and nickel. Rubidium salts behave similarly.—Wagner and Saytzeff have succeeded in synthetically producing a new amyl alcohol. Of the eight isomeric amyl alcohols pointed out by theory, four are primary, three are secondary, and one is tertiary. Of these, again, five were previously known; the new one now discovered is the sixth. It is di-ethyl-carbinol, of course a secondary alcohol, and is produced by the action of zinc-ethyl on ethyl formate, the reaction being foreseen by theory before it was realized as fact.—Bender has analyzed the gas given off by apples when they are exposed to the air in a finely divided state. The experiment was made on gas prepared by heating the apples, cut in small pieces, in a flask filled with water from which the air had been previously expelled by boiling. At  $60^{\circ}$  gas bubbles appeared, and became rapid at  $100^{\circ}$ . Four apples yielded about 100 cubic centimeters of gas, composed in the first experiment of 40.20 per cent. of carbonic acid, 0.43 per cent. of oxygen, and 59.37 per cent. of nitrogen. In subsequent trials more care was taken to exclude the air, and the gas collected consisted of 31.07 per cent. of carbonic acid and 68.93 per cent. of nitrogen. The author thinks the carbonic acid the result of a continuous fermentation going on within the mass.—Kreusler has negated the assertion of Raoult that pure cane sugar in aqueous solution, without the presence of air or ferments, but solely by the action of light, became inverted and yielded glucose. Solutions of various strengths were sealed up *in vacuo* and were exposed to direct sunlight whenever possible for eleven months. Not a trace of glucose could be detected. In presence of air, however, some glucose is formed; and to this fact the author attributes the results obtained by Raoult.—Vogel has continued his researches on the effect of coloring matters on the sensitiveness of colloidion to the various rays of the spectrum, and now concludes that the action of the coloring matter may be quite different, according to the nature of the silver salt employed. Naphthalin red, used with silver bromide and silver chloride, gives both increased sensitiveness to yellow rays; while fuchsin acts very differently, being with silver bromide in complete



accordance with its absorption spectrum—which is similar to that of naphthalin red—but giving to silver chloride but little increased delicacy for yellow rays, but much for the violet ones. The same fact he has observed to be true of certain colorless bodies; morphine, for example, increasing the delicacy of silver iodo-bromide not only for the blue and violet, but also for the green, while silver bromide is completely unaffected by it. Hence, to produce the effect he at first described, three things are necessary: 1st, the coloring matter must optically absorb the identical color which the collodion is to be made sensitive to; 2d, it must unite with any free bromine or iodine; and 3d, it must not decompose silver nitrate, since in that case it would injure the preparation of the plates. The so-called night-blue, for example, possesses the first and third conditions, but fails on the second. It has no action, therefore, on the sensitiveness to light of different colors of silver salts.—Hofmann has examined a new red coloring matter, brought into commerce within a few months under the name of eosin. It has an exceedingly rich tint, recalling that of rosaniline, but inclining more to a garnet red. In mass it is a brown powder with a greenish metallic lustre. Upon investigation it proved to be a bromine-derivative of one of the remarkably fluorescent bodies discovered by Baeyer, and called fluorescein, obtained by the action of phthalic oxide upon resorcin. Its composition proved it to be a phthalein of dibromoresorcin, and this was confirmed by its successful synthesis, by the action of bromine on fluorescein.—The crude acids of the native petroleum of Wallachia have been examined by Hell and Medinger. The second run of the still yields to caustic soda an acid which, after solution in water and treatment with sulphuric acid, collects as an oil on the surface, and is called "mineral oil" by the workmen. This is a mixture of several acids, probably homologous, but their separation is exceedingly difficult. An ethyl-ether of one was finally obtained, whose saponification yielded the acid as a colorless liquid of specific gravity 0.982. It is a weak acid, its sodium and potassium salts being of the consistency of soft soap. It is a fatty acid, but does not belong to either of the three series of fatty acids now known.—Carey Lea has published a valuable modification of the usual iron test for hydrocyanic acid. If a little uranic acetate be added to a solution of a ferrous salt, there is thrown down in presence of a soluble cyanide a purple precipitate. One five-thousandth of a grain of hydrocyanic acid gives, when thus treated, a perfectly distinct reaction. He also recommends the use of ammonio-ferric citrate, in connection with ferrous salts, in the Prussian-blue test. In this way one two-thousandth of a grain of potassic cyanide may be detected, a delicacy far greater than has been claimed for this test.—Gautier has effected an important synthesis likely to prove of practical value. He has succeeded in uniting two molecules of dextrose by abstracting from them a molecule of water, thus forming a substance having the composition of the compound sugars. The result was accomplished by the action of hydrochloric acid gas on the dextrose dissolved in absolute alcohol. A substance was obtained which was more analogous to gum and dextrin than to sugar in appearance and

