WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

The great comet of 1882. — Mr. R. H. Tucker, jun., of the Dudley observatory, gave a brief account of his observations, beginning Sept. 29, and followed during October and November by a series of twenty complete comparisons with stars, the accurate places of which are to be obtained by the meridian circle of the observatory. Positions of the comet depending upon star places from catalogues of old observations have been, however, used for orbit work; five made here having been telegraphed by request to the Cambridge observatory and used for the 'normal place orbit,' the best that has appeared. Mr. Tucker showed the similarity of the elements of this orbit to those of others, notably those of 1843 and 1880. The best theoretic orbits, however, show that this cannot be a comet of short period, and consequently not a return of either of those above referred to. He also gave the results of measurements of the head and tail made at the observatory, and described the changes noted in the structure of the former; also some of the results of spectroscopic work elsewhere, showing, among other things, distinct sodium bands in the spectrum.

In answer to questions raised in the discussion, Mr. Tucker gave the perihelion distance of the comet as probably within 500,000 miles; and stated that the form of the orbit is probably an ellipse, but very nearly a parabola; also, that the comet is evidently to a great degree self-luminous; and, further, that the comet's motion was not affected by its near approach to the sun, — unless, perhaps, retarded by a solar atmosphere, — for the obvious reason that both the comet's motion and the form of its orbit were originally due to the sun's attraction. — (*Albany inst.; meeting* Jan. 30.) [260

ENGINEERING.

Transverse strength of wooden beams. — Prof. Gaetano Lanza, of the Massachusetts institute of technology, described the testing-machine, and exhibited its mode of operation by breaking a 6×12 inch spruce beam, eighteen feet span, loaded at the middle. He also reviewed the results of some of his tests, as published in the Journal of the Franklin institute for February, 1883, and deduced a modulus of rupture of from 3,000 to 4,000 pounds per square inch in case of spruce, depending on the quality of the lumber; also, an average modulus of elasticity of 1,293,732. The results of four tests of *yellow pine* were also given with a time test on a 4×12 inch yellow pine beam, twenty feet long and loaded at the middle; also, the author's deductions from this time test as to the value of the factor of safety to be employed until a large number of tests shall determine the true value of the modulus of elasticity. — (*Bost. soc. civ. eng.; meeting* Jan. 21.) [261

CHEMISTRY.

Complex inorganic acids. — Professor Gibbs stated, that, in the further generalization of the results of his investigation of the complex inorganic acids, he had obtained glycero-phospho-tungstate and glycero-phospho-molybdate of barium as well-defined and beautifully crystalline salts; also dimethyl-arsino-tungstate and dimethyl-arsino-molybdate of sodium in colorless, very slightly soluble crystals. He directed attention to the fact that hypo-phospho-molybdate of ammonium, which he had at first expressed empirically as, —

$$24\,Mo\,O_3 \,.\, 6\,P\,O_2 \,.\, 6\,(N\,H_4)_2\,O + 7\,aq,$$ —

should be written rationally, with 2 additional molecules of hydrogen, either as —

$$8\,Mo\,O_3 \,.\, 2\,\{H_2 \,.\, P\,O \,.\, O\,H\}\,2\,(N\,H_4)_2\,O + 2\,aq;$$

or as —

$$8\,Mo\,O_3\,2\,\{H_2 \,.\, P\,O \,.\, (O\,N\,H_4)\} \,.\, (N\,H_4)_2\,O + 3\,aq.$$

In like manner the phosphoroso-molybdate of ammonium described by him with the empirical formula, —

$$24\,Mo\,O_3 \,.\, 2\,P_2\,O_3 \,.\, 5\,(N\,H_4)_2\,O + 20\,aq,$$ —

should be written either —

$$24\,Mo\,O_3 \,.\, 4\,\{H \,.\, P\,O \,.\, (O\,H)_2\}\,5\,(N\,H_4)_2\,O + 14\,aq;$$

or —

$$24\,Mo\,O_3 \,.\, 4\,\{H \,.\, P\,O \,.\, (O\,N\,H_4)_2\}\,(N\,H_4)_2\,O + 18\,aq;$$

