

abandoned women as unhappy victims whose aspirations toward virtue are denied by society and crushed by a remorseless contempt, and treats them as truly lost, and needing not only to have the paths of virtue opened, but also the aspirations to virtue awakened in their souls.— Between the years 1860 and 1865 Professor TYNDALL and Mr. EDWARD WHYMPER vied with each other in an attempt to reach the summit of the Matterhorn—a peak of the Alps which had before been regarded as inaccessible, and was by the imagination of the superstitious peasantry peopled with demons, who, it was confidently asserted, would be sure to take due vengeance on any mortal bold enough to invade their dominions. The Wandering Jew was supposed to have his home in this desolate peak, and a ruined city of demons to cover its summit. This supernatural terror was not, however, to deter adventurous travelers from attempting to scale this peak, which is nearly 15,000 feet high, and rises abruptly by a series of cliffs which may properly be called precipices nearly a mile above the glaciers which surround its base. The records of the attempts of these adventurous climbers are recorded in two volumes—those of Professor Tyndall in a moderate-sized book with the modest title of “Hours of Exercise among the Alps” (republished in this country by D. Appleton and Co.), of which we have given our readers some account in a previous number of the Magazine, those of Mr. Whympier in a finely illustrated volume with the more suggestive and taking title of *Scrambles among the Alps* (republished by J. B. Lippincott and Co.). The American edition does not equal, either in the beauty of its typography or the exquisite finish of its engravings, the English original, which is one of the handsomest products of the English press; but we should not hesitate to declare it a handsome volume did it not suffer in comparison with the original, and despite that comparison we do not hesitate to

characterize it as a very attractive book. Nor is it doing any dishonor to Professor Tyndall's volume to say that Mr. Whympier, who succeeded in first reaching the top of the Matterhorn, has also succeeded in producing by his pen and pencil a volume which, to those who are fond of adventures, has few equals, and almost no superiors, in the literature of mountain-climbing. Mr. Whympier is a genial companion. He is bold, but not audacious; a lover of adventure, but neither fool-hardy nor a boaster. He is in hearty sympathy with nature, and inspires you with his own simple but earnest enthusiasm for the sublime. No task seems too difficult for him to essay, no danger daunts him in the pursuit of his object; but he essays no adventure for its own sake, never displays his prowess to us, or exerts it without an object; is not the man to climb a precipitous rock to cut his name upon its surface, nor to retreat from before it if it lies between him and the summit which he aims to reach. He is at once brave and modest, and the unconscious simplicity of his narrative of dangers, perils, adventures, and escapes adds intensity to the interest of the story, which contains much practical and scientific information.— There is a great deal of power in some of ELLA WHEELER's poems, *Drops of Water* (National Temperance Society), but there would be a great deal more if they were not all set to the same key. When we take up a volume of poems, it is not in the mood with which we take up a volume of philosophy; we are not content to turn it into a series of homilies all pointing to the same end, and all written with the same purpose and embodying the same moral. “Drops of Water” are all temperance poems; if set to music they would serve a good purpose as a temperance glee-book; but in their present form they grow wearisome. The author defeats her own purpose by the very persistency with which she pursues it.

Editor's Scientific Record.

MAC CORMAC ON THE ORIGIN OF TUBERCULAR CONSUMPTION.

IN 1855 Dr. Mac Cormac presented a theory in regard to tubercular disease of the lungs, or consumption, in which he maintained that this disease is caused solely by breathing air which has already passed through the lungs of man or other animals (or, otherwise, air that is deficient in oxygen), the inhalation of air already respired being accompanied by the retention of unoxidized carbon, or the dead, poisonous carbon, within the body of the organism. This effete matter he considers to be the starting-point in the tubercle. He does not think that it forms the tubercle itself, but constitutes the poison from which tubercular disease takes its origin.

His deduction from this is to the effect that the greatest care must be taken to secure an ample supply of fresh air, especially in cases where numbers of persons are obliged, by cold weather or other causes, to occupy a limited space together, and in which a proper provision for a constant supply of fresh air has not been made.

He believes that the predominance of tubercular disease in northern latitudes is not due to a tendency in the climate itself to produce this condition, but to the greater liability to huddling together for purposes of warmth, although it is probable that a diseased condition or irritation of the lungs in such cases may increase the morbidification of the poisonous material. Where, in consequence of the mildness of the climate, persons are induced to live a great deal out-of-doors, or where the houses are not closed up to such a degree as to exclude the external air, or prevent its free passage, this disease becomes comparatively unknown. He, indeed, encourages open windows and draughts of air, especially at night, if the body be well covered.

ZUCCATOR COPYING MACHINE.

The electro-chemical copying-press devised by Signor Eugenio de Zuccator, of Padua, has been materially improved since its first announcement, and now bids fair to realize measurably the object of a simple and ready method of

multiplying any writing, printing, or drawing, by electro-chemical action, for the use of editors, telegraphers, reporters, etc. The copying-press itself differs but little from the screw-press in ordinary use, the difference being mainly in having the upper bed composed of a plate of copper, and the lower of a plate of copper tinned, both on mahogany beds, the upper being attached to the solid iron press by clips, and the lower being made to slide out. These two plates are placed in the ordinary way in the circuit of a battery, so that when brought into close proximity by the action of a screw the circuit is completed, and the current established over the whole surfaces.

A steel plate is coated with an insulating varnish, and upon this the writing or drawing is traced. When this plate is interposed in the circuit, the current of electricity is confined to those portions deprived of the insulating surface, and leaves a record of its passage by its continued action on the steel plate and on sheets of copying paper, especially prepared and dampened with a solution of prussiate of potash. The electrolytic action causes the formation of the ferro-prussiate, or "Prussian blue," producing a perfect fac-simile of the original manuscript or design upon the varnished surface of the plate.

The movable steel plates on which the writing or drawing to be copied is made must be thoroughly cleaned and well and evenly varnished, care also being taken, by a firm and steady pressure on the style, to remove the varnish, leaving the writing, printing, or other pattern, in bright steel on a raised ground of varnish, affording perfect insulation every where on the surface. Any number of sheets, from one to six, can be placed one upon the other, after being dampened with the solution, and by interposing these in the circuit, screwing the press down so as to secure a proper contact, and by establishing the circuit, one wire being connected with the upper bed and the other with the lower, the desired result is accomplished in a few seconds.

PROCTOR ON PHYSICAL OBSERVATORIES.

Mr. Richard A. Proctor, in an article on National Observatories for the Study of the Physics of Astronomy, refers to the communication of Colonel Strange, made to the British Association last year, urging the propriety on the part of the government of establishing observatories for the study of the aspect and changes of aspect of the sun, moon, and planets, on the ground that the establishments already in operation confine themselves too much to determining the position and motions, real or apparent, of the celestial bodies.

Colonel Strange, in urging his project, calls attention to the great uncertainty that has hitherto prevailed in regard to climatological laws, and promises that, if observatories are established especially for the purpose, there is a strong probability that the systematic study of the sun will throw useful light upon climatological conditions. To this Mr. Proctor rejoins that while all weather changes may be traced to the sun's influence, the idea that we shall ever be able, by studying the spots, the faculae, the prominences, or the chromatosphere, of the sun, to interpret the phenomena of the weather, appears demonstrably incorrect. While the sun's diurnal course accounts for the seasonal changes, we yet know that the weather

of any single day is almost wholly independent of the general character due to the season. A season may be exceptionally cold or hot in one portion of the earth, while in another precisely the opposite characteristics will prevail, although subjected to the same solar conditions.

Even if the direct action of the sun were more obviously recognizable in its general effects, yet, inasmuch as, in the length and breadth of England—a mere speck on the earth's surface—the greatest variety of weather is commonly experienced, it is surely hopeless to attempt to predict the conditions which will prevail in any one country where the solar relations exhibit such and such a character; and short of this no prediction would be of the least use to man. Even if there is the slightest prospect of our being able to do so much as this, of what practical use would it be to know that a storm will rage on a certain day, if it is as likely to occur in Russia as in the United States, or in India as in China?

Mr. Proctor also takes occasion to rebuke those who have sneered at the labor bestowed by meteorologists in tabulating and reducing a regular series of observations upon the weather, and remarks that even though we may not, at present, have the means of interpreting meteorological relations, we must know what these relations actually are; or, in other words, we must have those long arrays of tabulated figures—thermometric, barometric, wind-recording, etc.—if we are to understand the cause or causes of changes in the direction of the wind, in the prevalence of cloud, in temperature, barometric pressure, etc. Although but little has hitherto come of these records, compared with the labor bestowed upon them, and though we may be under the impression that little ever will be the result, yet, if ever the great mysteries of meteorology are solved, these tables will have fulfilled their purpose. To cease to make them, he thinks, is to admit that these mysteries are inscrutable.

CHEMICAL COMPOSITION OF CLEAN AND FOUL SALMON.

Every one conversant with the fish is aware of the great difference in taste and value between what are called the clean and foul salmon; and Professor Christison has endeavored to determine the precise nature of the difference, by means of chemical analysis. The most prominent indication was the occurrence of a large percentage of oil in the clean salmon, and a deficiency in that of the poorer qualities. As a mean of the examinations made by Professor Christison, he states that in clean salmon there are 18.53 per cent. of oil, 19.70 per cent. nitrogenous matter, 0.88 per cent. saline matter, and of water 60.89 per cent.; while in foul salmon the amount of oil was only 1.25 per cent., and of water 80.88 per cent., the saline and nitrogenous matter not being materially different, although the latter was somewhat diminished.

RECENT UPHEAVAL OF THE PATAGONIAN COAST.

In illustration of the recent upheaval of certain portions of the South American coast, Professor Agassiz, speaking in a letter to Professor Peirce of the geology of the Straits of Magellan, remarks that about a mile back from the shore,

near Possession Bay, he found, at a height of nearly 150 feet above the sea-level, a salt pond, which, to his very great surprise, contained marine shells, some of them still living, of species common in the adjacent ocean waters. The most abundant were *Fusus*, *Mytilus*, *Buccinum*, *Patella*, etc., occurring in apparently the same numerical relation as in the waters of the bay.

The period at which this upheaval took place could not be determined; but it certainly could not be very remote, in view of the fact that so many specimens were still living. The pond appears to become nearly dry in the winter season, the small quantity of water remaining in it being intensely saline.

ABSORPTION OF METALLIC SALTS BY WOOL.

A memoir on the absorption of metallic salts by wool when mordanted, submitted by Professor M. P. Havrez, was very favorably received by the Royal Society in Brussels. The action of the mordants—which usually have alum as a basis—is not confined to making the coloring principle insoluble and thus fixing it upon the tissue, but also imparts to the tint purity and intensity of color. The way of proceeding has always been empirical, as the influence of the many possible modifications has never been fully ascertained. Mr. Havrez, in experimenting with tepid and boiling solutions of alum of different strength, used the salt in eleven different proportions, gradually increasing the amount from one-twentieth of one per cent. of the quantity of wool to 100 per cent. The feeble solutions had an alkaline reaction; those more impregnated were acid. The cause of this difference Mr. Havrez at first attributed to traces of soda retained in the wool, to lime in the water used for washing, and finally to the presence of ammonia, resulting from the alteration of the gelatinous principle of the wool. Mr. Stas then pointed out, as the true cause, the dissociation of the alum, and the extended experiments of Mr. Havrez have confirmed this supposition. Diluted solutions of sulphate of iron and copper give entirely analogous results. As to the influence of the different conditions in which the solution of the mordant is applied, Mr. H. found, first, that lime dissolved in the water acts like a diminution of the mordant; second, that the presence of free acid in small quantity does not prevent dissociation, but reduces the amount of alumina absorbed by the wool; third, that most diluted solutions of alum, at the highest temperature, and by their long-continued action, produce the most extended dissociation and fix the most alumina. Besides, the ratio of the quantity of wool operated on to that of the alum applied is of greater influence than the proportion of the solvent to the alum.

In summing up, Mr. H. maintains that the elements of the mordants, separated by dissociation, are gradually and very unequally absorbed by the wool, so that the whole process appears as a kind of dialysis, in which the wool acts the part of the porous body.

GENERATION OF EELS.

Much uncertainty prevails in regard to the mode of generation of eels, and many contradictory views have been presented, none of them bearing the test of critical examination. This

animal forms a remarkable exception to the characteristics of the anadromous fish, such as the shad, salmon, etc., which run up from the sea as mature fish, and spawn in the fresh-water and return again; their young remaining for a time, then visiting the sea, also to return to the rivers when the sexual instinct seizes them. The eel, on the contrary, spawns in the sea, and the young run up into fresh-water and pass the period of immaturity, then going down to the sea and remaining there, their young in turn pursuing the same round.

It is now announced by Ercolani, an Italian physiologist, that the eel is really a perfect hermaphrodite; that the genitals are only completely developed at sea, during the month of December; the ovaries and testes being together in the same animal, with spermatozoa; and he believes that the ova are fertilized there before their emission from the body. This is a very remarkable statement, but one that may, perhaps, prove to be correct; at any rate, it comes nearer to solving the problem of the generation of the eel than any suggestion that has hitherto been made.

OCCURRENCE OF ASPHALTS.

Professor Newberry, in an article published in the *American Chemist* upon the asphalts, expresses the opinion that, without exception, they are more or less perfectly solidified products of the spontaneous evaporation of petroleum. In many instances the process of the formation of asphalt may be witnessed as it takes place in nature, and, in oil stills, varieties of asphalt are constantly produced. These are undistinguishable from the natural ones.

Among the most important of our asphaltic minerals are the Albertite and Grahamite—the first from New Brunswick, the second from West Virginia. Both occur in fissures opened across their bedding in strata of carboniferous age. There is little room for doubt that the fissures which contain the asphalt have afforded convenient reservoirs into which petroleum has flowed, and from which all the lighter parts have been removed by evaporation. Similar deposits, of less magnitude, are known in Colorado, Arkansas, Ohio, and Kentucky. In Southern California, Western Canada, and elsewhere, asphalt may still be seen passing through the process of formation from petroleum, and especially in Santa Barbara and San Luis Obispo, where the accumulations of asphalt are well known to geologists. It also occurs on the shores of the Gulf of Mexico; but it is in Trinidad, according to Dr. Newberry, that we must look for the greater part of the supply that is likely to be required for various purposes, especially those connected with road-making. The quantity appears to be inexhaustible, and the quality is the very best; and its accessibility to the sea-ports of the United States renders its transportation so cheap that it may be furnished, to the Atlantic cities especially, at much less cost than any of the asphalts from the interior.

RILEY ON THE BARK-LOUSE OF THE APPLE-TREE.

At the meeting of the St. Louis Academy of Sciences on the 17th of June last Mr. C. V. Riley announced the interesting discovery of the male of the mussel-shaped bark-louse of the

apple-tree (*Mytilaspis conchiformis*, Gruelin), and exhibited specimens and drawings. This is the insect that produces the so-called "scurvey" on apple-trees, and in the more Northern and Western States has been one of the most injurious of our orchard pests for many years past. Yet, common and injurious as it is, entomologists have been endeavoring in vain for a quarter of a century to discover the male. Recently in the Northwestern States, which have suffered most from this insect, it has suddenly become harmless, and is fast dying out and being exterminated by its natural enemies, while in that part of Missouri where the male has been discovered it is increasing rapidly. Mr. Riley concludes that organic reproduction is the more normal with this insect, but that, as with the closely allied plant-lice (aphidæ), the male element is occasionally required to prevent degeneracy.

NATURE OF CHLORAL HYDRATE.

According to Meyer and Dulk, chloral hydrate is in reality ethylene-glycol, chloral alcoholate being the ethylic ether of the same substance.