taste, but which yielded again a simple sugar on heating, though this appeared not to be dextrose again, but to be analogous to, if not identical with, inosite.

*Mineralogy.*—A new mineral, as yet imperfectly described, has been found at the Clara mine in the Black Forest, and hence termed *clarite*. Its constituents are copper, antimony, arsenic, and sulphur, or the same as for tetrahedrite, from which it differs, however, in crystalline form.

The active mineralogist of Saxony, August Frenzel, has described another new species under the name of wappelerite. It is a hydrous arseniate of lime, containing some magnesia, and is closely related to pharmacolite. It occurs in crusts, but also in crystals with monoclinic habit. Its locality is Joachimsthal, in Saxony.

According to Knop, koppite is a new mineral standing near pyrochlore, although its character seems somewhat doubtful. It is found in a granular limestone near Schelingen, Kaiserstuhlgebirge, in Baden. It looks much like pyrochlore, but seems to differ from it most in the absence of fluorine, as also of thorium and titanic acids.

*Ethnology.*—The Alaska Commercial Company has presented to the National Museum at Washington eight mummies from a cave in the Aleutian Islands. They resemble very much in form those from Peru, being doubled up with the knees close to the chin, and wrapped in skins. They were formerly hung up in the cave, like hams in a smoke-house; but the loops decaying, they were all found lying on the floor. The patriarch, in addition to his skin wrapping, is in a wooden frame resembling a hay-rack in a stable, and has a hoop like a cheese-box around the bottom of his frame. One of the small children has a little frame somewhat like that of the patriarch.

A communication made by Dr. Prunières (de Marvejols) before the meeting of the French Association for the Advancement of Science, at Lille, treated of the curious artificial perforations common among the neolithic skulls of the Lozère. These perforations vary, in the pieces exhibited, from an inch to an inch and a quarter in diameter. Near the perforated skulls were found rings of cranial bone, which seemed to be designed as amulets. These were evidently worked with flint tools. The men of the polished stone age practiced trepanning; for if some of the skulls appear to have been perforated after death, others were treated during life, and the patients had lived for years afterward. One skull presented three perforations made near each other upon a line fore and aft. There is no distinction of age, the excisions occurring upon infants as well as upon adults. The motive of this strange custom was either medical or superstitious. They probably attributed disease to supernatural agencies. The evil spirit escaped through the opening made by the sorcerer, who wrapped the operation in a shroud of mystery by preserving the detached piece as a precious relic. From the appearance of these facts reported by the learned archæologist of Lozère, he said that a new light had been shed upon the intellectual state of man in the polished stone age. It explained his religious conceptions, and confirmed the discovery of the figure of a goddess in the

caverns of Baye (Marne). M. Broca remarked that perforated skulls were also found at the last-named station. Among the skulls dug up by General Faidherbe were found two in the same condition. Dr. Chil, from the Canary Islands, said that perforated skulls had been found in the ancient burial-places of his country. Notice was also called to an example from the grotto of Lorde, upon which M. Hamy and M. Chaplain-Duparc gave some interesting details. A similarly perforated or trepanned skull was found by Mr. E. G. Squier among some ancient Peruvian crania collected by him.

The Rev. A. H. Sayce, M.A., has read a paper before the Society of Biblical Archaeology of London on "Human Sacrifices among the Babylonians." The evidences of this awful rite "are found in two Accadian tablets, one of which declares the immolation to have a vicarious efficacy, especially in the case of children when offered as atonements for the sins of their parents." The Palestine Exploration Fund report the most cheering progress in their work, especially as to the identification of new sites and the examination of former investigations.