though of course in each case a partial replacement of $(O\,H)$ by $(O\,N\,H_4)$ within the molecule of $2\,\{H_2 \,.\, P\,O \,.\, O\,H\}$ or $4\,\{H \,.\, P\,O \,.\, (O\,H)_2\}$ is equally possible. The hypo-phospho-molybdates should be called *di-hydryl-phosphino-molybdates*, and the phosphoroso-molybdates *hydryl-phosphino-molybdates*. The dimethyl-arsino-tungstates and dimethyl-arsino-molybdates evidently belong to the first series. Prof. Gibbs further stated, that he had found that other modifications of phosphoric acid were capable of forming complex acids with tungstic and molybdic oxides, and that he had obtained very well characterized pyro-phospho-tungstates and meta-phospho-tungstates, as well as the corresponding molybdenum compounds. The molybdico-tungstates, the discovery of which he had announced at the last meeting of the club, and which contained molybdic dioxide ($Mo\,O_2$), formed a particularly well defined and beautifully crystallized series. In conclusion, he described in detail the very remarkable relations of vanadic pentoxide ($V_2\,O_5$) to phosphoric and arsenic pentoxides, and gave an account of the phospho-vanadates and arsenio-vanadates considered as complex acids of an entirely new class. — (*Harvard chem. club; meeting* Jan. 23.) [262

AGRICULTURE.

A new nitrate ferment. — The reduction, as well as the formation, of nitrates in the soil is now proved to take place under the influence of living organisms. A year and a half ago, while experimenting with infusions of the roots of plants in water, Dr. A. Springer noticed a copious evolution of nitric oxide proceeding from those rich in nitrates; this seemed to arise from the action of small organisms upon the roots. He then made separate infusions of the roots, stems, and leaves of tobacco, and divided each set into four parts. Fermentation was excited in these by yeast, by urine, by the 'spontaneous method,' and by the newly discovered ferment. Among the ferments developed was one which appears to have the property of dissociating the nitrates of the soil. This may be classed among the Anaerobies, but oxygen does not stun it. The ferment obtained from chalk by Bechamp (Bull. soc. chim. [2] vi, 484) is probably the same. Further experiments are in progress. — (*Ohio mech. inst.; sect. chem. phys.; meeting* Jan. 18.) [263

Manuring vineyards. — In experiments in three Rhenish vineyards, Wagner finds that manuring with soluble phosphoric acid (100 kg. per hectare) produced in one case no increase, in another case a considerable and profitable increase, and in the third case an undeniable decrease, of the crop. Addition of potash and nitrogen produced no, or only a very slight, increase. The soil was already rich. No explanation of the unfavorable effect of the phosphoric acid was evident; but experiments on other plants by the same experimenter have shown that excess of phosphoric

acid, especially in a dry soil, may hasten the death of the organs of nutrition. — (*Landw. versuchs-stationen*, xxviii. 123.) H. P. A. [264

Determination of humus in the soil. — Loges finds that the results obtained by oxidation with chromic acid and absorption of the CO_2 are too low. From 64 to 96 per cent of the total amount of carbon was obtained, the remainder being incompletely oxidized, and escaping partly as volatile products. The loss on ignition was hardly sufficient for even an approximate estimate of the amount of organic matter present. — (*Landw. versuchs-stationen*, xxviii. 229.) H. P. A. [265

GEOLOGY.

The formation of coal. — This memoir by M. Gaston de Saporta, written in a clear, elegant, and really admirable style, reviews and eulogizes without critical observations the essential point of the theory of Grand'Eury, mentioned in two other places in this issue. The first part of the review is a historical record of the researches made on the formation of coal since the first author who tried to ascertain its nature and composition, or from Antoine Jussieu to Buffon in France; then to the Germans Blumenbach, Schlotheim, Sternberg especially, and after him to Brongniart, who in 1837 was the first to consider the origin of coal as related to that of peat. The author of the memoir sees in the lignite deposits of Fuveau, near the Bouches du Rhone, analogy of formation with that of the paleozoic coal-beds, as it has been exposed by Grand'Eury. — (*Rev. des deux mondes*, Dec. 1, 1882.) L. L. [266

METEOROLOGY.