NATURE OF THE BLUE COLORING MATTER OF FISHES.

Pouchet has been investigating the cause of the blue color of certain fishes, which, as is well known, is extremely brilliant in certain species. In confining his attention to the French species exhibiting this color, he refers the characteristic in question to a constant anatomical cause. Beneath the skin of the portion of the fish so colored there is always a layer, more or less thick, of small ovoid or irregularly circular minute bodies, yellow by transmitted light, which are the product of the complementary blue color in diffused light. These he calls iridescent bodies, from certain analogies with anatomical elements found in the cephalopods and some acephala. The diameter of these iridescent bodies varies from two to four or five thousandths of a millimeter. In the *Callionymus* they are larger than elsewhere, and each is seen to be formed of a pile of extremely delicate lamellæ applied one upon the other, but readily separable under the field of the microscope. This blue color, complementary of the yellow, Pouchet considered to be due to a kind of fluorescence.

WATER SUPPLY OF NISMES, ON THE RHONE.

In 1866 M. Dumont presented to the Academy of Sciences of Paris a sketch of a project for supplying the city of Nismes with drinking-water from the Rhone, filtered naturally. In 1872 he announces to the same body a satisfactory completion of his labor, by means of which there is a daily supply of over 37,000 cubic yards, or 130 gallons to each inhabitant. In an industrial and scientific point of view, the importance of the work just completed presents three classes of interesting facts. First, the natural filtration of the waters of the Rhone by a subterranean and lateral gallery of 555 yards in length, and 33 feet wide inside, the largest known at the present time. Second, the throwing up of this water by two steam-engines of 200 horse-power each to a distance of 11,000 yards, by a single discharge pipe of a little over three inches interior diameter. This conduit,

which presents numerous inflections in its course, is commanded by a great reservoir forty-six feet in height, upon which the pumps act, not directly, but after having worked on small reservoirs joined to the latter. The intervention of these manifold reservoirs, and the establishment of numerous emptiers of the air, at all projecting points, have had the effect of rendering very manageable the immense column of water, the weight of which is nearly 5000 tons, the elevation at this distance amounting to 240 feet.

The amount of fuel required for these engines, which are vertical, with direct movement, is 2.21 pounds of coal an hour for each horse-power. The entire initial expense of this hydraulic arrangement, including the necessary machinery, was about \$1,200,000.

The hypothesis upon which M. Dumont proceeded in undertaking his labors, so satisfactorily accomplished, was that there exists under the gravel and sands of the Rhone, and under the course of all waters of an analogous nature, a volume of water perfectly clarified (really an inferior and subterranean river), and that these gravels, etc., are genuine filters, which cleanse themselves by a double process, their product being always the same. The labors executed by the author at Lyons and elsewhere have proved to him the correctness of these views, and enabled him to establish the true principles which should be taken into consideration in the execution of similar labors. These are, first, to give the preference to lateral galleries instead of filtering basins; second, to bring these galleries as near as possible to the principal current of the river; third, to give these galleries the largest interior diameter possible; and fourth, to build the abutments up to the level of the low-water mark only, and make the layer of the filtering frame-work in the form of a cradle.

CHONDRINE IN THE TISSUES OF TUNICATES.

According to Dr. Schäfer the tissues of the tunicate mollusks contain a substance which in its properties and percentage of nitrogen corresponds closely to chondrine, usually considered a characteristic attribute of the vertebrata.

DENTRITIC MARKS ON PAPER.

According to Mr. Liversidge the minute dentritic marks frequently noticed on paper, to which various observers have assigned a vegetable origin, are actually inorganic; blow-pipe examinations, supplemented by special tests, showing that they consist mainly of sulphide of copper. These usually have a nucleus, which consists of a minute particle of copper or brass, and probably derived from some part of the machinery used in the manufacture of the paper.

CHANGE OF TEMPERATURE IN THE NORTHERN HEMISPHERE.

Mr. Howorth has been engaged for some time on a series of papers discussing the changes that have taken place to, the present time in regard to the distribution of land and water, and the consequent effect upon the climate. He finds that the result has been a great increase in the amount of cold in the far north, rendering regions such as those of East Greenland, once capable of supporting a considerable population,

now entirely uninhabitable, and literally covered the year round with snow and ice. He says, however, that while the evidence is overpowering that the climate has been growing more severe in the highest latitudes, there is a great deal of evidence to show the cold has decreased elsewhere, and that, especially in view of the accounts given of the climate of Gaul and Germany in the Roman times, we can not but admit that there has been a great improvement since that date. Thus we are told of winters when the Danube and Rhine were frequently frozen over, and of the occurrence of the reindeer and moose in localities far south of their present habitat. Ovid laments over the fearful severity of his place of exile on the coast of Thrace, and refers to the occurrence of white foxes there, and contemporaneous references corroborate his statements.

Mr. Howorth inquires whether, even within the prehistoric period, the circumpolar climate may not have been very temperate, when that of more southern latitudes was very severe. We know, in fact, that during the miocene period Greenland once possessed a climate not dissimilar to that of the Eastern United States, as shown in the occurrence of numerous species of trees of large size, some of them, like our cypress, etc., absolutely identical with our forest vegetation of the present day. Mr. Howorth also refers to the general impression among whalers that excessively severe winters in the more temperate latitudes are accompanied by an unusual degree of mildness in the more northern latitudes.

This we accept as an augury in favor of Captain Hall's exploration, since the winter of 1871-72 was one of the severest on record of late years; and should Mr. Howorth's suggestion be correct, the captain should have enjoyed an unusual freedom from snow and ice, permitting him to prosecute his researches to great advantage.

CYCLONES IN THE PACIFIC.

Mr. Whitmer, in referring to a paper by Mr. Murphy in *Nature* on the scarcity of cyclones in the Pacific, remarks that there is rarely a year without at least one cyclone passing through, or in the neighborhood of, one of the Feejee, Samoan, or Hervey group of islands. He states that the cyclone season extends over the greater part of the period during which the sun is south of the equator; consequently, when the trade-winds from the north reach farthest south, they are most prevalent about the middle, or a little later than the middle, of the season, rarely earlier than December or January. They are usually preceded for a few days by strong northerly winds; and if during such winds a sudden fall of the barometer occur, this is considered a sure indication of an approaching cyclone.

POLLARD ON SEASICKNESS.

Doctor Pollard, in a paper in the *British Medical Journal* upon seasickness, remarks that two opposite theories have been suggested as explaining its cause; one that it arises from a depressing effect on the brain produced by the motion of the vessel, for which the remedy would be lying so as to obtain an increased supply of blood to the brain; the other, supported by Sir J. Alderson, that increase of blood in the brain is the real cause, an analogy being drawn between the

blood in its vessels and the mercury of a barometer.

The most probable theory of seasickness is that held by Dr. Carpenter, Mr. Bain, and other writers, who consider that the mental and bodily prostration and the other symptoms arise from the continued action on the brain of a certain set of sensations, more particularly the sensation of want of support. This feeling, arising from the sudden loss of support, as when the footing, or any prop that we lean upon, suddenly gives way, is of the most disagreeable kind.

The phenomena of seasickness appear to be due to the constant repetition of this feeling of loss of support consequent on the pitching and rolling of the ship, more particularly the former. If, therefore, seasickness arises from certain impressions on the senses, the theory of its prevention is to render these impressions as feeble as possible. Application of the mind to an engrossing book will keep it off for a short period; but this answers only a temporary purpose.

To lessen the impressions as much as possible the patient should preserve the recumbent posture as near the centre of the ship as practicable; he should lie on a thickly padded couch, so as to diminish the vibration. Fresh air should be admitted in order to remove bad smells. The eyes should be shaded, and as much noise as possible shut out. As regards drugs, the most rational suggestion is that of Dr. Döring, of Vienna, that a full dose of hydrate of chloral should be taken shortly before the vessel starts; and, even in long voyages, the repeated use of this medicine will insure comfortable nights without the disagreeable after-effects of opium and chloroform.

MINERAL SPERM-OIL.

Mr. Hayes calls the attention of American chemists to the value, for illuminating purposes, of a heavy oil obtained from petroleum, and known in the trade as Morrill's mineral sperm-oil. This, it is claimed, has the advantage of being as safe as sperm-oil in combustion. It is sufficiently thin to fill the wicks perfectly, but is so far from being a volatile oil that it is comparatively inodorous, and will not take fire at any temperature below 300° F. Flames of considerable size, such as a large ball of wicking-yarn, saturated with oil and ignited, when plunged beneath the surface of this oil, previously heated to the temperature of boiling water, are extinguished at once. It burns freely in the German student lamps, and with great brilliancy from the "dual burner." The patentee of this oil estimates that 60,000 gallons can be manufactured per day, or about one-fourth of the whole product of petroleum. This is more than twice the whole product of the sperm and whale oils in the best days of the fishery in this country.

TESTING ANIMAL FLUIDS.

According to Mr. J. A. Wanklyn, the differential action of potassic hydrate and potassium permanganate may serve as a method to distinguish between various animal fluids. When these are evaporated down with excess of potassa solution, and then maintained for some time at 150°, a certain proportion of ammonia is evolved; and if the residue be now boiled with an alkaline

solution of potassium permanganate, a further definite quantity of ammonia is given off, the relative amount of ammonia evolved by these two additions being constant for the same animal fluid. The author has examined by this method urine, milk, blood, white of egg, and gelatine, the latter of which gives but a mere trace of ammonia by treatment with caustic potash. It would be possible by this process to distinguish between a spot of milk and one of white of egg on a cambric handkerchief.

SOLIDIFICATION OF SOLUTIONS IN COUNTRY AIR.

According to Tomlinson, supersaturated saline solutions, which would instantly solidify if exposed to the air of a room, may be kept for many hours in the open air of the country without crystallization, even newly sprouted leaves not acting as nuclei.

ALLEGED GIGANTIC PIKE.

Among the stock curiosities of the literature of fishes may be mentioned the story referred to in "Walton's Complete Angler," that a pike was taken in 1497, in a fish-pond near Heilbronn, in Suabia, with a ring fixed in its gills, on which were engraved the words, "I am the fish which Frederick the Second, Governor of the World, put into this pond 5th October, 1233;" by which it would appear that this fish had then lived 260 years. This fish was said to have been nineteen feet in length, and to have weighed 350 pounds.

Mr. Frank Buckland remarks that he has at present in his possession a painting of great antiquity which professes to be a portrait of the identical fish, and bearing an inscription corresponding somewhat to that referred to above. The length, however, of the fish represented is four feet nine inches; the ring around the neck measured ten and a half inches, and the fish would probably weigh about fifty pounds. What the facts may really be in regard to the fish in question it is, of course, impossible to state; although it may be reasonably doubted whether any thing like the age mentioned could have been attained, and the length of nineteen feet must evidently be an exaggerated statement.

SOLUBILITY OF SALTS AND GASES IN WATER.

Mr. Tourmasi communicates to *Les Mondes* the following laws in reference to the solubility of salts and of simple gases in water, which he thinks he has established, but for which he desires additional verification. These are as follows: First, for salts belonging to the same chemical formula (as sulphates, bromides, etc.) the coefficients of solubility are in direct ratio to their specific heat; one exception only, so far, has been met with, namely, chloride of manganese. Second, for simple gases the case is just the reverse from that of salts, namely, that their solubility in water is in inverse ratio to their specific heat.

NEW MODE OF PRINTING GOODS.

Mr. Vial presented to the Academy of Sciences, in Paris, a new method of printing upon fabrics by means of metallic precipitation. An illustration of the process is seen if we take a piece of linen, cotton, or silk fabric, and soak it

for a time in a solution of nitrate of silver. After exposing this to the air for a short time for the purpose of partially drying, if we place above it a coin, or a casting of zinc, lead, or copper, the nitrate will be decomposed in places where contact has been effected and the silver immediately precipitated in the form of a black powder, representing the image upon the coin in its minutest details, and in a faithful, distinct, and indelible manner. Every time the coin is placed upon the moist cloth the impression will be repeated instantaneously and perfectly, this not being the result of the application of color, but a chemical phenomenon exhibited by the simple contact of the salt and the metal, whatever be the delicacy or extent of the point of contact, and the deposition of the silver is made with such intensity as to strike almost entirely through the material.

Simple washing with water will remove from the cloth the undecomposed salt. The tint of the impression may be varied at will, from pale gray to intense black, according to the proportions of the silver and the material used as a precipitant. In general it is black, in proportion to the affinity it has for oxygen, and the degree to which it is removed from the silver. The process of Mr. Vial is presented by him to the consideration of scientific and practical men for their experiments, and he feels quite sure that it will take a place of great importance in the arts of printing and dyeing.

KIRKWOOD ON COMETS AND METEORS.

Professor Daniel Kirkwood, in a communication to *Nature* relative to the late paper of Schiaparelli upon comets, calls attention to an article published by himself in the *Danville Quarterly Review*, for July, 1861, in which the following propositions were maintained:

1. That meteors and meteoric rings "are the debris of ancient but now disintegrated comets, whose matter has become distributed around their orbits."
 2. That the separation of Biela's comet, as it approached the sun in December, 1845, was but one in a series of similar processes, which would probably continue until the individual fragments would become invisible.
 3. That certain luminous meteors have entered the solar system from the interstellar spaces.
 4. That the orbits of some meteors and periodic comets have been transformed into ellipses by planetary perturbation.
 5. That numerous facts—some observed in ancient and some in modern times—have been decidedly indicative of cometary disintegration.
- In reference to these propositions Professor Kirkwood remarks that, though stated as theory in 1861, they have since been confirmed as undoubted facts.

NEW FOSSIL DEER.

Mr. Boyd Dawkins, in a paper on the fossil deer of the forest bed of Norfolk and Suffolk, describes a new species under the name of *C. verticornis*, which has certain characters allying it to the Irish elk, and which it must also have rivaled in size. In this new species the base of the antler is set on the head very obliquely; immediately above it springs the cylin-

dricul brow tyne, which suddenly curves downward and inward; immediately above the brow tyne the beam is more or less cylindrical, becoming gradually flattened. A third flattening tyne springs on the anterior side of the beam, and immediately above it the broad crown terminated in two or more points. No tyne is thrown off on the posterior side of the antler, and the sweep is uninterrupted from the antler base to the first point of the crown.

IS CHLORAL AN ANTIDOTE TO STRYCHNINE?

Oré has been repeating the experiment of Dr. Liebreich in reference to the availability of strychnine as an antidote of chloral, and he has come to the conclusion that, however the fact may be in this respect, Liebreich's experiments are insufficient to prove his assertion, especially in consideration of the fact that a hypodermic injection neither of chloral nor of strychnine, in the proportions used by him, is necessarily fatal to rabbits.

PURPUROPHYL, A DERIVATIVE OF CHLOROPHYL.

If we boil chlorophyl with potash lye for a quarter of an hour we shall have a mixture of a green color, which may be filtered, and hydrochloric acid added. As soon as the potash is neutralized a precipitate is produced; and on adding more acid the liquid becomes of a bright grass-green color; and when again neutralized with carbonate of lime a green precipitate is formed, constituting a new substance, which has been called *purpurophyl*. This, when washed with water and covered with alcohol, assumes a fine purple tint, and is turned green by ammonia.

BLUE COLOR FROM BOLETUS.

In the course of some recent experiments Dr. Phipson has ascertained that a certain blue color, produced by the action of hypochlorite of lime on the alcoholic solution of a yellowish coloring matter of *Boletus luridus*, etc. (species of fungi), may be reproduced almost exactly from phenol, which renders it probable that the vegetable blue in question belongs to the phenyl group.

