This weight was also greater in summer than in winter. Notwithstanding the great variation of weight at birth, the difference diminished with age, all the animals thus tending to approach a certain standard size. One of the most important facts discovered was, that the rate of growth diminishes continuously from the time when the animal recovers from the loss of weight at birth; this diminution being rapid at first, and slower afterward. By rate is here meant, not the absolute increment in weight in a given period, but the per cent of the weight at the beginning of the period, which is added to said initial weight during the period. A discussion of the best available data indicates the result to be also true of man.

Dr. Minot had also made some experiments with rabbits, and compared the results with those for guinea-pigs and for man. He found that the guinea-pig grows on an average, until it is full-grown, 1.73 grams per diem, the rabbit 6.20, and man 6.60 grams. Men are therefore larger than rabbits, not because they grow faster, but because they grow longer; while rabbits are larger than guinea-pigs because they grow faster. The *rate* of growth, however, as above defined, is very different; being 4.6 % in the guinea-pig, 5 % in the rabbit, and 0.02 % in man.

Phi'osophical society of Washington.

Jan. 5. — Prof. J. R. Eastman discussed the Rochester (Minn.) tornado of Aug. 21, 1883, describing the ground as it appeared a few days after the storm, and showing that the phenomena did not indicate cyclonic motion. All disturbed objects were thrown in essentially the same direction, and were pressed down rather than lifted. In the course of the ensuing discussion, Mr. W. H. Dall described similar phenomena in the Escanaba region, where he observed storm-tracks consisting of swathes of prostrate trees, the trunks of which pointed uniformly in one direction.

Mr. Dall then read a paper on Recent advances in our knowledge of the limpets, summarizing the researches of Spengel on the sensory organs or osphradia; Cunningham, on the renal organ and reno-pericardial pore in Patella and Patina; Fraissé, on the eye in Patina, Fissurella, and Haliotis; and the speaker, on the presence of an intromittent male organ in Cocculina. He stated that among the Acmaeidae and Patellidae the type of eye differs; and while in Patina it is of a very rudimentary character, in other genera it might be well developed, — as, for instance, in Ancistromesus, which has as well developed eyes as Fissurella. He also alluded to the gradual progress in classification afforded by anatomical investigation during the past few years, and observed that nearly all the known forms except Propilidium and Scutellina were amenable to classification; our ignorance of the branchiae in the former, and the dentition in the latter, operating to prevent a final classification in these two cases until more is known. Those authors who study the embryology and histology usually from a single species generally ignore the wide differences of adult anatomy between the genera of limpets, and sow their generalizations on a basis of classification which is little in advance of that of Lamarck and his immediate successors.

The president of the society, Dr. James C. Welling, announced the death, since the last meeting, of Gen. A. A. Humphreys, one of the founders of the society, and pronounced a brief eulogy on his character.

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Geological survey.

Geological notes. — Prof. I. C. Chamberlin and his assistants, during December, 1883, were engaged in field-work in Illinois and in Missouri. Professor Chamberlin devoted his personal attention mainly to the borders of the newer drift, the concentric morainic belts that lie within it, and the contiguous old drift without it, in north-eastern Illinois. Mr. R. R. Salisbury continued his previous observations of the residuary clays and loess and drift-borders in eastern and central Missouri.

The revision of the manuscript of a report by Mr. J. S. Curtis on the Eureka mines has been completed by Mr. G. F. Becker and Mr. Curtis, and will soon be ready for the printer.

Since the beginning of Prof. R. D. Irving's study of the metamorphic rocks in 1882, he and his assistants have made five hundred thin rock-sections. Of this number, written descriptions of three hundred have been prepared. They include rocks from the original Huronian, the Huronian of the Marquette and Menominee regions, the Animikie group of the national boundary, the folded schists of the same region, and the crystalline rocks of the Minnesota and Mississippi valleys.

Assistant John Chaplin at Denver has prepared thin sections of all the eruptive rocks collected in the Rocky-mountain district during the past season.

Paleontology. — Prof. L. F. Ward has completed the work of preparing index slips for a catalogue of fossil plants. He has so arranged all of the fossil plants collected from the Laramie and Fort Union groups, that they are in a convenient form for future detailed investigation.

Chemical division. — The analyses of waters from Walker Lake and Walker River have been completed by Prof. F. W. Clarke.

Mr. J. W. McGee, in his examination of the subterranean forest exposed by an excavation on Connecticut Avenue, Washington, D.C. (referred to in *Science* of Nov. 30, 1883), discovered an earthy blue mineral, which was abundantly distributed throughout the

stratum of clay, at the bottom of which the remains of wood were found. This blue earthy mineral has been identified as vivianite by Professor Clarke.