Indian meteorology. — The studies of A. N. Pearson, the acting meteorological reporter for western India, of the meteorological conditions in 1881, confirm the results of previous observations, that there are abnormal movements of atmospheric pressure which affect a very wide area, and which are not simultaneous in all parts of that area, but travel from west to east. The barometric readings made at Zanzibar, when compared with those of the Bombay presidency, show the possibility of predicting the general nature of the seasons in western India some months beforehand; but there are irregularities in these abnormal movements, the cause of which must be discovered before the nature of the seasons can be foretold with certainty. These observations of Mr. Pearson are to be welcomed, since they are in the direction of a legitimate forecasting of the seasons on a scientific basis. — (*Brief sketch meteor. Bombay pres.*, 1881.) W. U. [267

ZOÖLOGY.

Protozoa.

Preservation of Protozoa. — Henri Blanc recommends preserving protozoa with a mixture of 100 pts. concentrated solution of picric acid, 2 pts. sulphuric acid, and 600 pts. distilled water, with one drop of 1% acetic acid for every five centimetres of the mixture. For coloring use 5 grms. of safran dissolved in 15 grms. absolute alcohol, which is allowed to stand for a few days, and then be filtered. — (*Zool. anz.*, vi. 22.) C. S. M. [268

Criticism of Künstler's theory of Protozoa. — Künstler, in a recent thesis, attempted to overthrow the cell-doctrine in its application to Protozoa, and reported a number of surprising discoveries. Bütschli criticises him severely, and maintains that one form which he described as new, under the name of Künckelia gyrans, is in reality a Cercaria and not a Protozoan: Bütschli suggests that so gross an error ought to invalidate the whole article. — (*Zool. anzeig.*, no. 128.) C. S. M. [269

Interesting new ciliate infusorian. — "Mr. F. W. Phillips describes a new genus and species (*Journ. Linn. soc., zoöl.*, xvi. 476.) under the name of Calyptotricha pleuronemoides, found attached to Myriophyllum. The animals are furnished with a remarkable transparent hyaline ovate lorica, opening teat-like at both ends, and a vibratory membranous hood or velum almost equal to the ventral length. The anterior end of the body is protrusible from the lorica. Their length is .001 inch; and the non-vibratile setose body-cilia are about two-thirds of this length, with shorter, stronger vibratile cilia at the entrance of the velum." — (*Journ. roy. micr. soc. Lond.*, ii. 799.) C. S. M. [270

Merejkowsky's Suctociliata. — Merejkowsky found in the gulf of Naples an infusorian having both cilia and suckers, and therefore intermediate between the Ciliata and Acineta. The animal, which is very common, resembles a Halteria: the anterior part of the body has a conical neck, around the base of which is a crown of three circles of seven or eight stiff cilia; the mouth is at the front of the neck, and is surrounded by four conically placed suckers, which cannot, however, be observed when the neck is retracted: hence they were overlooked by Cohn, who has given a superficial description of the animal under the name of Acarella siro. Merejkowsky regards this as a new type of great phylogenetic importance. — (*Comptes rend.*, xcv. 1232.) [271

Maupas criticises this publication. Stein had long ago described an intermediate type, Actiorobolus. Merejkowsky's species has been long known as Halteria pulex (Clap. Lach.), H. tennicollis (Fresenius). The supposed suckers have been figured by Claparède and Lachmann, and described besides by Fresenius; and there is no proof that they are homologous with the suckers of Acineta, but they are organs of attachment by which the animal anchors itself. Maupas reiterates his opinion, that the ancestral affinities of the Acinata are to be sought with the Heliozoa, rather than the Ciliata. — (*Comptes rend.*, xcv. 1381.) C. S. M. [272

Theory of the conjugation of Infusoria. — Bütschli criticises the assertions made by Balbiani, in his lectures as reported in the *Journal de micrographie*, concerning the reproduction of Infusoria. He gives brief summaries of Balbiani's views as advanced in 1861, and of his own. The brief and clear *résumés* render the article valuable for reference, but the author's purpose is to correct certain misrepresentations which Balbiani has permitted to appear in his lectures. — (*Zool. anz.*, vi. 10.) C. S. M. [273

VERTEBRATES.