APPLICATION OF DISINFECTANTS.

According to the experiments of a committee of the Academy of Sciences of Paris in reference to disinfectants, it was ascertained that the first place among the agents destructive of infectious germs should be assigned to hyponitrous acid. This, however, being very poisonous, must be used with great precaution. It is said to be especially applicable for the disinfection of apartments in which cases of small-pox, yellow fever, or other grave diseases have existed. Before using this substance all crevices of the doors, windows, and fire-places should be carefully pasted up with paper. Acid fumes are to be generated by placing two quarts of water in earthen vessels of about ten quarts capacity for a small room, and adding to the water about three pounds of ordinary nitric acid and ten ounces of copper filings. Should the room be large, proportionally larger vessels should be employed. After starting the operation the door of entrance should be carefully sealed, and the room left undisturbed for forty-eight hours. Great care

must be taken on entering the room after the operation, so as to avoid breathing the acid. Carbolic acid may also be used to great advantage by mixing it with sand or sawdust in the proportion of one part to three. This may be placed in earthen pots as above.

PREHISTORIC (?) MAN IN AMERICA.

Several years ago General James H. Carleton, U.S.A., visited the abandoned drift of the Hanover copper mine, on the side of a mountain ten miles northeast from Fort Bayard, Grant County, New Mexico. The passage was made through a body of earth to reach the solid rock. At the distance of twenty-five feet from the mouth, and where the earth overhead was perhaps equally thick, a portion of the dirt roof had fallen away, and revealed an object which, on examination, proved to be the cranial portion of an inverted human skull. With a bowie-knife the general broke off a considerable portion of the calvarium, the remainder being imbedded so firmly that he could not remove it.

He was unable to determine whether the rest of the skeleton was there or not, but is satisfied as to the completeness of the cranium. In his visit he was accompanied by Governor Robert B. Mitchell and Hon. Charles P. Cleaver, both of whom were cognizant of the circumstances. The fragments of the skull obtained by him were presented to David L. Huntingdon, U.S.A., then stationed at Fort Bayard.

ALCOHOLIC PRODUCTS OF DISTILLATION.

Messieurs Pierre and Puchot have been prosecuting some researches into the alcoholic products of distillation, and find that these consist, first, of aldehyde; second, of ethylic acetate; third, of propylic alcohol; fourth, of butylic alcohol; fifth, of amylic alcohol; and sixth, of essential oils.

For the purpose of determining the existence of these various products as chemical substances, and formed at the expense of sugar during fermentation, the authors above named have submitted them to numerous chemical tests, and have also sought for the means of depriving vinous alcohol, properly speaking, of these various substances, for the practical purposes of purification, as it is to the presence of one or other of them that the defective taste of certain forms of spirits is attributed.

Among the indirect results reached in their inquiries, the authors maintain that it is incorrect to say, when two non-miscible liquids are boiled together, that the atmospheric pressure is equal to the sum of the elastic forces of the vapors of the two liquids, estimated separately at the temperature at which the mixture boils; but that, *first*, when two non-miscible liquids are boiled together, one of them being water, the boiling-point of the mixture is below that of the liquid that boils most readily; *second*, this boiling-point of the mixture continues absolutely constant as long as there remains an appreciable quantity of each of the two liquids; *third*, this constancy is independent of the relative proportions of the two liquids; *fourth*, the mixed vapors condensed during distillation have a direct relation to each other, independently of the relative proportions of the two liquids brought together in the distilling apparatus.

Editor's Scientific Record.

THE PROBOSCIDIANS OF THE AMERICAN EOCENE.

DURING the past summer Professor Cope, in charge of a division of Dr. F. V. Hayden's Geological Survey of the Territories, explored the paleontology of the eocene beds of Wyoming Territory. He obtained many species of plants, mollusks, and insects, and eighty species of vertebrata, of which some fifty are new to science.

One of the most important of the discoveries made was the determination of the type of proboscidians prevalent in that period. This is exceedingly peculiar and anomalous in many respects. Proboscidian limbs are associated with a dentition of the same type when the number and position of the teeth are considered. Thus a huge external incisor alone occupies the front of the upper jaw (premaxillary bone); there are no canine, and the molars are but few. The incisor is shorter than in the mastodons, etc., and is compressed, trenchant, and recurved, forming a most formidable weapon. The great peculiarity is seen in the structure of the molars, which is nearly that of *Bathmodon*, Cope, an allied perissodactyl. This type is, however, graded into an approach to *Dinotherium* in another perissodactyl, *Metalophodon*, Cope, of which more below.

The type species of this group, called by Professor Cope *Eobasiliscus cornutus*, was as large as the Indian elephant, but stood lower, having proportions more as in the rhinoceros. The elongate form of the cranium added to this resemblance. The physiognomy was very peculiar. On either side of the front, above each orbit, rose a stout horn, its base continuous with that of its mate. The immensely prolonged nasal bones overhung the premaxillary, as in the rhinoceros, and supported on each side, near the extremity, a massive reverted shovel-shaped protuberance, which united at an open angle with its fellow on the middle line of the front.

These beasts must have lived in herds, like the elephants of to-day, judging from the abundance of their remains, no less than twenty-five or thirty individuals having left their bones within a short distance of one of the camps of the party. Three species were distinguished—*E. cornutus*, *E. furcatus*, and *E. pressicornis*.

THE ARMED METALOPHODON.

This is an extinct odd-toed ungulate discovered by Professor Cope in the lower "Green River" division of the eocene of Wyoming. The only species was named *M. armatus*. It possessed a full series of six superior incisors, and had a formidable knife-like canine, with cutting edges, and a groove on the outer face. The premolars are like those of *Bathmodon*—i. e., with one outer crescent—while the molars differ in having the constituent crests of the single crescent separated on the inner side of the tooth, thus producing two subparallel crests. The lower premolars are singular in possessing one crescent, with a rudimental second by its side. This increases in proportion on the posterior teeth, till on the last inferior molar the two are nearly equally developed. Alternate ridges are, how-

ever, on this tooth reduced and rudimental, leaving a parallel two-crested tooth, approaching a tapir, or a *Dinotherium*. There were probably tusks in the lower jaw.

The species was about the size of the rhinoceros, and constituted another addition to the well-armed ungulates of the Wyoming eocene. The transitional forms seen in its tooth structure constitute a point of especial interest.

SKELTON OF BAOUSSÉ-ROUSSE.

The discovery of a human skeleton in a cave on the Italian frontier near Mentone, by Dr. E. Rivière, has excited great interest among ethnologists, in view of its association in point of time with the remains of extinct animals, being one of the best authenticated occurrences of the kind on record. At the time of the discovery Dr. Rivière was engaged in the exploration of bone caves, under the authority of the French government, and had obtained numerous remains of birds, gigantic stags, hyenas, rhinoceroses, and other animals.

The cavern in which the discovery took place (Baoussé-roussé) is near the line of railway from Mentone to Vintimille, and the skeleton was found beneath a layer of earth several yards in thickness. It is of the ordinary size, and entire, with the exception of the ribs, which were broken by the pressure of the superincumbent earth. The teeth and lower jaw are in a good state of preservation. The skull differs from the rest of the bones in being of a deep brick-red color. From the attitude it would appear as if the man had died in his sleep, and was carefully covered over without disturbing the earth beneath. Stones were placed at the back and sides, as if to indicate the outline of the grave. Numerous small shells and deer teeth, all pierced with a hole, were found around the skull, as if they had been twined in the hair or formed part of a head-dress. Around the skeleton were found many stone implements and bone needles. Associated with these were bones of various animals.

ENGLISH ECLIPSE EXPEDITION.

Comment is made by the English scientific journals upon the omission of any official announcement on the part of the English eclipse expedition of December last of the results of the facts observed, and a comparison with the conduct of private expeditions is made, quite unfavorable to the former. A writer in the *Popular Science Review*, referring to this subject, applauds Colonel Tennant for the promptness with which he communicated the results to the Royal Astronomical Society, and exhibited the photographs obtained at Dodabetta. These, when compared with the photographs made by Lord Lindsay's photographer, proved, in the opinion of the writer, in the most conclusive manner the solar nature of the corona.

RELATION OF EUROPEAN NATIONS TO SCIENTIFIC PROGRESS.

M. Berthelot publishes a remarkable article in the *Temps* on the scientific relations between Germany, France, and England, in which he points out that, without depreciating the scien-

tific position of the other countries of Europe and of America, the lead in all great scientific discoveries and movements has been taken by one or other of these three great nations, often by all three simultaneously; and he strongly urges the necessity, especially as regards the first two, of a complete cordiality and union, under the penalty of a general loss to civilization.

DRIFTING OF THE STARS.

The views of Mr. Proctor in regard to the movements of certain stars in systems of families have lately received a remarkable confirmation in the observations of Dr. Huggins, who for some time past has been prosecuting spectroscopic inquiries into the proper motion of the stars in the direction of the line of sight. With the instrument formerly used by him he was unable to determine that Sirius was receding at the rate of twenty miles per second; but now, by means of a telescope of fifteen inches aperture, specially adapted to gather as much light as possible, and placed at his service by the Royal Society of London, he has determined the facts in regard to various groups. Among these are five stars, β , γ , δ , ϵ , and ζ of Ursa Major (or the Great Bear), as also Alcor close by ζ , and the telescopic companion of ζ , which Mr. Proctor three years ago maintained to be moving in a common direction, and which, more recently, he predicted would prove to be either receding or approaching together, whenever Dr. Huggins was enabled to test the question spectroscopically.

Dr. Huggins now finds that all these five stars are receding at the rate of about thirty miles per second; while the star ζ , which Mr. Proctor had indicated as not belonging to the set, is found to have a spectrum differing in character from that common to them, and though receding, has a different rate. Arcturus, on the other hand, is moving toward us at a probable rate of seventy miles per second. Other stars have been determined as moving with corresponding velocities.

LEFT AND RIGHT HANDEDNESS.

In a notice in *Nature*, by Mr. Pye Smith, of a pamphlet upon left-handedness by Dr. Daniel Wilson, of Toronto, it is stated, as general results from the investigations of the author and others, that we may conclude (1) that the primitive condition of man and other vertebrates was, as their early foetal condition still is, one of complete bilateral symmetry of structure, and also of functional symmetry; (2) that this primitive ambidextrous use of the limbs is occasionally superseded in animals, and constantly in all races of men of which we have any knowledge, by a preferential use of one side, and that this is a necessary step in development as soon as the more delicate operations performed by a single hand take the place of those of digging, climbing, etc., in which both take part. It is, in fact, a differentiation produced by the same causes which have led to the specialization of the fore and hind limbs in frogs, birds, or kangaroos, compared with their uniformity of structure and function in fishes, crocodiles, and horses. (3) The prevalent choice of the right hand when differentiation was established must have depended on some slight advantage, at present unascertained,

by which dexterity at last suppressed *gaucherie*. (4) The occasional preference of the left hand, which is often partial and sometimes hereditary, does not depend on any "coarse" structural abnormality, but is an instance of atavism—of reversion to the primitive and universal ambidextrous, or to a subsequent and partial left-handed condition.

TRIMORPHOUS CONDITION OF SILICA.

Professor Maskelyne, of the British Museum, announces the discovery of a new form of crystallized silica, detected by him in a meteorite found in 1861 at Breitenbach, in Bohemia. The best-known species of silica is common quartz, which crystallizes in the hexagonal system, and has a specific gravity of 2.6. Professor Rath, however, not long since detected a second species of silica, which he called Tridymite, having a specific gravity of only 2.3, crystallizing in the hexagonal system, but with different parameters from those of quartz. The discovery of Professor Maskelyne shows that silica is trimorphous, and for this third species he proposes the name of Asmanite. The specific gravity is very low, 2.245, in this resembling Tridymite, from which, however, it differs in being a biaxial mineral, and belonging to the orthorhombic or prismatic system. Its hardness is 5.5. Two analyses show that it consists essentially of silica, and contains but a small percentage of foreign matter. The Asmanite is associated in the Breitenbach meteorite with enstatite, chromite, triolite or meteoric pyrites, and nickeliferous iron.

MANUFACTURE OF WOOD PULP FOR PAPER.

Among the more interesting articles at the International Exhibition in London, in the summer of 1872, was a series of illustrations of the process devised by Mr. Houghton for converting wood into pulp for paper. It is said that the difficulty hitherto in using this material for the purpose mentioned has been the necessity of using such large quantities of alkali as to make the cost of the operation too great to be generally employed, at least abroad. This difficulty has been overcome by Mr. Houghton's process, and it is expected that large quantities of wood, heretofore wasted, will be made available. Every saw-mill in the United States has an immense amount of refuse material, which it is extremely difficult to get rid of, and in many instances large fires are kept burning night and day in order to destroy it. There will be nothing in the way, it is said, of treating this refuse so as to have it rendered available for paper-making, and thus, while utilizing an immense amount of waste material, to cheapen the cost of books and newspapers.

In the process of Mr. Houghton, in the first place, the wood is cut diagonally by a series of knives, so that the fibre easily separates by the splitting of the grain. These slices are again broken in smaller pieces, furnishing the raw material for the next manipulation. This consists in introducing them into a patent boiler calculated to endure great pressure, and heated by hot water circulating in pipes which traverse it in sections throughout its length, the heat being capable of most accurate regulation.

The pressure employed in the process of treat-

ing the fibre is 180 degrees, and the wood is introduced into the boiler in wire cages running upon a set of rails, the small pieces after boiling being quite soft and of a dingy color. This is next treated by means of chlorine in a vat, and the bleaching finished by the use of permanganate of potash. The material is now a soft, pulpy, and highly fibrous substance, which is next subjected to the action of a hydro-extractor, a kind of wringer, which leaves it in the shape of a damp, fleecy mass.

The liquid with which the fibre has been treated is then pumped into a vat, and subjected to the action of carbonic acid gas, which solidifies to some extent the resinous particles. It is next placed in a copper boiler, and heated exactly to the boiling-point. This produces a complete coagulation of the resin, which falls to the bottom in large flakes. No use has been, so far, found for this resin, but it is expected that before long it may become of commercial value. There are many other details in the manipulation of the fibre, for which reference must be made to the technical journals.

DEEPEST KNOWN WELL.

The deepest well in the world is said to be that at Spenberg, near Berlin, which was excavated in the attempt to obtain a supply of rock-salt. This was reached at a depth of 280 feet from the surface, and the boring was continued to a maximum depth of 4194 feet, the stratum of salt having been followed to a depth of 3907 feet without being pierced through, and the boring then discontinued in consequence of the mechanical difficulties of the operation.

CURIOUS HABIT OF BEES.

A correspondent of the Torrey Botanical Club of New York narrates an interesting fact in the history of the bumble-bee, as witnessed by him during the present season. In collecting some specimens of *Dicentra cucullaria* he observed that the spurs of many of their flowers had been perforated or cut, and on looking about for the cause, he found that this was done by the bees, for the purpose of more readily getting at the honey inclosed. He observed that they alighted first on the lowest flower, and cut a hole in the spur with the mandible, and then inserted the proboscis and took a sip of the honey; thence going to a second flower and to a third, repeating the operation each time.

On another visit he found that the original hole would be used a second time without a renewal of the puncture. The bees appeared to know the exact moment when the flower was fully grown and the honey secreted. Honey-bees were noticed using the perforations made by the bumble-bees to obtain the honey, but never made any incisions themselves. Other species of *Dicentra*, as *spectabilis* and *eximia*, were similarly treated.

ELECTRICAL PYROMETER.