*Microscopy.*—Professor Leidy has recently called attention to the parasite that lives in the proboscis of the house fly, a thread-worm—*Filaria muscæ*—first discovered by the well-known naturalist Mr. H. J. Carter in the house fly of India. Dr. Leidy found it in numbers from one to three in about one fly in five. Dr. Diesing has referred the parasite to a new genus, with the name *Habronema muscæ*. The singular position in which the worm lives suggests that there are many unsuspected places we may have to search in to find the parents or offspring of our own parasites. In a communication to the French Academy in November last, M. Duval called attention to a former paper in the *Journal de l'Anatomie*, September, 1874, states that he has found a means of explaining both the doctrines of the panspermists and the heterogenists. The explanation lies simply in the statement that he has discovered that the various so-called minute organisms (such as ferments) are simply one and the same organism, which has the power of becoming differently developed. He asserts that he has proved by experiment that the transformation of yeasts is possible, and that the specificity of action of different ferments is a purely relative phenomenon, dependent rather upon the composition or the state of the media than upon the proper constitution of these same organisms.

A paper of some interest on the *sphæraphides* in plants appears in the *Monthly Microscopical Journal* for December, 1874. The author states that in *Urtica dioica*, *U. urens*, and *Parietaria diffusa* the leaf blades are studded with sphæraphides about  $\frac{1}{32}$  of an inch in diameter, composed mainly of carbonate of lime; smaller forms, with projecting crystalline points, and composed of oxalate of lime, occur in the fibro-vascular bundles of the leaf; the same two kinds abound in the leaf and pith of *Humulus lupulus*.

In a paper read at a late meeting of the Zoological Society, Professor Gulliver stated that in the mammalia, the largest red corpuscles of the blood are those of the two elephants, the two-toed sloth, and the walrus. In the human subject the corpuscles are exceeded in size by those of only eight or nine exotic mammalia, and not

equaled in size by the corpuscles of any British animals of the class. And this fact, independently of its physiological interest, may prove important in medico-legal inquiries, since by it alone, as Dr. Joseph G. Richardson states (and as we have already noticed in this journal), he has correctly distinguished dried stains of human blood from those of the ox and sheep. M. Onimus, in a recent communication to the Société de Biologie of Paris, states that by electrifying the eggs of the frog the development of those which are in connection with the negative pole will be accelerated, while the hatching of those in connection with the positive pole will be either retarded or stopped. In an abstract of a paper by Dr. Hollis on "What is a Bacterium?" in the January number of the *Monthly Microscopical Journal*, the limitations we should place on the term Bacteria are summed up: 1. They strictly form part of the vegetable kingdom. 2. The name ought to be restricted to those minute rod-like hyaline bodies, *B. termo* and *B. lineolata* of Cohn, with a more or less rapid to-and-fro motion. 3. We must always associate the presence of true Bacteria (especially the *B. termo*) with putrefactive or analogous changes in organic liquids. In a paper read before the Royal Society, November 26, 1874, by Professor C. Wyville Thompson, the origin of the calcareous formation known as "globigerina ooze" is attributed to surface organisms, as advocated by the late Professor Bailey, of West Point, and others; and in partial proof that all the organisms entering into its composition are dead, the statement was made that "there are never spines on the globigerinæ from the bottom, even in the shallowest water." This is a mistake, as the spinous globigerinæ were quite abundant in the soundings from the Gulf of Campeche made during the summer of 1874, during the cruise of the United States steam-ship *Fortune*, from depths of between 64 and 210 fathoms. It is a remarkable fact that all of the original articles of the last (January, 1875) number of the *Monthly Microscopical Journal*, of London, are contributed from the United States, and in the same number we find the proceedings of the new Memphis Microscopical Society. The perfection of objectives is yet far from being attained, as we now have Mr. Toller, with his new system  $\frac{1}{10}$ , surpassing the best work hitherto even with his  $\frac{1}{20}$ ; and Messrs. Powell and Leland at a recent soirée of the Royal Microscopical Society exhibited a  $\frac{1}{2}$  and  $\frac{1}{3}$  on a new formula, the first resolving *Amphipleura pellucida*, and the other showing *Pleurosigma angulatum*  $\times 4000$ , under the most difficult test of direct light, in a remarkably magnificent manner, the heads standing out like minute spheres. At the same meeting Messrs. Beck exhibited a large microscope in solid silver, fitted with every conceivable piece of apparatus, all in silver. This luxurious work of art, intended for an American microscopist, cost some £500.