Localization of functions in the cerebral cortex. — From the results of experiments on dogs, Bochfontaine concludes that Flourens was correct in ascribing vicarious functions to the cerebral convolutions. At one time electrical stimulation of a particular surface area *a* may, for example, be followed by secretion of the sub-maxillary gland or by some definite movement of a limb, while the same stimulus applied to other regions of the cerebral surface has no such consequences. In half an hour or forty-five minutes the region *a* will, however, cease to react to stimuli, while some other area *b*, previously inexcitable, becomes irritable, and its stimulation is followed by the same phenomena as previously the stimulation of *a*. The author suggests that the gray rind is itself not capable of electrical excitation, and that the

result is always due to direct stimulation of subjacent medullated nerve-fibres. A bundle of such fibres, all with the same peripheral connection, may subdivide in the brain, and end in three or four different regions of its surface: to this assumption he adds the further gratuitous one, that only one cerebral division of the nerve-fibre bundle is excitable at any one moment. — (*Arch. physiol. norm. path.* (3), i. 1883, 28.) H. N. M. [274

Properties of saliva. — Why has human saliva the power of saccharifying starch-paste, while that of many animals, even herbivorous as the horse, has not? Under the prevalence of atmospheric-germ theories, some have lately been inclined to believe that human saliva owes its power merely to the fact that it is a good medium for the development of amylolytic bacterial organisms. Béchamp, as a result of somewhat extended observations, concludes: 1°, that the starch-saccharifying activity of human saliva is not due to chance germs which have entered the mouth from the atmosphere; but 2°, is due to a special ferment more active than diastase; and 3°, produced by the action on the pure secreted saliva of specific microscopic organisms living in the salivary glands and in the mouth-cavity of man. The pure parotid saliva of horse or dog does not convert starch-paste into copper-oxide-reducing substances, nor does it acquire this power when exposed to the air, or when gently warmed along with scrapings from the tongues of those animals; but when scrapings from the inside of the human mouth are added to it, it soon becomes a very efficacious agent for the saccharification of starch. — (*Arch. physiol. norm. path.* (3), i. 1883, 47.) H. N. M. [275

Fish.

A new genus of Lepidopodinae. — In 1878 Mr. F. E. Clarke described (*Trans. New Zeal. inst.*, v. 294) a new lepidopodine as Lepidopus elongatus. Mr. Clarke established the species for 'eight or ten examples, all taken at Hokitika, on the South Island of the New-Zealand group' (lat. S. 43°, long. E. 171°). Singularly enough the new species has turned up, almost at the antipodes, on the Great Bank of Newfoundland; a specimen having been obtained from the stomach of a halibut, caught at a depth of eighty fathoms. The species has been re-described by Goode and Bean, and referred to a peculiar genus with the name Benthodesmus elongatus. It differs from Lepidopus by the more slender body, more numerous dorsal spines, etc. — (*Proc. U. S. nat. mus.*, iv. 379.) T. G. [276

Schedophilus medusophagus in Ireland. — A specimen of this interesting fish, 9½ inches long, was caught in August, 1878, in a salmon-net at Portrush, County Antrim, and has been recently described and figured by Dr. Günther. The illustration differs very much from those previously published, but bears internal evidence of being much more correct than the others. No remarks have been made by Dr. Günther as to the affinities of the species, and hence it is presumable that he still adheres to his classification of the fish in the family Coryphaenidae. It, however, is evidently a stromateid, and closely related to the rudder-fish (Lirus or Palinurichthys perciformis) of the United States, and like that species is a pelagic form which merely visits the coast. — (*Trans. zoöl. soc. London*, xi. 223, pl.) T. G. [277