According to the *American Chemist*, an instrument has been invented which will measure with perfect accuracy the heat of the hottest furnace. It is based on the principle that the resistance of pure metals to the electric current increases with the temperature in a very simple ratio. A platinum wire, of known resistance,

is coiled around a cylinder of fine clay, and covered with a tube of the same material. The test is a Daniell's battery, of two cells, and with a resistance measurer, and the instrument is placed in the furnace whose temperature is to be ascertained. It is then only necessary to read off the indications of temperature on the graduated resistance measure.

PALMIERI'S LAW RESPECTING ATMOSPHERIC ELECTRICITY.

Mr. George Forbes, in an article in *Nature* upon Professor Palmieri's observatory on Mount Vesuvius, to which constant reference has been made in the accounts of the recent eruption of that mountain, mentions a law in regard to atmospheric electricity that Professor Palmieri has reached, as the result of his observations for a quarter of a century in a country where meteorological changes are very regular and less capricious than in Great Britain. He enunciates this as follows: If within a distance of about fifty miles there is no shower of rain, hail, or snow, the electricity is always positive. The single exception is during the projection of ashes from the crater of Vesuvius.

During a shower he finds the following law to hold good universally: At the place of the shower there is a strong development of positive electricity; round this there is a zone of negative, and beyond this again, positive. The nature of the electricity observed depends upon the position of the observer with respect to the shower, and the phenomenon will change according to the direction in which the shower is moving. Sometimes negative electricity may be observed during a shower; but this is always due to a more powerful shower farther off. These conclusions have been supported by means of telegraphic communication with neighboring districts. It appears, then, that, except when the moisture of the air is being condensed, there is no unusual development of electricity.

CUTANEOUS ABSORPTION OF DRUGS, ETC.

The question has been discussed for some time past as to whether the skin, when brought in contact with solutions of various substances, can absorb them to such an extent as to produce a marked effect upon the system. The general tendency of experiments has been against such a supposition. Bernard, however, has lately made a series of investigations on this subject, in which he shows conclusively that certain substances are readily absorbed when brought in contact with the skin by means of vapor-baths. This, however, only takes place when the temperature of the bath is at least one degree above that of the body, the sebaceous matter in the cells of the epidermis at a less temperature completely excluding its passage. A successful result can even be obtained with the water-bath, if this be brought up to a degree sufficient to dissolve the sebaceous matter of the skin.

UTILIZATION OF SCRAPS OF TINNED IRON.

The method of utilizing scraps of tinned iron, devised by Dr. Adolph Ott, is said to answer an excellent purpose, and to be in successful operation in various German tin-plate establishments in New York. For the purpose in question the scraps are placed in large perforated copper ves-

sels, and rotated from thirty to forty minutes in a tank containing warm hydrochloric acid, when the tin, lead, and about five per cent. of iron will be dissolved. The copper drum is then lifted from the acid into a vessel of water, then into one of alkali, and again into water, when the scrap will be found free from tin, and may be sent to the puddling furnace.

The lead may be separated from the solution by the addition of sulphuric acid, and the tin may be obtained in the metallic state by immersing plates of zinc in the liquid. Thus regained, it requires only washing in water to be ready for melting and casting into blocks.

The solution left behind after the separation of the tin, containing chiefly chloride of zinc and iron, is said to be found serviceable in preserving timber by impregnation.

INDICATION OF HEATING BY FRICTION.

The history of science is filled with illustrations of the fact that abstract discoveries, apparently of little practical bearing, are often turned to very important economical account. A new instance of this is shown in the recent discovery, by Mensel, that certain double iodides, in a strong degree, and other substances to a less marked extent, possess the property of readily changing color upon the application of a comparatively slight degree of heat.

One of these applications is by Professor Mayer, who employs a double iodide of copper and mercury for obtaining a precise method of tracing the progress and of determining the boundary of a wave of conducted heat; and the same gentleman suggests that this and other sensitive compounds be painted upon the *pillow blocks* and other parts of a machine liable to injurious heating from friction. It will enable the engineer to determine the temperature of the moving parts of his apparatus, and to be on the watch for any injurious effect of heating by friction.

The iodide referred to, within the limits of the freezing and boiling points of water, changes from a brilliant carmine red to a brown-black, becoming regularly darker with the increasing heat, so that besides learning the general effect of the dangerous change, a little observation will serve to establish the standards of correspondence of the temperature and the color.

EFFECT OF VARIATION OF PRESSURE ON THE EVOLUTION OF GASES IN FERMENTATION.

According to Mr. Brown, nitrogen, hydrogen, or hydrocarbon, and sometimes nitric oxide, together with carbonic anhydride, are evolved during the alcoholic fermentation of grape juice, or of malt-wort. He shows that the proportion of gases unabsorbed by potassium hydrate is largely increased when the operation is carried on under diminished pressure. At the ordinary pressure by far the larger proportion of these gases is nitrogen, but under diminished pressure the hydrogen preponderates very decidedly. Nitrogen, however, does not occur when the solutions contain no albuminoids, even if ammonium salts are present in considerable quantity. The increase of the proportion of hydrogen, resulting from diminution of the pressure, is accompanied by the formation of a comparatively large amount of acetic acid and aldehyde, so that it would seem that water is decomposed during the alcoholic

fermentation, and that this result is facilitated by the diminution of the pressure. The presence of nitric oxide in the evolved gases was found to be due to the reduction of nitrates originally present in the solutions.

PARASITE OF THE BEAVER.

Dr. Le Conte, writing from Lausanne, in Switzerland, addresses a communication to *Nature* in regard to a remarkable parasite of the beaver (*Platypus castoris*), which has been considered by some as belonging to the *Aphaniptera*, and to a family equal in value to the *Pulicidae* (fleas, etc.), while others place it as a type of a new order of insects. Dr. Le Conte, however, who is well known as one of the most eminent of living entomologists, after a careful study, considers that it belongs to the *Coleoptera*, and that it is remarkable for the generic and specific peculiarities it presents. One special character which it shares with three other genera is the reception of the antennae in cavities on the dorsal surface of the thorax. Special attention is invited to this insect on the part of those who have to deal with beavers, either in captivity or otherwise, who are urged to collect whatever insects may be found upon them; and it is suggested that the capybara and the musk-rat may support allied forms. The insect is not supposed to feed in any way upon the body of the beaver, but simply to burrow among the epithelial scales of its epidermis. It has no organs with which it can perforate animal substances, and it can not eat living tissues nor fluids.

IMPROVED MODE OF NICKEL PLATING.

Mr. Keith announces an improved method of nickel plating, by which he obtains a flexible and tenacious deposit, the ordinary coatings of this metal being so brittle that the articles will not admit of the least bending. The invention consists in adding to the various solutions of nickel, whether formed of single or double salts, materials which, by their presence, prevent the decomposition of the solution of the plating bath, and the deposition of oxide of nickel and other impurities upon the articles receiving the coating of nickel. There is added to the solution of nickel one or more salts, either single or double, acid or neutral, or associate, formed by the union of organic acids, acetic, citric, and tartaric, with the alkalies and alkaline earths, ammonia, soda, potash, magnesia, or alumina. These additions will, it is asserted, counteract the tendency to decomposition of the solution by action of the electric current. These various organic acid salts may be added interchangeably and collectively, though the inventor prefers to use, in case of the double salts of nickel and alkalies and alkaline earths, the organic acid salts which have for their bases the alkali or alkaline earth which is associated with the nickel in its double salt. Thus when using a solution of nickel and ammonia, an organic acid salt of ammonia is preferred, though the similar salts of soda and potash will answer very well. In case of using a solution of a double salt of nickel and potash, or a double salt of nickel and soda, an organic acid salt of soda and potash is selected. Of the salts which can be used to accomplish the effect the tartrates are preferable. A comparatively small quantity of the organic salts is necessary to be added,

though it will not change the character of the deposit.

The following bath is said to work well: To twenty gallons of a solution in water of the double sulphate of nickel and ammonia, of 7° Baumé, add one gallon of a solution, of an equal gravity, of neutral tartrate of ammonia in water. Mix well, and the bath will be ready after standing a few hours.

IRON SAND ON THE PACIFIC COAST.

The discovery that the iron sand, so abundant on the shores of Australia and New Zealand, is capable of being smelted by a very simple and cheap process into iron of the best quality has stimulated search for similar deposits on the western coast of the United States; and at a meeting of the Academy of Sciences of San Francisco Dr. Stout announced that he had found such a deposit within fifty miles of that city, and indulged in glowing anticipations of an important addition to the resources of the State, more valuable, perhaps, than her treasures of gold or quicksilver.

Similar iron sands are found at various points on the western coast, and are extremely abundant throughout the whole chain of the Aleutian Islands. It is, perhaps, from the volcanic character of the region that Dr. Stout announced the novel hypothesis that this iron was probably formed by the discharge from volcanoes of vapor containing iron in suspension, and which, becoming condensed by electric action, fell again on the earth, or into the water, as iron sand, this being subsequently washed up and accumulated on the shores.

Dr. Gibbons did not feel inclined to accept this theory, and believed that it was produced by the wearing away by the action of the sea of the sea-side strata containing iron, comminuting it into fine powder. He anticipated one difficulty in regard to utilizing the iron ore, however rich, in many localities in the absence of fuel, and the great expense attendant either upon bringing this to the ore, or *vice versa*. If, however, the asphaltum deposits of the State could be used, as was stated in the course of the debate, then the difficulties would be less formidable.

PALATINE-ORANGE, A NEW DYE.

A new dye-stuff for silk, wool, and cotton, named palatine-orange, is highly spoken of, as furnishing a brilliant and fast color of easy treatment. The solution is made in hot water, and the dyeing finished in one boiling bath slightly acidulated. Acetic or tartaric acid is preferable to sulphuric. As the color is purer and faster than that produced by curcuma or quercitron, a second dye with fuchsine, indigo-carmin, orseille, etc., yields the peculiar shades of the so-called fashion colors in great beauty and permanence. For printing upon wool, a concentrated aqueous solution of palatine-orange may be used without any acid.

DIRECT OXIDATION OF CARBON.

An important announcement was made not long ago by Professor Schulze, at the meeting of the Chemical Section of the German Association for the Advancement of Science, at Rostock, in reference to the direct oxidation of carbon by means of permanganate of potash in an alkaline

solution. In addition to oxalic acid and other products not determined, Professor Schulze obtained an acid to which he has given the name of anthraconic acid, and which he found to closely resemble mellitic acid in its properties. The experiment was repeated with carbon of different varieties, all of them, however, yielding analogous results.

A subsequent investigation proved that the new body was identical with mellitic acid. By treating it with caustic soda, benzole was produced, which was converted into nitro-benzole in the usual manner, and from this aniline was manufactured. This may justly be considered one of the most important of recent chemical discoveries.

IS THE UNICORN A FABLE?

The question of the existence in nature of an animal corresponding to the unicorn of the Bible and of tradition has been again raised by Mr. Bouwer's account of a visit to a stone cave in Namaqua Land, about twelve days from Lake Ngami. On the walls of this cave are pictures of various animals, drawn by Bushmen with considerable accuracy, and among them is one representing an animal with a single prominent horn. Mr. Bouwer was informed by an old Bushman that he had himself seen the animal, and that it was very fierce, but that it has now disappeared.

A writer on the same subject, in commenting upon Mr. Bouwer's observations, remarks that, in his opinion, the unicorn existed recently in Africa, and that, although not proved to be extinct, the probability of its being in existence at present is not very great. He rests his opinion on the general accuracy of the sketches by savages in other parts of the world besides Africa, and asks, if the unicorn never did exist, why should native drawings of such an animal exist in Namaqua Land, Natal, the Transvaal Republic, and Cape Colony, all having the same general characteristics and the one particular feature?

EFFECT OF INTERMENT ON THE STRUCTURE OF BONE.

According to Carl Aeby, bones interred in the earth experience a similar change in the course of time to that which takes place in surface rocks. The carbonate of iron of the water acts upon the phosphate of lime, so as to produce carbonate of lime and phosphate of iron. The enamel of teeth found in the pile dwellings is colored by vivianite, and Göppert has observed the formation of large crystals of vivianite in human bones.

Mr. Aeby maintains that if the bones of domestic animals from the pile dwellings contain less gelatine than recent bones, they have been deprived of it not by time, but by the process of boiling.

CONNECTION BETWEEN PYÆMIA AND BACTERIA.

Dr. Sanderson has lately published a lecture, delivered before the Pathological Society of London, in which he shows the connection between the disease called pyæmia (or blood-poisoning) and bacteria, and proves that blood-poisoning is produced by the presence of bacteria within the body.

India and the Zoroastrian religion of Persia, and some other kindred topics.—We have already given our readers some account of TAINÉ'S work on English literature. We are glad to receive a *Tainé's English Literature Condensed* (Holt and Williams), because there are many, especially among the student classes in our schools and colleges, who have not the time nor the opportunity to master the larger work, to whom this smaller volume will be not impracticable. The work of condensing, by Professor JOHN FISKE, of Harvard University, appears to have been well done, the words of the author as well as his ideas being in all cases retained.—*Hints on Dress*, by ETHEL C. GALE (G. P. Putnam and Sons), is really an admirable little treatise—sensible, practical, and giving details of information as to expenditure, as well as very wise and perfectly practicable advice as to habits and methods of dress. It is a real surprise to find so much that is useful crowded into so few pages.—Mr. F. G. DE FONTAINE has prepared a curious book, but one that will be welcome to all lovers of the great English novelist, in his *Cyclopedia of the Best Thoughts of Charles Dickens* (E. J. Hale and Sons). The volume consists of extracts from Dickens's works, classified topically and arranged alphabetically. It is really a dictionary of quotations, but from Charles Dickens only.—Lee and Shepard issue a "student's edition" of *Bacon's Essays*, with *Annotations by Archbishop Whately*, and with notes by FRANKLIN FISKE HEARD. We do not think that the ordinary reader will find the

value of the work greatly enhanced by Mr. Heard's notes, which appear to be largely provided on the principle upon which questions are furnished in the ordinary Sabbath-school question books, or comments in a certain class of diffuse though pious Scripture annotations. We do not need, for example, to be told that "doctors of the church" are "teachers," or that the phrase "a jealous God" occurs in Exodus, or that "divers" means different, all of which specimens we cull from a couple of pages opened at hazard. However, the translation of Bacon's Latin quotations may be convenient to English readers, and the book is none the worse for such notes as are unnecessary, since they need not be read. As to the substance of the work, English literature contains nothing finer of its kind than *Bacon's Essays*, and though Whately's annotations suffer somewhat by comparison, seeming diffuse in contrast with his master's concentrated wisdom, yet it is only by comparison, and these annotations contain some of the ablest thoughts of one who deservedly ranks as one of the most liberal and progressive, as well as one of the most able and cultured, thinkers in the English Church—one who combined Bacon's respect for religion with his broadness of philosophic views, and because lacking his aphoristic style is therefore admirably fitted to explain it. The book is exceedingly well prepared and printed, and it is every way to be commended as an excellent edition of what will always hold a foremost place in English classics.

Editor's Scientific Record.

POLARIZING ACTION OF TARTARIC ACID.

IN the extensive series of organic substances there are some that, as is well known, are endowed with the peculiar faculty of deflecting the plane of polarization of the luminous rays. This property was discovered by Biot, in 1815, in various liquids—among others, in spirits of turpentine—and the laws which most of these substances follow are, *first*, the rotation produced by the liquids in the plane of polarization is proportional to the length of the path which the luminous rays must traverse in the liquid; *second*, in the mixture of substances endowed with the rotatory power with those that are inactive, and which exercise no chemical action upon the former, rotation is in proportion to the quantity of the active substance; *third*, when several liquid columns are superposed in the path of the luminous rays, the total rotation is equal to the algebraic sum of the rotations peculiar to each of them; *fourth*, the angle of rotation corresponding to the different simple colors is very nearly in the inverse ratio to the square of the length of the luminous rays. Tartaric acid does not follow the law of Biot, constituting a special exception to the second and fourth law. This anomaly induced Krecke to take up the inquiry the result of which he has lately published.