*Zoology.*—In a memoir on the geographical distribution of insects in New Hampshire, Mr. Scudder refers to the striking variety in its animal life, owing to the alpine peaks of the White Mountains. "Its northern and southern portions belong to distinct continental faunas; above the forest growth of its colder region rise some of the highest elevations east of the Rocky Mountains, and these bleak altitudes support a vegeta-

tion and an assemblage of animals intimately resembling those of Labrador and Greenland, while sixty miles to the south flourish animals characteristic of sub-tropical climates." Representatives of four faunas—the Alleghanian, Canadian, and a sub-alpine and alpine—are found within the State limits. A map showing the distribution of the two first-named faunas, and another of the alpine and sub-alpine districts of the White Mountains, accompany the paper, which is extracted from the first volume of the final report on the geology of New Hampshire.

The anatomy of the common mussel (*Mytilus edulis*) has been re-examined by M. Sabbatier, of France, while the development of the cuttlefishes has been studied with great thoroughness by M. Ussow, a Russian naturalist. He has examined the structure of the female sexual organs of several species of cephalopods, together with the mode of formation of the ova, and in four species traced the embryonal development from the fecundation of the egg up to the complete development of the young.

Although the anatomy of the earth-worm has been studied with great minuteness by Claparède, new discoveries regarding the circulation of the blood and the nervous and generative systems in some forms have been made by M. Perrier.

The metamorphoses of the itch mite and other acarians have been studied by M. Mégnin, and for his results the author received a prize offered by the French Academy.

The mode of development of the newt, frog, slow-worm, and lizard, as well as the snakes, has been studied by Mr. Tomes, and an abstract of his conclusions read at a late meeting of the Royal Society of London.

The new year begins in *Ornithology* with a bulky octavo volume by Dr. E. Cones, entitled *Birds of the Northwest: a Hand-Book of the Ornithology of the Region drained by the Missouri River and its Tributaries*. It is one of the miscellaneous publications of Hayden's Geological Survey of the Territories. It consists of detailed tables of the synonymy, with quite full remarks on the history of each species. It also contains a monograph of the North American *Laridae* (gulls), and of the North American *Columbidae* and *Podicipidae*, i. e., the loons and other diving birds.

A new scheme of the arrangement of the mammalia has been brought forward by Alfonse Milne-Edwards.

In a recent prize work on the fauna of the southern regions of the globe by M. Alfonse Milne-Edwards, illustrated by one hundred and seventy-five plates, the author discusses in one part the animals of the antarctic regions. He examines the value of the characters on which ornithologists have based specific differences, and shows that some pretended species should be regarded as only local races or even individual varieties. He does not adopt the hypothesis that the diversity of zoological types is due to the influence of surrounding conditions, though he acknowledges that animals may gradually acquire differential characters which they may transmit to their descendants, thus constituting fixed secondary species incapable of breeding together. The work gained the Bordin prize of 3000 francs. M. Harting, of Utrecht, has gained a prize of 2000 francs for his researches

in synthetic morphology on the artificial production of some organic calcareous formations. M. Marey has received a prize of 10,000 francs for his works on the circulation of the blood, animal mechanics, and other subjects. MM. Pouchet, Perrier, and Samson and Deshayes have also received prizes from the French Academy for zoological and physiological works. In this way the French people honor their scientific men, and encourage original research.