Delolepis, a new genus of Cryptacanthidae. — The family of Cryptacanthidae has been long confined to a single genus of two species, or sub-species, peculiar to the New-England fauna, but has recently received a notable addition from the west coast of America. The new species has been detected at Port Wrangel, Alaska, as well as at Kingcombe Inlet, Brit. Col., and differs from the typical species by the development of small cycloid imbricated scales. It has been, therefore, distinguished by Dr. T. Bean as a special generic form, under the name Delolepis virgatus. — (*Proc. U.S. nat. mus.*, iv. 465.) T. G. [278

The Anguilla Kieneri of Günther a Lycodes. — Some years ago ichthyologists were startled by the announcement, from Dr. Günther, that 'the young of Anguilla Kieneri, a species hitherto known from the Mediterranean only,' had been found in the North Atlantic at a depth of a hundred and eighty fathoms; and the specimen in question, *inter alia*, was even adduced in evidence 'that fishes hitherto known from more southern latitudes occur in the north Atlantic at a moderate depth (of between eighty and two hundred fathoms).' The fish thus identified has been re-examined by Surgeon Francis Day, and proves to have ventral fins, and not to belong to the same order as the A. Kieneri: it is, in fact, a species of Lycodes, a characteristic type of the northern waters of moderate depths. — (*Proc. zoöl. soc. Lond.*, 1882, 536.) T. G. [279

Birds.

Albinos. — Mr. Charles A. Townsend called attention to a large number of albino specimens from the ornithological collection of the academy, among which the magpie and merganser had not, as far as he was aware, been before observed in this condition. The collection also included a kingbird, red-tailed hawk, chewink, and red-head duck, all of rare occurrence in the albino state. Melanism had only been observed by him in one specimen of a meadow-lark. — (*Acad. nat. sc. Philad.; meeting* Feb. 13.) [280

ANTHROPOLOGY.

Laughter in lower animals. — In a discussion upon specimens of the orang and chimpanzee, M. Dally remarks that young negroes are gay and frolicsome, but no one has ever seen a negro aged over thirty or forty years show gayety, — in which respect there is a strong resemblance between them and the anthropoids, the latter being frolicsome in youth and morose when adult. This statement is startling to persons familiar with the negroes in America, who at all ages are noticeably light-hearted and merry. Nothing is more common here than the broad grin and loud laughter of a white-headed and coal-black negro. Indeed, the contrast between the inveterate and irrational merriment of the blacks, and the prevailing anxious, if not sad, expression of our adult white population, would present an argument regarding their relative inferiority in precise opposition to that urged by M. Dally. — (*Bull. soc. anthrop. Paris*, April–July, 1882.) J. W. P. [281

Hero myths. — Dr. Daniel G. Brinton presents another volume entitled "American hero-worship: a study in the native religions of the western continent." In it he discusses certain myths of the Algonkian, Iroquoisian, Aztekan, Mayan, andother linguistic families of North America.

The purpose of this volume is, "to show that their chief god was not identified with any objective natural process, but was humane in nature, benignant in character, loved rather than feared, and that his worship carried with it the germs of the development of benevolent emotions and sound ethical principles." This he attempts to do by giving interpretations of the myths in question. The gods are considered as anthropomorphic heroes of light and darkness, and the cardinal points of the compass.

The work is rather an elaborate study of some well-known but badly recorded myths. The myths discovered among savage and barbaric peoples, and told by untrained anthropologists, have as little value for the science of anthropology as the stories told by unscientific travellers concerning wonderful animals have for zoölogy. In every Indian village of North America, civilized or uncivilized, the myths of the ancient days are yet told; and the science of North-American mythology cannot be given to the world until thousands of myths now current are collected by trained men. — J. W. P. [282

Mortuary customs. — Several curious survivals in different departments of France noted; among them, beehives put in mourning with black cloth, on the death of the proprietor, to prevent flight of the bees after the soul. — (*Bull. soc. anthrop. Paris*, April-July, 1882.) J. W. P. [283

Cranial deformation. — In the collection of crania by M. Marche, from the Philippine islands, a large proportion exhibited an occipito-frontal compression, described by M. Topinard to be nearly identical with the results of the cranial compression of the Peruvians and Chinooks. — (*Bull. soc. anthrop. Paris*, April-July, 1882.) J. W. P. [284