The special points that he desired to investigate were, whether the anomaly which tartaric acid exhibits at the ordinary temperature is seen also at a more elevated temperature; if the tartrates present the same anomalies as free tartaric

acid; and if tartrates follow the law of simple relations. The results which he attained in the course of his inquiry he sums up as follows: For all the rays of the spectrum the specific rotatory power augments with the temperature, but in a quantity different for different solutions of the acid, and the peculiar irregularity presented by tartaric acid—namely, that the green rays are displaced more than the yellow or the violet—disappears with the augmentation of the temperature. It decreases also in proportion to the increase of the quantity of water, as had already been demonstrated by Biot. He also informs us that the tartrates, as far as examined, follow the laws of Biot; that the molecular rotatory power is very nearly the same in all the normal tartrates and alkaloids, but considerably more in tartar-emetic; and that the molecular rotatory power of the tartrates is threefold that of tartaric acid, thus following the laws of simple relations.

INFLUENCE OF A DIAMAGNETIC BODY ON THE ELECTRIC CURRENT.

Professor Stephan has been engaged in investigating the phenomena exhibited when an electric current is opened or closed in the presence of a diamagnetic body, and has arrived at the following conclusions: *First*, the presence of a diamagnetic body at the moment of closing the circuit accelerates the ascending movement of the current, and the chemical action developed simultaneously within the pile is less than when

the closing takes place in the absence of a diamagnetic body. *Second*, the heat developed at the moment of opening the current by the secondary current is less when the interruption takes place in the presence of a diamagnetic body. *Third*, when the current sets in motion a diamagnetic body, the action simultaneously supplied by the chemical force inside of the pile will be to the live force furnished by this body as two to one. This surplus of chemical action is manifested as soon as we open the current in the secondary circuit, reinforced by the absence of a diamagnetic body. The contrary takes place every time that a body of this nature is moved in a direction opposite to that of the electrodynamic forces. *Fourth*, the energy of the needle increases or diminishes according as it is removed or approximated to a diamagnetic body. If this body is set in motion by a needle it furnishes a sum of live force equivalent to the action of the live forces acting in the needle.

EFFECT OF BATHING ON THE WEIGHT OF THE BODY.

Drs. Jamin and De Laures, in an account of some experiments made by them upon the loss of weight experienced by the human body in a bath, remark that, under ordinary conditions, a man of good constitution will consume about 4000 grams of food in the course of a day, of which 1500 grams are excreted, while the remaining 2500 grams are consumed in the course of twenty-four hours, either by the lungs or by the skin, being a loss of about 100 grams per hour. This loss, however, is not uniform, as it amounts to about 125 grams after dinner, diminishing until the following morning, when it is only 80 grams between six and seven o'clock, and increasing again after breakfast. In exercising under a hot sun it sometimes amounts to as much as 340 grams per hour.

When the body is immersed in a bath there is a certain temperature at which the weight is maintained unchanged, this, however, increasing when the temperature is lowered, and diminishing very rapidly as the water becomes more and more heated. Before taking the bath 30 grams may be lost by respiration, and 60 by perspiration; but during the hour after it the conditions are different: a much less loss will take place, and sometimes none at all; indeed, occasionally there may be a slight increase of weight. As, however, the quantity of water exhaled can not be less than before taking the bath—and, indeed, should be greater, in consequence of the humidity of the epidermis—the diminution or loss of weight, it is thought, can not but be the result of a single cause, namely, a diminution in the amount of carbonic acid expired. But these conclusions are not to be considered as established, and further investigations are to be made by the gentlemen named.

IMPROVING THE QUALITY OF POOR COAL.

According to the *Journal of Applied Sciences*, the qualities of the best anthracite or cannel coal may be given to poor tertiary coals by soaking them in a mixture of naphtha and bitumen. A similar treatment of peat, by means of the residuum of kerosene refineries, has lately been adopted in the United States, as furnishing a fuel far superior in heating power, in freedom

from foreign substances, and in availability to the best qualities of true coal.

CARBONIC ACID IN SEA-WATER.

Oscar Jacobsen, of Kiel, has made a communication to *Nature* in reference to the carbonic acid in sea-water, the determination of the amount of this gas being considered a matter of much importance in deep-sea researches. He states that the complete expulsion of oxygen and nitrogen from sea-water presents no difficulty, the comparative proportion of the two gases not being sensibly different in the first and last portions of the gas expelled. Carbonic acid is only partially driven off by boiling the sea-water for hours in a vacuum, and the proportion of acid found in the expelled gas justifies no conclusion as to the amount in the water. The portions of the sea-water gas first displaced are almost entirely free from carbonic acid, the later being richer.

The complete expulsion of carbonic acid from sea-water is attained by its distillation in a current of air free from carbonic acid; but even under this operation it is detached so slowly that only after the evaporation of a considerable amount of water does the carbonate of lime begin to separate. The distillation must be continued until only one-fourth of the original quantity of water remains. The fact, therefore, that carbonic acid is present in sea-water not as a dissolved gas in the same sense as oxygen and hydrogen but in a peculiar condition of combination, Mr. Jacobsen considers of great importance, not only as respects animal and vegetable life, but also in reference to the geological relations of the sea. He is now prosecuting an inquiry as to which of the constituents of sea-water is due its power of close combination with carbonic acid, and what is the proportion of this acid to the salt.

GLACIAL PERIOD OF THE NORTHERN HEMISPHERE.

Mr. James Geikie has lately published an elaborate article upon the successive changes of climate experienced in Great Britain, especially during the glacial epoch; and among some of the more general conclusions at which he has arrived are the following:

1. That at some distant period (according to Mr. Croll's calculations, upward of 200,000 years ago), owing to the eccentricity of the earth's orbit being at a high value, and the winter of our hemisphere happening to fall in aphelion, a climate of intense severity covered Scotland, Ireland, and the major portion of England with a massive sheet of snow and ice. At the same time similar conditions characterized the mountainous and northern regions of Europe and America.

2. That one result of this glacial action was the erosion of rock-basins.

3. That intense glacial conditions were interrupted by intervening periods characterized by mild and even genial climates, the changes of climate being directly due to the precession of the equinoxes, which during a period of extreme eccentricity would gradually cause the ice cap to shift from one pole to the other.

4. That these interglacial climates are represented in Scotland by stratified deposits intercalated with the till, and containing, in places,

mammalian and vegetable remains; in England by beds in the boulder clay, and by some portions of the valley gravels and cave deposits, with paleolithic implements and bones of the extinct mammalia; on the Continent by similar deposits; in America by layers of peat, with buried trees and extinct mammalia.

5. That the climate of the earlier cold periods was more severe than in subsequent glacial periods of the same great cycle.

6. That when submergence, in consequence of subsidence of the land, was approaching its limits in the northern latitudes of Europe, a change of climate gradually supervened, and icebergs and ice-rafts set sail from the frozen islets that represented Scandinavia and Great Britain and Ireland.

In connection with the glaciation of the northern hemisphere, Mr. Geikie recognizes a *Pre-glacial Period*, a *Glacial Epoch*, and a *Post-glacial Period*, followed directly by the *Recent Period*. The *Pre-glacial Period* is represented in England by the Norwich Crag, and is characterized by remains of the elephant and mastodon; but Mr. Geikie finds no evidence of the existence of man, as shown by the discovery of stone implements. The Glacial Epoch is divided into the *Great Cycle of Glacial and Inter-glacial Periods*, a *Last Inter-glacial Period*, and a *Last Glacial Period*. The first-mentioned is characterized in Europe generally by the occurrence of traces of man in the form of paleolithic implements and of remains of arctic and southern mammals.

In the second, or *Last Inter-glacial Period*, there are also river gravels and cave deposits, paleolithic implements, and extinct mammalia, or species no longer indigenous to Europe. These include the *Elephas antiquus*, the rhinoceros, etc.

In the *Last Glacial Period* we have also river and cave deposits, with arctic mammals—the arctic mammoth, the Siberian rhinoceros—and paleolithic implements. The *Post-glacial Period* is marked by the existence of raised beaches, river and cave deposits, neolithic implements, and the passage from the stone to the bronze and iron periods; and in Denmark by the occurrence of peat, and buried trees, and *kjökkenmøddings*. The series is closed by the *Recent Period*, with its well-known characteristics.

DEFECTS OF VISION IN THE YOUNG.

Dr. Liebreich, the eminent ophthalmic surgeon connected with St. Thomas's Hospital, London, has lately written an article in regard to school life in its influence on sight, and attributes many of the permanent defects of vision from which educated people suffer to the physical conditions of the school-rooms in which they were taught. The more important changes in the functions of sight developed under these circumstances, according to the author, are three in number—namely, decrease of the range of vision, decrease of the acuteness of vision, and decrease of the endurance of vision. Decrease of the range, or short-sightedness, he remarks, is developed almost exclusively during school life, rarely afterward, and very rarely before. It may be true that short-sightedness is often hereditary, but this condition is suspended, and in most cases would not probably be developed but for the tendencies of school life. The effect of short-sight-

edness is to injure the general health by inducing the habit of stooping for the purpose of more readily seeing objects, and this result of the defect, in a national point of view, is to be considered a serious evil.

The decrease in the acuteness of vision is generally the result of a positive disease of the eye, which may be exceptionally induced at school; while the decrease of endurance arises principally from two causes: the first, a congenital condition, which can be corrected by convex glasses, and can not, therefore, be the product of school life; the second, a disturbance in the harmonious action of the muscles of the eye, a defect difficult to cure, generally caused by unsuitable arrangements for work. All these three anomalies in vision may arise from the same circumstances—namely, insufficient or ill-arranged light, or a wrong position during work, the former obliging us to lessen the distance between the eye and the book while reading or writing, and the same being required if the desks or seats are not in the right position, or of the right shape and size.

If the muscles of the eye are not strong enough to resist such tension for any length of time, one of the eyes is left to itself, and while one eye is being directed on the object, the other deviates outwardly, receives false images, and its vision becomes indistinct—*amblyopic*. Or perhaps the muscles resist these difficulties for a time, become weary, and thus is produced the diminution of endurance.

To prevent these evils the light of the school-room should be sufficiently strong, and should fall on the table from the left-hand side, and, as far as possible, from above. The children should be obliged to sit straight, and not have the book raised nearer the eye than ten inches. In addition to this, the book should be raised twenty degrees for writing, and forty degrees for reading. Dr. Liebreich thinks that in very few schools are the conditions here stated complied with. He remarks that the proper light is most easily obtained if the class-room is of an oblong shape, the windows being in one of the long sides, and the tables arranged parallel to the short walls, so that the light falls from the left side. The desk of the master should be near the short wall toward which the scholars look.

This simple and practical arrangement, which in some places is a matter of course, is in England almost exceptional. Light coming from the right hand, according to Dr. Liebreich, is not so good as that from the left, because the shadow falls upon the part of the paper to which we are looking. Light from behind is still worse, because the head and upper part of the body throw a shadow upon the book; but the light that comes from the front, and falls on the face, is by far the worst of all.

A similar principle should be adopted in regard to the use of artificial light. Naked gas jets Dr. Liebreich considers to be injurious because of their unsteadiness, and he recommends that glass cylinders be used with them; and reflectors are still better. Ground-glass globes ought not to be used. These are useful for the ordinary lighting-up of a room, as they diffuse the light more equally throughout all parts, but for that very reason they give an indistinct light for work, and, if they are opposite the eye, are daz-

zling and injurious. Ground glass, for the same reason, is objectionable for lighting rooms, and should only be used for sky-lights or the upper portion of windows.

The arrangement of seats in drawing schools should differ from that in ordinary class-rooms by having a diagonal arrangement; or if the room be long and very narrow, and the pupils only draw from copies, while the light comes from the top, it will be best to turn the back to the light.

ALLEN ON THE BIRDS OF KANSAS, ETC.

Mr. J. A. Allen, of the Museum of Comparative Zoology at Cambridge, has lately published "Notes of an Ornithological Reconnaissance of portions of Kansas, Colorado, Wyoming, and Utah," forming No. 6 of the third volume of the *Bulletin* of the Museum. This, like the preceding memoir on the "Birds of Florida," is a very important addition to the philosophy of American zoology, giving, in addition to the facts observed, many important generalizations as to the climatic and other influences which tend to modify the forms, colors, and notes of birds.

According to Mr. Allen, in the woodlands of Eastern Kansas there is a decided general tendency to a greater intensity of color than at the northward. The males of the common indigo-bird are more than ordinarily lustrous, and the females also have a decided tinge of blue, which is not the case in the Eastern States; while in Middle Kansas the light band on the wing of the Baltimore oriole becomes either pure white, or scarcely tinged with a pale yellowish color. In the plains proper the faded aspect of the birds generally struck his attention, especially of species that range across the continent. This abstraction of a dusky or melanistic shade of the birds tends to bring out the pattern much more distinctly, as seen in the representatives in that region of the night-hawk, the meadow-lark, etc.

Most of the species of this region, heretofore supposed to be distinct, Mr. Allen considers as simple races of forms found in the Atlantic States. The difference in color between the Pacific forms of the arid and the comparatively moist regions is greater toward the end of the breeding season, or just before the autumnal moult, than afterward, or in spring specimens, showing the more unmistakably the direct influence of the intensely heated dry winds and strongly reflected light upon the color of birds in semi-desert regions.

Another generalization referred to by Mr. Allen is that birds exhibit a greater tendency to the enlargement of the bill to the southward, along the Pacific slope of the continent, just as there is, to perhaps a less extent, in the Atlantic region. As regards color, there is a narrow belt extending from the valley of the Columbia River northward along the Pacific coast, where the annual rain-fall is nearly double that of any other portion of the continent, and in which the birds not only exhibit the brighter colors of the region east of the great plains, but frequently take on a peculiar deep plumbeous, or dusky brown, accompanied by a partial obsolescence of spots and streaks, especially in the *Fringillidae*.

Mr. Allen takes strong ground against the idea of hybridity in birds, by which it has been at-

tempted to explain the occurrence of intermediate forms, linking the so-called species of the different provinces of North America along or near their supposed line of separation. These hybrids, according to some authors, Mr. Allen considers to be expressions of the same law of variation which established the primary races; and he suggests that, in passing from the Atlantic to the Pacific, the forms will be comparatively uniform as long as the physical conditions remain constant, while as these conditions change more or less abruptly the effect upon the birds will be more or less strongly marked.

The observations of Mr. Allen establish the occurrence of numerous eastern species at points several hundred miles to the westward, and of western species considerably to the eastward of localities hitherto assigned them. Northern species were also met with at points considerably farther south than their previously known range, having been found breeding above the timber line in Middle Colorado. The imaginary boundary of the eastern and western species, as existing along the 100th meridian, heretofore suggested, Mr. Allen is therefore inclined to remove, and to look to the extension of forests and plains, as well as of wooded river-bottoms, as determining the limits of the range of the birds. In consequence of the great irregularity of the surface, the fauna of the middle and western portion of the continent have very irregular and broken areas, the more southern, while occupying the lower tablelands, extending also up into the lower mountain valleys to a limit varying with the latitude and the peculiar local condition of the valleys themselves. Above this basal zone are several other zones, which are continuous for considerable distances along the main chains, but also embrace distinct insular patches in the more isolated groups of mountains. The higher zones are still less regular in their continuity and in their respective areas, the highest having an arctic character, and occupying only the partially snow-covered summits that rise above the limit of tree growth.