*Agriculture and Rural Economy.*—A very encouraging indication of the progress of agricultural science is to be found in the establishment of new experiment stations, of which several are lately announced. In Belgium the "Association pour le Fondation de Stations Agricoles," a society of agriculturists and others, was, some time since, successful in establishing a station in connection with the agricultural school at Gembloux. The same society has decided to found another station at Gand. For the support of this, as of the one at Gembloux, large appropriations have been made by the government.

The association of manufacturers of alcoholic spirits in Germany have organized an experiment station at Berlin for scientific investigations relating to their branch of industry. Somewhat over 3000 thalers (about \$2200 gold) have been pledged for the purpose, of which 1100 thalers is the sum of the first of a series of annual subscriptions.

The beer-brewing interest is also laboring to secure the aid of science, and a station for the purpose is already in operation in connection with the agricultural school at Weihenstephan, in Bavaria. Investigations of water, barley, malt, hops, and other materials, as well as of instruments used in beer-making, the carrying out of theoretical studies, and the giving of advice useful in this branch of manufacture, are to constitute the labor of the station.

Among the most valuable of later investigations are those on the nutrition of animals. During the past fifteen years some hundreds of feeding experiments have been made with oxen, cows, sheep, goats, horses, swine, and other animals. Among the questions investigated have been the effect of fodder upon milk production, the digestibility of various food materials, and the functions of the ingredients of the food, such as albuminoids, carbo-hydrates, and fats, in the formation of flesh and fat, and in the production of animal heat and muscular force.

The lately opened guano deposits in the province of Tarapacá, in Southern Peru, appear, from the inspectors' report to the Peruvian government, to contain guano not only in immense quantities, but also of remarkably good quality. One sample contained 12.15 per cent. soluble phosphoric acid, 14.67 total phosphoric acid, and 15.67 per cent. actual ammonia. Fourteen of the best samples averaged 9.52 soluble phosphoric acid, 15.31 total phosphoric acid, and 10.82 actual ammonia.

In the department of *Engineering* it is of interest in our monthly summary to record the fact that the fortunes of the East River Bridge, New York, have been transferred into other hands. The new Board of Directors has already had several meetings, at which questions of future policy and the prospects of the enterprise were fully discussed. The indications for

the speedy completion of the work were probably never more favorable than at the present time. It was declared that prices have so materially declined that the iron and trestle work will cost less than fifty per cent. of the original estimates, while in addition to this the severity of the present winter, by blocking the river with ice and seriously impeding its ferriage, has influenced a very general public opinion in its favor. Some \$5,000,000 have already been expended upon it, and the completion of the work will require yet \$8,000,000. The recent suggestion of the importance of a permanent bridge across the Niagara River at Lewiston, New York—which, by-the-way, will have to be effected in the face of great natural difficulties—has called forth a proposition from Messrs. Clarke, Reeves, and Co. to undertake the work as soon as a proper company shall be formed for that purpose. Their proposition looks to the building of a single-span bridge, with a span of 600 feet. The structure is designed for a double-track railway 120 feet above the level of the river, and for a carriage-way beneath this road a distance of 75 feet. The estimated cost is \$800,000. The construction of a canal from Lake Michigan to the Mississippi River has of late been strongly advocated. Its supporters urge in its behalf that it would greatly lessen the cost of conveying the produce of the Upper Mississippi Valley to the sea-board, declaring, moreover, that one-half the present cost of transportation is incurred in sending it by rail across the narrow belt of land between the river and the lake.

In *Technology* we note that the stated annual meeting of the American Iron and Steel Association was held in Philadelphia on the 11th of February last, under the presidency of Mr. Samuel J. Reeves. The most important feature of the meeting was the presentation of the report of the secretary, Mr. James M. Swank, which, as usual, contained a very thorough review of the condition of the iron trade, and much valuable statistical matter. From this report we present the following abstracts as bearing upon the present state of our iron industries:

Of 696 completed furnace stacks in the country, 472 had reported to the association up to the 10th of last February their condition on the 1st of January last. Of these 472 stacks 260 were then in blast, and 212 were out of blast. In addition to these 212 out of blast, 37 of the 260 then in blast were announced to be blown out in January. This would give on the 1st of February 249 furnaces out of blast, 223 in blast, and 224 to be heard from. Of these non-reporting furnaces it is safe to assume that one-half were out of blast on the 1st of February. Fully one-half of all the furnaces in the country were therefore out of blast on the 1st of February—a degree of depression not previously reached since the beginning of the panic.