Brain-weight tables from Cochin China. — A contribution of M. Neïs is described by M. Topinard as the most important yet received regarding the cranial capacity of the 'yellow race,' showing a near approach to Europeans, and marked separation from negroes, in this respect. — (*Bull. soc. anthrop. Paris*, April-July, 1882.) J. W. P. [285

The nur-aghes of Sardinia. — Dr. d'Hercourt described the ancient stone-works, or nur-aghes, of Sardinia, and contended that the object of their construction was for places of refuge for man and beast against sudden attack, and also to serve as signal-stations. — (*Bull. soc. anthrop. Paris*, April-July, 1882.) J. W. P. [286

Races in Cochin China. — M. de Claubry presents the characteristics of the Malabars, Malays, Cambodians, Chinese, and Anamites, the last named being the most interesting. — (*Bull. soc. anthrop. Paris*, April-July, 1882.) J. W. P. [287

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Bureau of weights and measures.

Distribution of standards. — Under the provisions of a joint resolution of the two houses of congress, approved March 3, 1881, there are now preparing in the Bureau of weights and measures, at Washington, sets of customary English standards, for distribution to the governors of the various states, for the use of the agricultural colleges throughout the country. One set is to be sent to each state. In cases where there are two or more agricultural colleges in one state, the question of assignment is left with the governor. Each set consists of a yard-scale divided to tenths of inches; weights, twenty-six in number, ranging from twenty-five pounds to one grain; liquid measures from a gallon to a pint; and dry measures from a half-bushel to a quart. These are closely adjusted to the standards, and with each set will be sent a table of the very small residual errors shown to exist by the final comparisons. The adjustment of these weights and measures is now so nearly completed that notifications have been sent to the governors of most of the states, and the distribution will begin in a few weeks. These standards will serve an important use in educating students to ideas of accuracy in this most important matter. The general government has already supplied to each of the states, for use as state standards, full sets of English weights and measures, and also balances. Upon the passage in July, 1866, of the act legalizing the metric system in the United States, the general government also furnished to each state complete sets of metric weights and measures. These sets are kept at the respective seats of government, and are available for the verification of the standards used by the county or town sealers of weights and measures. Being all carefully adjusted to a common standard, their use will procure practical uniformity in weights and measures throughout the country.

Geological survey.

Topographical work. — Congress having authorized the extension of the work of the geological survey into the older states, topographical work, preparatory to geological study, was commenced in the southern Appalachian region shortly after the adjournment of congress last August. A division, consisting of one party for carrying on triangulation, and three for topography, was organized at Bristol, Tenn. Triangulation was extended north-west-ward from the Coast Survey belt along the Blue Ridge, the line 'Benn Knob to Poore's Knob,' as determined by the Coast and geodetic survey, serving as a base. About 5,000 □ miles only were surveyed, as the season for field-work was short, and the weather very unpropitious. The area surveyed includes portions of the high mountain region of east Tennessee, western North Carolina, south-western Virginia, and eastern Kentucky.

For the purpose of testing thoroughly the practical value of Mr. G. K. Gilbert's method of reducing barometric observations, four barometric stations were established about and on the summit of Roan Mt., N.C., at elevations ranging from 2,000 to 6,300 feet, and connected with one another by level lines.

Besides the work of this division, geographic work was carried on in northern California, looking towards mapping the Cascade range, with a view of studying its volcanic phenomena.

Another geographic division continued the work in western New Mexico, commenced the previous year; while a fourth division commenced work in southern Montana, near Bozeman.

Besides these four divisions engaged upon general geographic work, a number of parties were engaged upon special and more detailed surveys. Among these surveys may be mentioned that of the quicksilver mining-districts of California, of the Silver cliff and other mining-districts of Colorado, and the surveys for tracing out the shore-lines of the fossil lakes of western Nevada and Oregon.

National museum.

Telegraphic announcement of the stranding of large marine animals. — A short time ago the men at the different life-saving stations along the entire coast were instructed by Supt. Kimball to telegraph to Washington the stranding of any large marine ani-