Mr. Hillebrand, in the laboratory at Denver, has been examining the Leadville porphyries with respect to the proportion of precious metals contained in them. He has prepared a new gravity-solution, the borotungstate of cadmium, designed to replace in part the Thoulet solution, which is in some cases inapplicable in the separation of the mineral constituents of rocks. He has also made various qualitative examinations of several minerals new to the west, — tantalates, columbates, and phosphates of rare earths.

Dr. Mellville and Mr. G. F. Becker, at San Francisco, have been investigating some of the chemical relations of quicksilver.

In the laboratory at New Haven, Dr. William Hallock, at the suggestion of Mr. Arnold Hague, has begun a series of experiments upon the artificial production of geysers. Small models have been made that worked admirably with regular periods. An artificial geyser, with a reservoir twenty-five feet deep, has been constructed, and will soon be in working-order. The study of this model will be of exceeding interest.

Topographical notes. — It was hoped that topographical work could be carried on through the winter in Massachusetts; but owing to the continued bad weather through December, especially in the latter part of the month, the work was greatly delayed; and about the middle of the month it was decided to postpone further field-work in the state until spring.

Mr. Willard D. Johnson, assistant topographer, who has been preparing several small local maps in the Mono basin, California, has completed a map of the Parker-creek moraines, and began one of the Leevining-creek moraines. He has been unable to complete the latter on account of unfavorable weather. The map of the Parker creek moraines includes an area of about seventeen square miles, on a scale of four inches to the mile. The general map of the Mono basin covers some two thousand square miles, and the field sheets of the map are upon an approximate scale of one inch to one and three quarters miles. Several points of the transcontinental triangulation of the coast and geodetic survey are included. They give it scale and position. The vertical relief is derived mainly from angles, and a line of levels connects the work with a determined point on the Carson and Colorado railroad. The map exhibits the outline of the ancient expansion of Mono Lake; the outlines of the ancient ice-stream of the adjacent Sierras with their present remnants. Agricultural and grazing lands are shown, and the areas of timber lines also indicated.

Mr. J. D. Hoffmann, in the division of the Pacific, was busy during December, carrying on the detailed survey of the new Idria quicksilver district in California.

Prof. A. H. Thompson, geographer, was occupied during December in the determination of the latitude and longitude of Fort Wingate, New Mexico, which work has been satisfactorily completed.

PUBLIC AND PRIVATE INSTITUTIONS.

Harvard college observatory.

Funds. — In his report to the president of the university, the director of the observatory states that the annual subscription of five thousand dollars, which has been in force for five years, has expired by limitation, and that an attempt to raise a fund of one hundred thousand is meeting with good success, about half having been already obtained.

Variable stars. — The study of the variable stars has been continued by Mr. Chandler. The bibliography is nearly completed, so far as the first extraction of references is concerned. Notes have been prepared to exhibit the evidence of variability which has been published with regard to about twelve hundred stars. This list excludes many cases in which the evidence is entirely inadequate. A table, giving all the published maxima and minima of each of the variables of long period, is now in process of construction. The preparation of this table has led to the important result that an interval of several years occurs in which no observations appear to have been made of about thirty of these objects. About one hundred and forty stars belong to this class; and, since last April, all of them have been observed by Mr. Chandler with the six-inch Clacey equatorial mounted in the west dome. Charts of the vicinity of these variables have been prepared, and some progress made towards their completion. Similar charts have been made for about seventy telescopic stars suspected of variability, and nearly two hundred observations of these stars have been obtained. The color of the variable stars is also estimated, about three hundred observations of this class having already been made. The circular distributed, asking the aid of amateurs and others, in the observation of stars known or suspected to be variable, has, it is believed, secured much valuable co-operation. Numerous replies have been received, and important results have been obtained, especially by Mr. H. M. Parkhurst of New York, and by the Rev. J. Hagen, S.J., of Prairie du Chien, Wis. The great difficulty encountered by most of the observers was that of identifying with certainty the fainter stars, although this is one of the first things that should be learned by any person desiring to do useful astronomical work.

Astronomical photography. — With the assistance of Mr. W. H. Pickering, an investigation was undertaken in astronomical photography. Two objects were kept in view, — first, the determination of the light and color of the brighter stars; and, secondly, the construction of a photographic map of the whole heavens. After numerous preliminary observations, a method was employed by which a photograph of the brighter stars included in about one-twelfth of the entire heavens could be obtained on a single plate. Maps were also obtained, containing a region of about fifteen degrees square, containing stars as faint as the eighth magnitude. The color exercised a marked influence on the intensity of the photographic images, in some cases producing a difference equivalent to four magnitudes. It is thought that

photography may offer the most delicate test we yet have of the color of a star, — differences too small to be perceptible by the eye, becoming distinctly visible in the photographic images.

NOTES AND NEWS.