FILARIA IN THE BRAIN OF THE WATER-TURKEY.

In the course of some explorations in Florida several years ago Professor Wyman ascertained that in a large percentage of cases the brain of the Florida water-turkey (*Plotus ankanga*) contained numerous specimens of a *Filaria* (*F. ankangæ*) in the space between the cerebral lobes and the cerebellum. The professor demonstrated the fact that these worms are viviparous, their oviducts containing eggs in all stages of development, from the egg just formed to the mature embryo. In the lower portion of the oviduct the eggs were hatched and ready for exclusion.

A more recent investigation has shown the professor the existence of both sexes of the *Filaria* in some specimens of the *Plotus*, while two contained female worms only. Where both sexes were present the eggs were found in various stages of development; in the others, where females only occurred, the oviducts were equally full of eggs, but there were no signs of impregnation, and no developmental changes. From these facts it seems almost certain that impregnation, with the *Filaria*, takes place in the head of the bird, and that unless both sexes are pres-

ent the brood fails. It is also inferred, on the supposition that the worms are migratory, that it is in the head of the *anlinga* that the sexual organs are developed, the young arriving there in an immature state. Every effort to find traces of this worm in other parts of the body, or even of the brain, failed entirely.

PHYSIOLOGY OF VIRUS.

Professor Chauveau has lately published an elaborate memoir upon the general physiology of virus, and sums up his inquiries with the following propositions: *First*, healthy or non-putrid pus has the power of producing inflammation in any conjunctive tissue with which it is brought in contact; *second*, this power belongs exclusively to the solid particles held in suspension in the serum, the latter, at least, not containing morbid elements of positive activity; *third*, the inflammation produced in the conjunctive tissue by these solid particles is not the result of mechanical irritation, but is brought about by means of a specially irritating power inherent in them; *fourth*, the activity of this property depends upon the intensity of the inflammatory process which has produced the matter experimented upon—very intense or moderately acute, with corresponding phlegmons, it becomes very weak, or almost nothing, in chronic phlegmons; *fifth*, the morbid action of the pus appears to be influenced by its age, that recently formed being more potent than that which is older.

The professor also remarks that it may be considered as well established that a putrid pus which produces mortal or gangrenous ulcers when brought in contact with tissue, becomes inert when freed, by filtering, of its solid particles.

REPORT ON ENCKE'S COMET.

The Washington Observatory has lately published a report, by Professors Hall and Harkness, of observations on Encke's comet during its recent return. It was first seen at Washington on the 11th of October last, and continued to be observed on favorable nights until the 7th of December. The observations on the movements and relations of the comet are detailed by Professor Hall, while the spectroscopic investigations were conducted by Professor Harkness. The results of the latter are summed up in the following propositions:

1. Encke's comet gives a carbon spectrum.
2. From November 18 to December 2 the wave length of the brightest part of the second band of the comet's spectrum was continually increasing.
3. No polarization was detected in the light of the comet.
4. The mass of Encke's comet is certainly not less than that of an asteroid.
5. The density of the supposed resisting medium in space, as computed from the observed retardation of Encke's comet, is such that it would support a column of mercury somewhere between $\frac{230}{1017}$ and $\frac{285}{1020}$ of an inch high.
6. There is some probability that the electric currents which give rise to auroras are propagated in a medium which pervades all space, and that the spectrum of the aurora is in reality the spectrum of that medium.
7. It is not improbable that the tails of all

large comets will be found to give spectra similar to that of the aurora, although additional lines may be present.

SPAWNING OF THE STERLET.

According to Professor Owsjannikow, the sterlet spawns in the Volga early in May, on rocky bottoms, the temperature of the water being at 54.5° F. The eggs are readily fecundated by the artificial method. After they have been in the water a few minutes they adhere to any object which they touch. The development of the embryo can be observed in progress at the end of one hour. On the seventh day they hatch. At first the young fish are about one-quarter of an inch long. At the age of ten weeks they are nearly two inches long. They feed on larvæ of insects, taking them from the bottom. Both in the egg, and when newly hatched, the sterlet has been taken a five days' journey from the Volga to Western Russia, and in 1870 a lot of eggs was carried to England to stock the river Leith. This species, like many other of the sturgeons, passes its whole life in fresh-water.

USE OF THE BILL OF THE HUIA BIRD.

A puzzling fact in natural history has been the difference in the shape of the bill of the male and female of a certain New Zealand bird, called the huia (*Heteralocha acutirostris*), which in the former sex is lengthened and much curved, while in the latter it is nearly straight. Mr. Buller, however, in a recent work upon New Zealand ornithology, remarks that the two sexes work together in extracting grubs from rotten wood, the bill of the male being adapted for attacking the more decayed portions of the wood, chiseling out the prey after the manner of some woodpeckers, while the female probes with her long pliant bill the other cells, where the hardness of the surrounding parts resists the chisel of her mate. Mr. Buller has sometimes observed the male remove the decayed portion without being able to reach the grub, when the female would at once come to his aid and accomplish with her slender bill what he had failed to do. He noticed, however, that the female always appropriated to her own use the morsels thus obtained!

ON ALCOHOLIC FERMENTATION.

An exhaustive essay upon alcoholic fermentation, by Professor Dumas, in an August number of the *Comptes Rendus*, is summarized by the London *Chemical News* as follows: No chemical movement excited in a saccharine liquor can convert sugar into alcohol and carbonic acid. The simple fermentation of a saccharine liquor and yeast may be regulated like any other chemical reaction. The duration of the fermentation is exactly proportionate to the quantity of sugar contained in the liquid. Fermentation proceeds more slowly in the dark, and in *vacuo*. No oxidation takes place during the fermentation. Neutral gases do not modify the fermentation, inducing action of yeast. Sulphur is converted into sulphureted hydrogen by the fermentation. Acids, bases, and salts can exercise an accelerating or retarding, disturbing or destructive, action on fermentation; but the accelerating action is more rarely observed. Very dilute acids do not affect fermentation, but acids

in larger quantity completely destroy it. The same applies to alkalies. Carbonated alkalies only impede fermentation when they are present in, or added to, the fermenting liquid in large quantity. Earthy carbonates do not interfere with fermentation. Neutral salts of potassa and of some other bases exert no influence upon the process. Silicate of potassa, borate of soda, soap, sulphites, hyposulphites, neutral tartrate of potassa, and acetate of potassa may be applied for the physiological analysis of ferment, and for studying its mode of action.

EFFECTS OF A SUPEROXYGENATED ATMOSPHERE ON ANIMALS.

In a communication, by Birt, upon the result of certain experiments upon animals kept in a superoxygenated atmosphere, it is stated that birds succumb whenever the proportion of carbonic acid generated amounts to twenty-five per cent., while dogs require thirty-five per cent. for a similar fatal result. It would appear that, in an atmosphere of this kind, it is not so much the carbonic acid contained in the blood, as that which accumulates in the tissues, which causes death. When the tissues are treated first by potassa, and then by sulphuric acid, it is shown that the accumulation is considerable in the liver and kidneys, but most in the brain. Carbonic acid abounds in the intestines, and also in the urine and the blood.

FAYRER ON POISONOUS SERPENTS OF INDIA.

An extremely important work from the pen of Dr. Fayrer, upon the poisonous serpents of India, has lately been published, embracing an account of all the species that are known to possess venomous characteristics. Dr. Fayrer has been well known by the publication of numerous experiments tending to show that the ammonia injection process of Dr. Halford, of Australia, is not the certain remedy for snake bite that has been claimed, and, indeed, that with serpents in India it has little effect. These experiments have been made by injecting the ammonia immediately after the bite of a cobra, by mixing the ammonia with the cobra poison at once, or by administering the ammonia by the mouth, and by subcutaneous injection, with the same result in all—death. The experiments of Dr. Fayrer show the importance of a prompt application of a tight ligature to the limb, above the bite, after which excision and the actual canterly are to be used. In the case of the finger or toe being bitten, amputation should be performed immediately at the next joint. A fowl bitten on two occasions by cobras had amputation of the wing performed each time, and survived.

Carbonate of ammonia or spirits of ammonia may be given, but with no more effect than spirits and water. Treatment, to be efficacious, must prevent the entrance of the poison. When the virus is once in the blood no known agent is capable of neutralizing it. Dr. Fayrer found that snakes have a great repugnance to carbolic acid, which acts as a sudden and fatal poison to them; for which reason carbolic acid is recommended for regions infested with poisonous serpents, as one of the best methods of preventing their entrance into buildings and outhouses.

The most poisonous snakes appear to possess a perfect immunity from the poison of their own

species, and a considerable immunity from that of other kinds. Indeed, the result of most of the experiments was to show that the cobra and some other serpents were unable to poison themselves or each other. The rapidity of the action of the poison seems to be in proportion to the warmth of the blood, birds dying very quickly; but the power of resistance, although generally in proportion to the size of the animal, is not invariably so, as a cat will resist poison almost as long as a dog of three or four times the size. Cold-blooded animals, as fish and non-venomous snakes, and invertebrates generally, are sure to die if bitten. In poison by the colubrine snakes the blood coagulates firmly, but in death by the viperine, according to Dr. Fayrer, it remains permanently fluid.

THE RINGS OF SATURN.

The rings of Saturn have always been an enigma to astronomers. La Place showed that if they were solid, and of the same thickness throughout, they would soon fall down on the planet and be destroyed. He therefore supposed them of irregular density. Not many years ago Professor Peirce found that the same catastrophe would occur even in this case, and he and Bond have concluded that they are fluid. It soon became doubtful whether a fluid ring would be any more stable, and Professor Peirce hence conceived the idea that it was held up by the attractions of the satellites. Mr. Hirn, a French physicist, has lately presented a paper to the French Academy, in which he maintains that the ring is neither solid nor fluid, but is a swarm of small particles, which looks solid owing to the great distance at which we see it. The idea is not new, as it was developed mathematically more than ten years ago by Mr. J. C. Maxwell, of England; but Mr. Hirn adduces some new arguments to its support. One of these is that when the ring is seen on its dark side, which is presented to us on very rare occasions, it does not seem absolutely black, a little light shining through.

SULPHOHYDRATE OF CHLORAL.

The sulphohydrate of chloral is a newly discovered substance, the chemical and physiological properties of which have been discussed by Mr. Byasson. It is prepared by submitting anhydrous chloral to a current of dry sulphureted hydrogen, various precautions being taken to render the experiment successful. The sulphide body, after being purified, is white, of a disagreeable taste, and of a peculiar odor, somewhat similar to that of chloral-hydrate. It crystallizes in right prisms, and readily evaporates, like camphor, its vapors blackening moistened paper impregnated with a soluble salt of lead. As this substance is decomposed by water, and alcohol containing any per cent. of water, its administration presents considerable difficulties. Rabbits treated by subcutaneous injection with quantities dissolved in ether, in moderate doses, exhibited an appreciable diminution of temperature, a relaxation of the muscles, with quiet slumber lasting for about two hours, no notable diminution of sensibility, and a slight acceleration of the beating of the heart, after the slumber the animal returning to its normal condition.

tract attention even if it were not the first novel by the famous poet and successful story-teller, JEAN INGELOW. The Skelligs are two rocks which constitute the westernmost point of British land, and rise up perpendicularly out of the sea like spikes. In calm weather they are serene and light, but in storms they become the dread of the mariner. The plot of the story, if it can be said to have a plot, turns upon the rescue by a yacht of part of the crew of a burning vessel off the Skelligs. The story has some wonderful passages in it—the description of the fire and rescue, for example—but it is uneven in character and inartistic in construction. The connection between the first and last part of the story is not apparent. Scarcely a single character retains its own consistent individuality or fulfills its early promise, and at the close there remains in the reader's mind a decidedly unsatisfied consciousness of much good material having vanished into air. While the book, as a whole, contains many fine passages and beautiful delineations, it falls short of the standard which attaches to the poetical writings of Jean Ingelow. —We come to *The Inglishes*, by MARGARET M. ROBINSON (A. D. F. Randolph and Co.), prepossessed in its favor by our recollection of a very pleasant previous story from the same pen, *Janet's Love and Service*. Like that, this is a story of a minister's family. David, the son, goes through various experiences of trial and temptation, and finally, though not till after his father's death, is converted and becomes a minister himself. There is rather more incident and life in this story than in its predecessor, though undoubtedly not enough to satisfy the craving of the average novel-reader. Its religious tone is peculiarly free from false sentiment, as its characters are from a sickly and unnatural pietism. Decidedly the authoress must be ranked as one of our best religious story writers.—EDWARD EVERETT HALE has three notable characteristics as a story-teller. He conceives a grandeur and nobility in life which by his pen he seeks to inspire in others both by the negative and the pos-

itive, the beckoning and the warning. He possesses a singular and indescribable fancy, and draws out and works up the oddest conceits, and with the most plausible air narrates the most impossible incidents. Every story has in it a philanthropic inspiration, yet his enthusiasm of humanity is not without a balance wheel of solid common-sense. His fancy never runs away with his judgment, but is used by it. These characteristics are illustrated by *His Level Best*, and *Other Stories* (James R. Osgood and Co.). The first story, which gives title to the book, describes in an amusingly exaggerated way the experiences of Mr. and Mrs. Boothby, who "meant well," but whose endeavor to do what was expected of them by society brought them to the poor-house. —*In Extremis*, by MRS. RICHARD S. GREENOUGH (Roberts Brothers), is a sketch which originally appeared as a serial in the *Christian Union*, in which form its artistic beauty was utterly destroyed. The picture is a sad one, nothing relieving its pathetic sombreness but the touches at the close which show the brilliant hues of the glorious heaven just beyond shining upon the closing hours of Helen. The idea of the story is an old one—the voluntary and unacknowledged sacrifice of a daughter for her parents' sake—but the setting is a new one, exquisite in conception and in the literary finish of its execution.—One hardly knows whether to class *Shawl Straps* (Roberts Brothers) with fiction or with books of travel. It is the latter under the guise of the former. The travelers are three girls, and their perpetual conversation, which sometimes becomes a chatter, gives to the tour a dramatic form if not a truly dramatic interest. Miss ALCOTT's style is so well known that we can not better characterize this little volume than by simply saying that it is her last book. It is always vivacious, but not always natural and simple. It contains a good deal of fresh information and but little that is stale, and on the whole affords a decidedly agreeable method of visiting the places it describes—Brittany, France, Switzerland, Italy, and Sweden.

Editor's Scientific Record.

DISCUSSION OF DEEP-SEA TEMPERATURES.

PROFESSOR MOHN, of Christiania, discussing in Petermann's *Mittheilungen* the results of the deep-sea temperature observations in the waters between Greenland, North Europe, and Spitzbergen, remarks that the deep basin of the polar sea is filled from bottom to top with an enormous mass of cold water, which on the southeast is encompassed by the warm waters of the Gulf Stream, and penetrates below its current to the coast of Europe. The principal discharge of the polar ocean takes place into the lower strata of the Atlantic, through the deep channel between Greenland and Iceland; while the shallow sea between Iceland and the Faroes hinders any further outflow, which is only permitted through the narrow lower portion of the Faroe-Shetland channel. The banks around the British Islands (the shallow North Sea and the Norwegian banks) prevent any other outflow southward; and those between the Bear Islands and Norway answer

the same purpose to the east. On the other hand, an immense mass of warm water extends from the deep abyss of the Atlantic northward over the shallow sea between Iceland and the Faroe Islands, as also above the Faroe-Shetland channel. Thence some part of the current passes the Norwegian coast and continues in two different arms, the narrower but deeper reaching to the north coast of Spitzbergen, while the second and broader arm expands over the entire sea of Nova Zembla.