Our total product of rails in 1874 is estimated at 450,000 net tons; importation, 100,000 tons.

The production of Bessemer steel in the United States since 1867 is given as follows:

Years.	Tons.	Years.	Tons.
1867.....	3,000	1871.....	45,000
1868.....	8,500	1872.....	110,500
1869.....	12,000	1873.....	157,000
1870.....	40,000	1874 (estimated).....	175,000

There are eight Bessemer steel and steel-rail

establishments in this country which are now in operation, and two others are being built.

Returns of the production of pig-iron in the United States in 1874 indicate that it aggregated about 1,900,000 tons net, or about two-thirds of the product of the years 1873 and 1872. Of this amount Pennsylvania, with 262 stacks, makes nearly one-half.

At the last meeting of the Massachusetts Institute of Technology, Mr. George Woods, of Cambridge, Massachusetts, the well-known organ-maker, described his new process for drying lumber and other materials in a natural and rapid manner. The usual method has been to force a current of air through a room heated to about 150° F.; the ventilation in this must necessarily be imperfect, and the drying unequal, as currents will inevitably be established, causing some portions to dry before others, and a consequent shrinkage and springing of the wood; the surface will dry first, with shrinkage, and the interior parts afterward, with a different shrinkage, causing inequalities in the wood. He exhibited several specimens of black-walnut, dried by the old and by his process, showing the curved edges and irregular surfaces in the former, and the perfectly straight outlines and uniformity of texture in the latter. In the usual drying-rooms the steam-pipes are carried under the lumber, and the air forced to pass over it. Thus the outside is always dried first, and the internal air may be so damp and so soon saturated with moisture as not to affect the interior parts. He uses steam-pipes arranged in the same manner underneath the lumber, but the moisture which is driven by the heat into the room, instead of being carried off by the ventilating current, with great consequent loss of heat, is condensed by the cold of water constantly running in pipes through the chamber; the condensed moisture runs down the pipes into a grooved channel below, by which it flows out of the chamber. Thus the moisture is gradually, uniformly, and constantly withdrawn from the wood, which dries regularly, without strain on the outside or cracking on the inside. He saves three-quarters of the time required, and all his heat, which in ordinary rooms passes off with the ventilation; and the moisture, once out, can not get back, as it may in the usual processes. This method is applicable to laundries, to the drying of cloths and wools in factories, and to any material, organic or inorganic, which requires to be dried speedily and uniformly. He has taken 136 gallons of water in seven days from 9000 feet of lumber, as follows: the wood was walnut and cherry, mostly one and one and a half, with some two inches thick; on the third day after the steam was let on the water came away at the rate of a gallon in forty minutes, till, on the seventh, 136 gallons had been drawn off, and the water ceased running, which indicated that the process was completed; the lumber was found thoroughly dried, and was at once cut up for use. The process is natural and simple, being merely the removal of the moisture of the air by condensation, after it has been driven from the material by heat, the moisture being removed as fast as expelled, and not left to be slowly evaporated and in a measure re-absorbed. This practical invention is claimed to be of value for the following reasons: the great saving of time, the thor-

oughness and uniformity of the drying, the naturalness and simplicity of the operations, the less amount of heat required (none being lost by ventilation), the absence of checking, warping, or splitting of the material, its indication of the point when the material is dry, and its inexpensive character.

The United States Patent-office is about pub-

lishing complete alphabetical and subject-matter indices of all patents issued from the office from 1790 to 1873 inclusive. These indices will consist of two sets of three volumes each, and will be of the greatest service to the inventors of the country, of whom a large proportion are from the ranks of the engineering and mechanical trades and professions.