PROFESSOR MILNE-EDWARDS writes to the Société de géographie in regard to the scientific work of the expedition on the Talisman. After having studied the profiles from the African coast into deep water, the vessel recruited at San Jago, Cape Verde Islands, and later at San Vincente; soundings being carried on during the various movements of the vessel, and proving of great interest, as in some cases they did not accord with those on the charts. Branco Island, which has never been visited by naturalists, was carefully explored. The shores are very rocky, and it became necessary to swim ashore, which the temperature rendered rather agreeable. The island is entirely volcanic, and the rocks of a singular nature. Those near the shore were blocks of lava cemented by a sort of calcareous coquina, containing many shells, into a kind of pudding-stone. Others consisted of sea-sand, drifted by the winds to an altitude sometimes of a thousand feet, and changed into solid layers by calcareous infiltration. Vegetation is very sparse, yet the great lizards peculiar to this island were found to be herbivorous. The Sargasso Sea was then examined, and proved to be of great depth, reaching nearly thirty-three hundred fathoms, and the bottom entirely volcanic, with a rather poor fauna. A collection of lava and scoriae was obtained, some of which appeared to be of quite recent origin. There is probably in the Atlantic an immense band of volcanoes extending parallel with the Andean system, perhaps to Iceland, and of which the culminating peaks form the Cape Verde, Canary, and Azores islands.

More than two hundred deep-sea soundings were made before the return of the expedition *viâ* San Miguel, Azores. Wonderfully rich collections were made, and specimens of the bottom throughout the whole region traversed. The topography of the ocean-bottom hitherto accepted will be considerably modified by these researches. It was expected that Professor Milne-Edwards would address the society on the general results of the work before a general session about Jan. 21, and exhibit at the same time some of the treasures obtained.

— At the meeting of the Paris academy of sciences, Dec. 10, Dr. Hyades gave a summary report on the geological, botanical, zoölogical, and anthropological work accomplished by the French mission to Cape Horn. In the southern islands of the Fuegian Archipelago the prevailing rocks were found to be schists and granites, greatly weathered wherever unprotected by vegetation. The dwarf Antarctic beech is limited to an altitude of four hundred metres, the Fagus betuloides to three hundred, forming with the Drimys and Berberis a forest zone with a humid soil poor in vegetable humus, and covered with mosses, heaths, and a considerable variety of small plants. The marine flora abounds in all kinds of algae (the most common being the Macrocystis pyrifera), affording a shelter to numerous zoophytes, annelids, mollusks, crustaceans, and migratory fishes of eight or ten species. Of the shell-fish, which abound on most of the seaboard, all the large species are edible. Although poorer than the marine, the land fauna includes several species of Coleoptera, Lepidoptera, Arachnida, some forty species of birds, but no reptiles or frogs. The mammals are represented by only one species of fox, two rodents, and an otter, besides the domestic dog. The natives all belong to the Tekeenika stock of Fitzroy, called Yahgans by the present English missionaries. They speak an agglutinating language, current from the middle of Beagle passage to the southernmost islands about Cape Horn. About one thousand words of this language were collected, including some abstract terms, such as *tree*, *flower*, *fish*, *shell*. The numerals get no farther than three, although the natives count also on the fingers. Over a hundred anthropometric observations were taken on individuals of all ages and both sexes. Good photographs were also obtained of a large number of Fuegians, besides numerous castings of all parts of the body, some skeletons, and a great variety of ethnological materials.

— Besides the analyses of snow made at Madrid and in Holland (in which was observed volcanic sediment similar to that of the ashes found in Java after the eruption of the volcano), mentioned by Mr. Upton in his article on the 'Red skies,' in *Science* of Jan. 11, *Nature* of Dec. 20–Jan. 3 contains a number of letters in which mention is made of a grayish volcanic (?) sediment having been found at several points in England after rain-storms in December.

— The International congress of geologists will meet at Berlin on the 25th of September next, and last five days; then a grand geological excursion will be made through the Hartz Mountains, Saxon Switzerland, from the 1st of October to the 5th, ending at Dresden by a visit to the Royal museum, under the guidance of its celebrated director, Prof. Dr. H. B. Geinitz.

— In Oregon City there is a large apple-tree in the Methodist-church lot, planted in 1842 by W. S. Moss, Esq., for Rev. G. Hines, who was then living there. The tree bears two kinds of fruit, but only one kind each year, and the different kinds appear on alternate years. It is still a vigorous, healthy tree.

— It is understood that the outer satellite of Mars, Deinos, has been observed by Professor Hall during the present opposition. As the planet Mars is now near its aphelion, its visibility would seem to show that the satellite can be observed at every opposition of Mars with the great telescopes which have recently been constructed.

— The Pi eta scientific society of Troy, N.Y., has changed its name to Rensselaer society of engineers.