The left bank and bottom of the Gulf Stream are formed by the ice-cold water of the Arctic Ocean; the right side, however, consists of the bottom of the North Sea and the banks connected with it, as also of the Norwegian coast to the Russian boundary. The Gulf Stream is warmest on the surface layer quite close to the coast of Norway (in the summer, of course), and from this point the strata exhibit a sensibly decreasing temperature with the increasing

depth, until we reach the stratum of the freezing-point.

Deep-sea observations in several of the Norwegian fiords, which are protected by their outlying banks from the great Atlantic depths, show that their water comes from the Gulf Stream, and they appear to be filled with this water to the very bottom, even when this lies lower than the ice-cold bed of the Gulf Stream off the coast. Thus the West Fiord, at a depth of from 100 to 320 fathoms, showed a uniform temperature of 44.6° F. in the summer of 1868, while outside of the Loffodens the observations of the *Norna* in July, 1871, at 35 fathoms, revealed a temperature of 44.6° F., and at 215 fathoms of 39.2°. To the southwest of Lindesnes and Lister, in June to August, 1871, at 150 to 250 fathoms, the temperature registered 42.8° to 44.6°, while in the Faroe-Shetland channel, at the same depth, the temperature decreased from 42.8° to 33.8°.

Attention is called by the author to the temperature indications of the *Porcupine* expedition in July, 1869, where, in the deep depression of the Atlantic Ocean, outside the channel, while the temperature at the surface was 62.6° F., at 2435 fathoms it was 36.5°, a decrease occurring abruptly below the first 50 fathoms, through the loss of the influence of the sun's rays, and then again at 700 fathoms, the difference between 900 fathoms and the sea-bottom amounting only to 2.7°.

Southwest of Iceland, to the west of the Rockall Gulf, at a depth of 300 fathoms, where the sea-bottom branches off from the greatest depression of the Atlantic, a uniform temperature of 44.6° was noted, while at the same depth on the east side of the Rockall the temperature was 48.2°.

In the Faroe-Shetland channel, and to the northeast of Iceland, at a depth of 200 to 300 fathoms, water was met with of 32° F., while in the neighboring portion of the Atlantic Ocean the temperature at the same depth was above 46.4°.

The general variation of the surface temperature amounts to 9° F., or even more, but becomes less as we descend, the decline, however, not being every where in the same ratio. Deep-sea strata reach their maxima and minima a little later than the surface layer.

PEOPLE USING THE BOOMERANG.

Colonel Fox, in his address before the Anthropological Subsection of the British Association, refers to the use of the boomerang in different countries, and remarks that he has traced this primeval weapon of the Australians to the Dravidian races of the Indian peninsula and to the ancient Egyptians; and he states that all these races have been referred by Professor Huxley to the Australoid stock, and that a connection between the Australian and Dravidian languages has been suggested by various philologists.

In reply to the objection that the Dravidian boomerang does not return, like the Australian weapon, he states that the return flight is not a matter of such primary importance as to constitute a generic difference, the utility of the return flight, due to the comparative thinness and lightness of the Australian weapon, having been greatly exaggerated. The essential principle of the boomerang consists in its bent and flat form,

by means of which it can be thrown with a rotary movement, thereby increasing the range and velocity of the trajectory.

In this connection the recent discovery by Dr. Edward Palmer of the use of the boomerang among the American Indians possesses a high interest. This gentleman, in the course of his explorations, found this to be the principal weapon among the Moqui Indians of Northern Arizona and New Mexico, replacing the gun and the bow and arrow. It is used more especially in killing rabbits, the motion by which it is thrown for this purpose being similar to that of a stone made to skip on the surface of the water. At a distance of twenty-five to thirty yards the rabbit is rarely missed, however rapidly he may be moving. The animal furnishes the principal meat eaten by these Indians, while its skin is worked into rugs and robes.

The wood of which the Moqui boomerang is made is obtained from the crooked branches of a species of walnut, procured by the barter of sheep, corn, etc., from the Navajoes, who own the locality (the cañon of Chelly) in which it is found.

More recently the same weapon has been detected, according to a communication to the California Academy of Sciences, among some of the tribes of the California Indians; and it is possible that further investigation will show a still more extended use of it among the Indians.

COINCIDENCE OF SOLAR OUTBURSTS AND MAGNETIC DISTURBANCE.

An interesting coincidence between solar outbursts and magnetic storms, if not a relation of cause and effect, is suggested by Professor Airy in a communication to *Nature*. In this, referring to an announcement by Father Secchi of a remarkable outburst from the sun's limb, which lasted nearly four hours, as witnessed by him on the 7th of July, he remarks that a magnetic storm commenced the same day, its influence upon all the instruments being unusually sudden and perceptible. The disturbance diminished gradually to the evening of the second day, and was accompanied during a part of the time by an aurora. If a connection really existed between the two phenomena, the transmission of the influence from the sun to the earth must have occupied two hours and twenty minutes, or a longer time if Father Secchi did not see the actual beginning of the outburst.

NOCTILUCINE.

A communication from Mr. Phipson appears in the *Comptes Rendus*, upon what he calls noctilucine, and which he claims to be a hitherto undistinguished organic substance, widely distributed in nature, and which constitutes the phosphorescent matter of animals, living or dead. This is not only the cause of the phosphorescence of dead fish and dead animal matter, but it is secreted by certain luminous worms (the *Scolopendra*, etc.), and probably by all animals which shine in the dark, and frequently by certain living plants (*Agaricus*, *Euphorbia*, etc.). It is also developed by the decomposition of vegetable matters, under certain conditions (fermentation of potatoes, etc.).

At the ordinary temperature noctilucine is an almost liquid, nitrogenized matter. It mixes

with water, but does not dissolve in it, and appears to have a density little less than this liquid. It is white, and, whether extracted from a living or dead animal, is luminous, and possesses an odor resembling that of caprylic acid. It is insoluble in alcohol and ether, and is dissolved and easily decomposed by the mineral acids and alkalis. When fermented in contact with water, it disengages an odor of cheese. When fresh, it is strongly phosphorescent, the production of light being due to its oxidation in contact with moist air. Indeed, it will shine as well in water as in air. It is a little more brilliant in oxygen gas; and it has been observed that it is always most lustrous when the wind blows from the southwest—that is to say, when there is most ozone in the air. As soon as the oxidation of all the matter is accomplished the production of light ceases. If the slightest quantity of air adheres to it, it shines for some moments in moist carbonic acid.

In phosphorescent animals noctilucine is supplied from a special organ—as the bile is secreted by the liver—and appears to be employed to produce light almost as soon as it is formed. It is also produced in certain conditions of temperature and moisture by dead animal matter of various kinds; but whatever its source, it always gives the same kind of light; that is to say, one that is almost monochromatic, giving a spectrum principally visible between the lines E and F, and possessing the same uniform chemical properties, as far as has been observed. It is secreted in a state of considerable purity by the *Scolopendra electrica*, and by causing several of these myriapods to run about on a large capsule of glass, enough can be obtained to allow an examination of its principal properties. From *Lampyrus* and the phosphorescence of dead fish it can always be obtained in a state of less purity.

The secretion of this substance by the luminous animals higher in the scale, such as *Lampyrus* and others, is, without doubt, up to a certain point, under the influence of the nervous system, this permitting them to shine at will. In this case the secretion is arrested for the moment, but it is known that the eggs of *Lampyrus* shine for some time after they are laid, probably from containing a small quantity of noctilucine. In the animals lower in the scale there appears to be the existence of a special organ for the production of light; and where we find scarcely any traces of a nervous system the secretion of luminous matter is often subject to external circumstances.

RATE OF GROWTH IN CORAL.

A suggestion in reference to the growth of coral is quoted by *Nature* from the *Honolulu Gazette* as follows: "Somewhat less than two years ago a buoy was moored in Kealakekua Bay. Last week the anchor was hoisted in order to examine the condition of the chain. The latter, which is a heavy two-inch cable, was found covered with corals and oyster-shells, some of which were as large as a man's hand. The large corals measured fourteen and a half inches in length, which thus represents their growth during the period of two years that the anchor and cable have been submerged. The specimens which we have seen show the nature of the formation of the coral by the coral ani-

mals very distinctly. The popular idea is that corals are of extremely slow growth, yet here we have a formation equal to a rate of over seventeen feet in a century."

CURE FOR ECZEMA.

Dr. Sacc, of Neufchatel, communicates what he considers to be a perfect specific against eczema, one of the most trying and painful of cutaneous maladies, and one very widely distributed. This is characterized by a redness of the skin, in spots, over all parts of the body, accompanied by small pustules filled with a colorless liquid, and by itching so persistent and varied as to produce not only sleeplessness, but even, at times, delirium. The usual remedies for this disease consist of emollient baths (iodized, sulphurized, or saline), as also the mercurial remedies. Dr. Sacc, however, has treated it for fifteen years by the application of acetic acid of eight degrees, rubbed night and morning upon the parts affected, until the disease disappears. Generally two or three applications are sufficient to effect a temporary cure. Each successive return of the disease will be weaker and weaker, and should be treated as at first, and finally the cure will be complete. The smarting caused by the first friction will be intense, but will soon cease with the other symptoms.

THE LOST COMET.

Just one hundred years ago a new comet was discovered by Montaigne. It was so faint and difficult of observation that no time could be fixed for its return. In 1826 a comet was found by Von Biela, and on computing the orbit it proved to be identical with that of 1772. Further investigation showed that it was also observed in 1805, but was not then recognized as the same. It was, therefore, a periodic comet, and the period of its revolution was found to be six years eight months. It has since been known as Biela's comet, from its discoverer of 1826. The next two returns were not favorable for its observation, so that it was not again satisfactorily detected till 1845. It was seen in November and December of that year by a number of observers, who noticed nothing unusual; but in January it was found to have suffered an accident such as was never before known to happen to a heavenly body, and of which no explanation has ever been given. It was split in two, and for some months was observed as two comets. In 1852 it appeared again, and now the two comets were nearly two million miles apart. They disappeared from view about the end of September, and have never been seen since, although they must have returned in 1859, and again in 1866 and 1872. The return of 1866 was quite favorable, but although the most powerful telescopes searched for it, all was in vain. The comet had vanished from the heavens.

The earth crossed the orbit of this comet about the end of November. Professor Newton was thus led to infer that, though lost to sight, the fragments of the comet would be seen about that time striking the atmosphere as shooting-stars. This prediction was fully verified by the event. On the evening of November 27, between the hours of six and eight, a remarkable shower of meteors was observed, the astronomers of the

Naval Observatory counting several hundred. And further, the direction of their motion corresponded, as nearly as could be judged, to that of the lost comet. In consequence, the Washington astronomers entertain no serious doubt that the meteoric shower was really caused by the earth's meeting the debris of the comet.

PHYSIOLOGICAL ACTION OF DELPHINIUM.

Recent researches made at the physiological laboratory at Leipsic have shown a remarkable action of the poisonous principle of delphinium, or the common larkspur, upon the muscular tissue of the heart. The lower two-thirds of the ventricle of the frog's heart have not, as is well known, the power of spontaneous rhythmical contraction when cut out and placed in a condition of isolation. If a portion of the base of the ventricle be included, however, in the piece cut off from the frog's heart, rhythmical contraction will continue in the isolated portion, on account of the presence in that case of some of the nervous ganglion cells which lie at the base of the ventricle. Dr. Bowditch has found that the introduction into its cavity of a solution of delphinium in serum acts upon an isolated lower two-thirds of a frog's heart ventricle like providing it with a nervous system. The portion of heart which, as is well known to physiologists, is invariably inert, now, under the influence of delphinium, exhibits spontaneous and continued rhythmical contractions.

NATIVE SULPHURIC ACID IN TEXAS.

According to a communication presented to the British Association by Professor J. W. Mallet, of the University of Virginia, sulphuric acid occurs native in certain pools in the midst of the open prairie to the westward of the Nueces River, in Texas. These pools are strongly acid, owing to the presence of free sulphuric acid combined with various salts, especially of aluminum and iron sulphates. At the bottom of some of these lakes there is a deposit in which sulphur is largely present.

A kind of petroleum is sometimes found oozing from the soil to such an extent that sods taken up with the spade can be ignited, and produce a considerable amount of light. Professor Mallet was informed by Confederate officers serving west of the Mississippi during the late war that during the blockade of Southern ports the galvanic batteries of the telegraphic offices in Texas and Southern Louisiana were worked with this sulphuric acid.

ARCHAEOLOGY IN AMERICA.

A few years ago Dr. Schmidt, of Essen, Germany, visited the United States for the special purpose of investigating certain questions connected with the archaeology and ethnology of America. He devoted special attention to the investigation of the crania of the aboriginal tribes of America, both ancient and modern, and after his return prepared a memoir detailing the result of some of his inquiries, which has just been published in the *Archiv für Anthropologie*. He passes in review various well-known crania, some of which are in the Army Medical Museum at Washington, Professor Whitney's Calaveras skull, the human pelvis found by Mr. W. Dickinson in the bluffs of

Natchez, and others, including the alleged discoveries of human remains in the post-pliocene beds at Charleston.

As a summary of his observations, he remarks that five well-authenticated instances of human remains of extreme antiquity have come to his knowledge: first, those referred to by Holmes in South Carolina; second, implements found in caves in Anguilla; third, the California skull; fourth, the human pelvis found in the bluff; and fifth, a skull found in a limestone fissure in the drift formation in Illinois, and presented by Mr. M'Connell to the Smithsonian Institution, by which it was transferred to the Army Medical Museum.

These he considers to be of much importance, since, until very recently, our knowledge of the early condition of the human race was extremely slight in any part of the world; and the California skull takes us at least beyond the glacier period, and, as Dr. Schmidt believes, is the very oldest monument of the human race in existence. He thinks that the ice period in America occurred simultaneously with that in Europe, and that consequently the primitive inhabitants of California must have lived even before those of the valley of the Somme and of the Neander.

The case, however, is complicated by the high condition of development of the California skull; this at least shows that the race must have experienced a considerable development at that time, while the contemporary implements are often met with in California, exhibiting a great deal of skill in their manufacture.

PREHISTORIC REMAINS AT SOLOUTRÉ.

Some interesting prehistoric remains have lately been found by Ferry and Asetin at Soloutré. This locality is situated at the foot of a high rock, and the surface is covered by broken flints. In the superficial layer there are fragments of pottery of the middle age period, but broken and entire bones of horses occur at a greater depth. Under this layer are found the food refuse, reindeer and horses' bones, stone implements, etc. The hearths are set off with flat stones. Remains of the cave lion and mammoth are also to be met with; and a rude drawing of a reindeer was found inscribed on a bit of slate.

The bones of horses were extremely abundant, the soil being filled with them in every direction. The most interesting discoveries were certain graves, consisting of rude stone boxes, partly in the earth and partly lying on the hearths. The skeletons of the adults lay upon large hearths, and those of the children on the smaller. According to Pruner-Bey, all the human remains belong to a Mongoloid race. The discoverers estimated the antiquity of the remains of this locality at about the earliest period of the reindeer epoch.

EFFECTS OF USING BROMIDE OF POTASSIUM.

Long-continued use of the bromide of potassium has, as is well known, a tendency to produce certain nervous diseases, which, according to Carles, present themselves under five different forms. The first is represented by acne; the second by ulcers of a dull yellow, having an offensive odor; third, red blotches, like purpura; fourth, by furuncles; fifth (the rarest of all), exhibits the appearance of eczema. Hitherto the

only known method of causing the eruptions to disappear has been to suspend or diminish the employment of the bromide of potassium; but as there are cases where its continued use is necessary, it becomes important to discover some other way of meeting the difficulty.