## Editor's Historical Record.

### POLITICAL.

OUR Record is closed on the 22d of March.—Congress adjourned March 4. The House, February 23, rejected the Tariff and Tax Bill reported by the Committee of Ways and Means, and adopted Mr. Dawes's substitute, taxing whisky ninety cents a gallon, tobacco twenty-four cents a pound, cigars six dollars a thousand, increasing the duty on sugar and molasses twenty-five per cent., and restoring the duty of ten per cent. on woollens, iron, and steel. The new bill was passed by the Senate March 2.

The Civil Rights Bill was passed by the Senate February 27, and signed by the President March 1.—The House, February 27, passed the Force Bill, the suspension of *habeas corpus* being limited to Louisiana, Arkansas, Mississippi, and Alabama.—The Louisiana compromise resolutions—recognizing the Kellogg government and recommending the restoration of seats in the Legislature to the members entitled to them—were passed by the House March 1.—On the 2d the House rejected a resolution to reinstate Brooks as Governor of Arkansas, and passed, 149 to 80, a resolution declaring against interference by the general government with the government of that State.

By an amendment to the Post-office Appropriation Bill, introduced during the closing hours of the session, Congress voted its members the franking privilege until December 1, 1875, and doubled the rates of postage for the people on transient newspapers and periodicals and parcels of merchandise.

The Senate bill for the admission of Colorado as a State was passed by the House March 3.

The Senate of the Forty-fourth Congress met in extra session March 5. Action on the admission of Pinchback as Senator from Louisiana was postponed.—Godlove S. Orth was confirmed as minister to Austria, and Horace Maynard as minister to Turkey.—The new treaty with Belgium was ratified March 10. The Hawaiian treaty was ratified March 18.

Congress having failed to make any appropriation to carry out civil service reform, President Grant has abandoned the system.

The New Hampshire State election, March 9, was so close that it will have to be decided by the State Legislature, in which the Republicans have a majority.

The French Assembly, February 24, by a vote of 448 to 241, passed the bill for the organization of the Senate. The Senators are to be elected by colleges composed of Deputies of the Assembly, Councilors-General, Councilors of Arrondissements, and delegates from municipalities. Senators representing departments and colonies

are to sit nine years, one-third of their number being elected every three years. Those chosen by the Assembly are irremovable. On the 25th the Public Powers Bill was passed, the clause implying a recognition of the republic being adopted by a vote of 433 to 262.

M. Buffet, March 1, was elected President of the French Assembly.

The new French cabinet is announced as follows: M. Buffet, Minister of the Interior; M. Dufaure, Minister of Justice; M. Leon Say, Minister of Finance; M. Wallon, Minister of Public Instruction; Vicomte de Meaux, of the Right, Minister of Agriculture; Duc Decazes, Minister of Foreign Affairs; General De Cissey, Minister of War; Admiral De Montaignac, Minister of the Marine; M. Caillaux, Minister of Public Works. The Duc d'Audiffret-Pasquier succeeds M. Buffet as President of the Assembly.

John Mitchel was re-elected to Parliament from Tipperary, but died March 20, soon after the election.

The Convention between Spain and the United States for the settlement of the *Virginius* affair was signed March 5.

A new ecclesiastical bill has been introduced into the Prussian Diet, receiving its first reading March 16. It withdraws state grants from Roman Catholic bishops, and deprives the priest of any share in the administration of local church property.

### DISASTERS.

February 25.—The wall of an adjoining building fell upon and broke through the roof of St. Andrew's Church, New York city, while religious services were being held. By the falling bricks, and as a result of the panic which followed, five persons were killed and thirty wounded.

March 4.—Telegram from London announced the wreck of the steamer *Gothenburg* on one of the Fomrmeaux Islands, in Bass's Straits, between Van Diemen's Land and Australia. Of one hundred and ten persons on board, only twenty-two are reported saved.

### OBITUARY.

March 2.—In Washington, D. C., General Lorenzo Thomas, U.S.A., in his seventy-second year.

March 13.—In New York, William J. Hays, the animal painter, in his forty-fifth year.

February 22.—In England, Sir Charles Lyell, the eminent geologist, aged seventy-eight years.

March 7.—In London, England, Sir Arthur Helps, the author of *Friends in Council*, aged fifty-nine years.—In France, Claude Louis Mathieu, an eminent astronomer, in his ninety-second year.