From the observations of Dr. Carles, he is satisfied that the bromide of potassium is chiefly eliminated by the urine, and that it only establishes itself under the skin, producing the effects referred to when elimination by the kidneys is incomplete. On this account, therefore, he suggests the use of diuretics, and the opening of the pores of the skin by means of hot baths; and he found a very remarkable measure of success by this treatment.

SPECTRUM OF NEPTUNE.

Mr. H. C. Vogel, of the observatory at Bothcamp, has spectroscopically examined the light of Neptune, the most extreme of the known members of our solar system, and found the spectrum of this planet identical with that of Uranus. Eight lines of absorption have been measured, and they coincided with those of Uranus. Red could not be perceived. This result differs somewhat from that of Mr. Secchi, who only considers the spectra of the two planets as very similar.

DRY METHOD OF CLEANING SOILED FABRICS.

Great progress has been made of late years in the method of cleaning soiled articles of dress, by removing tar, grease, etc., from wool and other raw material, this, as it appears, being accomplished best by the so-called dry method rather than by the use of a watery solution of soap or other alkaline substance. This originally consisted in subjecting the articles in a proper apparatus to immersion in benzine, gasoline, bisulphide of carbon, etc., with continued rotation of the apparatus. More recently, however, it has been ascertained that the vapor of these substances, caused by distillation, is more efficient than the liquid substances themselves, the articles thus treated being much more thoroughly penetrated, and more rapidly, than in the old way.

The articles are placed upon a grating over the liquid, the vapor from which permeates them completely as it is carried over into the reservoir, where it is condensed and is collected. In this form it contains grease in solution, which may be removed by a second distillation, while the hydrocarbon is obtained in a form for further use.

EFFECT OF BATHING ON THE HEAT OF THE BODY.

Dr. John C. Draper has lately published the results of some experiments upon the heat produced in the body, and the effects of exposure to cold, as determined, in his own case, by the use of the bath. He found that exposure for an hour to water at a temperature of about 74° lowered the temperature of the mouth 2°; of the armpits, 4°; and of the temples, 2°. The rate of respiration was also diminished—in one case two, and in another four movements; and that of the pulse twenty beats in one, and twenty-three in another case. It is therefore evident that the effect of the long-continued application

of cold is to reduce the temperature of the body, and to make the pulsation slower, and that it affects the pulsations more profoundly. One of the consequences of this effect of the cold on the action of the heart was a great reduction in the quantity of oxygen introduced into the system. The rate of pulsation being reduced nearly one-third, the quantity of oxygen introduced into the interior of the body was diminished in a somewhat similar ratio.

From this resulted an almost overwhelming and, indeed, uncontrollable disposition to fall asleep. A similar result to this sluggish movement of the blood is a disposition to congestion of the various internal organs.

In summing up the conclusions from the entire series of experiments, Dr. Draper remarks that the primary and most important effect of the application of cold to the whole surface of the body is to reduce the action of the heart. This reduction is still further increased on removing the cold, if the application has continued for a sufficient length of time; and, as a consequence of the reduction of the heart's action, the phenomenon of stupor, or sleep, appears, produced either by deficient oxidation or by imperfect removal of carbonic acid. There is also a tendency to congestion of various internal organs, especially of the lungs, and the establishment of a pulse-respiration ratio similar to that of pneumonia.

RELATION OF THE BAROMETER TO THE AURORA AND SUN-SPOTS.

Professor Hornstein presented a paper to the Academy in Vienna in which he demonstrates that the daily as well as the yearly fluctuations of the barometer are intimately connected with the polar lights and the sun-spots. Thirty years ago Professor Lamont suggested that the daily variations of terrestrial magnetism and the daily oscillations of the barometer might be influenced by the electricity of the sun. This hypothesis seems to have been verified by Mr. Hornstein's researches.

PREHISTORIC REMAINS IN WYOMING.

According to Dr. Leidy, the plains and ravines of the buttes, and the lower mounds at the base of the larger buttes, near Fort Bridger, in Wyoming, are thickly strewn with stone fragments, sharply fractured in such a manner as to have the appearance of artificial origin. Mingled with them are many implements of the rudest construction, while there are some of the finest finish. Between these and the stone sprawls, of less doubtful or natural origin, there occurs every variety of form, so as to render it impossible to say where nature ceased her labors, and where primitive man commenced his.

The material of these splintered stones consists of jaspers, quartzites, some of the softer rocks of the buttes, and less frequently of black flint, the last probably transported by human agency from the locality of its natural occurrence, as it is only known to occur in position in the tertiary strata of Henry's Fork of Green River. In visiting a party of Indians encamped near Fort Bridger, Professor Leidy informs us that the only stone implement found among them was one called the teshoa, obtained from a quartzite boulder by a single smart blow made with

another stone, and used for scraping the green hide of the buffalo.

In an Indian grave, exposed to view by the wearing away of the edge of a bluff, he found a teshoa and some perforated canines of elk, which are highly prized by the Shoshones as ornaments. This form of adornment is quite common to primitive man, as it occurs abundantly in the shell heaps of New England, and among the prehistoric remains found in France, Germany, and Switzerland.

ILLUSTRATIONS OF NORTH AMERICAN ENTOMOLOGY.

Under the modest title of *Illustrations of North American Entomology*, Professor Townsend Glover, of Washington, has commenced the publication of what promises to be one of the most important works in practical natural history ever published in this country. It is intended to embrace fully detailed figures of all the species of American insects that stand in a noxious or beneficial relation to the farmer, including accurate figures of all stages of development, as well as illustrations of the methods by which their ravages are prosecuted.

The first part, recently published, is devoted to the *Orthoptera*, embracing the grasshoppers, crickets, mantis, cockroaches, earwigs, etc., among them, of course, many of the most destructive pests with which North America is afflicted. The accompanying text gives a description of these insects, an account of their habits, and the methods by which their ravages can be best met; and by an ingenious system of tables the student is enabled to determine, within a very short time, the name of any given insect before him, and the cross references from insect to plant, and from plant to insect, leave nothing to be desired.

The portion on the *Orthoptera* embraces thirteen plates, and that on the *Diptera*, which is in an advanced state of preparation, will include a considerably larger number. The whole work will probably require nearly 250 octavo plates, with some 5000 figures, and all of these, with the exception of twenty or thirty, are already engraved on copper by Professor Glover himself.

The only adverse criticism we have to make upon the book is the small number of copies published by the author, the edition having been limited by him to fifty, and intended exclusively, in its distribution, for entomological societies at home and abroad. A book like this, which must necessarily be a manual of reference not only for entomologists, but for every farmer and horticulturist, should be available to all who choose to purchase it, as it meets a want that has long been felt, and which no other publication in this country has ever supplied.

CHANGE OF LEVEL IN THE NORTHERN SEAS.

According to *Notice, No. 89*, just published by the Hydrographic Office at Washington, the principal results of the explorations in the Northern seas about Nova Zembla during the past year prove that the waters are completely free from ice for five months in the year, during which period they are navigable along the northwest coast of the island as late as September, while the sea east of it was not only free from ice, but had a temperature of about 43° F. in the month

of September. The position and contour of Nova Zembla on the map has been considerably changed, as it has been shown to reach north to latitude 77°, and east to longitude 69°, and Cape Nassau lies twenty-two miles farther southwest than the position given to it hitherto.

A very interesting discovery is that of the Gulf Stream islands, in the exact place where the examinations of the Dutch expeditions in 1594 to 1597 located a sand-bank with eighteen fathoms of water over it, the depth of water between it and the coast being fifty to sixty fathoms. This would indicate that the sea-bottom in that region has risen more than 110 feet in three hundred years, a very remarkable fact. According to Mack, these islands are six miles from the coast, the north point being in latitude 76° 22', longitude 63° 38'. They consist of sand and rock, being bare, with no trace of vegetation. Petrified shells are found on the firmer parts of the surface.

CARBONIC ACID OF SEA-WATER.

Mr. Lant Carpenter, who has been investigating the amount of gaseous constituents in samples of deep-sea water obtained during the *Porcupine* expedition of 1869-70, remarks that the analyses show that both surface and bottom water contain more carbonic acid and less oxygen in the more southern than in the more northern latitudes. The examinations made embraced samples taken from localities extending from the Faroe Islands to Lisbon. Contrary to the general supposition, however, he reports that there is no greater quantity of dissolved gaseous constituents in the bottom than in the surface water, although he fully admits the power of pressure at great depths to retain gases in solution if once evolved there.

ON THE PHYSIOLOGY OF SLEEP.

In an elaborate paper upon the physiology of sleep, Dr. Henry B. Baker takes the ground that the general cause of normal sleep in man and animals is the accumulation in the organism of the products of oxidation, and mainly of carbonic acid, that accumulation being favored and controlled by reflex action of the nervous system, which thus protects the organism from excessive oxidation, and also allows of sufficient accumulation of oxidizable material to enable the organism to manifest its normal functional activity throughout a succeeding rhythmic period.

FOSSIL ELEPHANT IN ALASKA.

Among other collections brought back from Alaska by M. Pinart was a tooth of a fossil elephant, which has been reported upon by Mr. A. Gaudry. This specimen is considered to be the sixth upper right molar of *Elephas primigenius*, in a state of preservation which will scarcely permit it to be called a fossil. There are certain peculiarities of the teeth, as with the Old World *primigenius*, which seem to indicate the fact of a well-marked race, although scarcely worthy of a specific distinction. The most important difference is the greater number of transverse plates—namely, one plate for each centimeter, instead of a decidedly smaller proportion. The enamel is said to be peculiarly thin. The analogy between the European and American mammoth, in Mr. Gaudry's opinion, indicates the probable

existence of a communication between the Old and the New World during the first portion of the miocene period, especially as the miocene fossils of France have striking analogies to those of Nebraska, and there are equally well marked relationships between the plants of Europe and North America in that same locality.

PHYSICAL GEOGRAPHY OF THE RED SEA.

The Hydrographic Office has lately published a pamphlet on the physical geography of the Red Sea, translated from the German of Captain W. Kropp, of the Imperial Austrian navy. The article contains an account of the formation of the coast, the winds, the clouds, the amount of atmospheric precipitation, the temperature and pressure, the saltness and temperature of the sea, the currents, tides, depths, etc. The tables of temperature given well bear out the reputation of the Red Sea in regard to excessive heat, the maximum temperature ranging from 80° in November to nearly 105° in July; and the minimum in November and December being about 58°. This temperature in itself, although indicating one of the hottest regions on the globe, would not be unbearable were it not for the enormous amount of the moisture in the atmosphere, which makes it a perpetual hot bath.

The Red Sea is an exception to the general rule that deep water approaches close to high and rocky shores, while a low and flat shore indicates shallow water. Although the sea is surrounded almost entirely by a flat sandy coast, the depth of the water up to the land is very considerable. The descent is gradual in a few localities, the bottom of the sea forming plateaus, with sudden and steep descents from one to the other in some cases.

INJECTION OF SEPTICÆMIC BLOOD.

According to a communication from M. Davaine upon the subcutaneous injection of septicæmic blood (that is, blood derived from an animal poisoned by putrefied blood), the virus acquires increased intensity and power by passing through the animal organism. This follows as the result of twenty-five series of experiments on rabbits and Guinea-pigs, and the accumulated intensity of power became so tremendous that "the blood of the rabbit killed by the ten millionth part of a drop was injected into five rabbits in doses of the one hundred millionth, the billionth, the ten billionth, the one hundred billionth, and the trillionth of a drop. All died within twenty-five hours."

IMPROVED LIQUID GLUE.

An improved liquid glue, according to the *Journal of Applied Chemistry*, may be prepared by dissolving three parts of glue, broken into small pieces, in twelve to fifteen parts of saccharate of lime. On warming, the glue dissolves rapidly, and remains liquid when cold, without losing its strength. Any desirable consistency may be secured by varying the amount of saccharate of lime.

The thicker glue keeps its muddy color, the thin becomes clear, on standing. The saccharate of lime is prepared by taking one part of loaf-sugar and dissolving it in three parts of water, adding to the sugar one-fourth part of its weight of slacked lime, and heating the whole to 145° or

165° and allowing it to macerate for several days, with frequent shaking. The greater part of the lime will be thus dissolved, and the solution may be decanted from the lime sediment, which has the properties of mucilage.

The solution of the glue in the saccharate of lime may be made very readily, and even old gelatine, which has become insoluble in water, will be easily dissolved. The glue has great adhesiveness, and admits of very many uses.

CONVERSION OF INDIGO-BLUE INTO INDIGO-WHITE.

It is well known that if, in any manner, one equivalent of hydrogen be added to indigo-blue or commercial indigo, the former becomes changed to a substance known as indigo-white; and that if yarns be impregnated with this, without being previously mordanted and exposed to the atmospheric air, the indigo-white loses one equivalent of hydrogen by the absorption of one equivalent of oxygen, and is again transformed into indigo-blue, the fabric or yarn becoming a genuine blue color. This transformation of indigo-blue into indigo-white, according to Professor Böttger, can be made very readily by boiling the finely powdered indigo with a solution of stannous hydrate of tin in caustic soda.

FIFTH REPORT OF THE PEABODY MUSEUM, CAMBRIDGE.

The fifth annual report of the trustees of the American Peabody Museum on American Archaeology and Ethnology, as presented by its director, Professor Jeffries Wyman, has just been published, and, like its predecessors, shows a gratifying evidence of that progress which has already made this museum the foremost collection of the kind in America as regards the ethnology and archaeology of the Old World. The collection is extremely rich in every thing illustrating the stone age of Denmark and Sweden, the reindeer period of France, and the lacustrine period of France, Switzerland, Italy, etc.; indeed, the number of European collections equally full must be very small. During the year 1871-72 a large part of the archaeological collection of the late Dr. Clement, of St. Aubin, was obtained, and the remainder was procured during the present year. This is extremely rich in specimens from the ancient dwellings of Lake Neufchatel.

The report chronicles the result of several explorations made under the auspices of the museum, among them that of Rev. E. O. Dunning in Tennessee. The specimens obtained during his investigations of certain caves and mounds were extremely important, particularly in reference to the objects of ornamented shell, which, as is well known, are very rare. Some very interesting specimens of pottery were also obtained in the same connection.

Professor Wyman recounts his own explorations in Florida, which he has been in the habit of visiting for several years past. Among these the most remarkable is one at Silver Spring, on the western side of Lake George, near Pilatka, from the fact that the lower part of the shell deposit is cemented by lime, uniting the whole in a solid mass, in which were inclosed the bones of the eatable animals, and implements of shell and bone, as in the ancient caves of France.

expression of opinion and his statements of fact. —*Art Education, Scholastic and Industrial*, by WALTER SMITH (James R. Osgood and Co.), will be valuable chiefly to those who are attempting to develop taste for art, and to introduce art education into our common-school system. Mr. Smith is unmistakably a practical teacher, and knows whereof he writes. His style is often involved and obscure, but his thoughts are worthy of study. His book includes not merely a general discussion of art education and its importance in a commercial point of view; it not only affords much valuable information derived from experiments in English art schools for the masses, with which he is familiar, but it also discusses the principles of industrial art and the proper methods of art study. The illustrations are sketchy and artistically imperfect, but as studies for the art student they may do as well or even better than finer work. —Mr. CHARLES HALLOCK describes the object of the *Fishing Tourist* (Harper and Brothers) in his preface. It is not a eulogy of fishing sports, nor a rhapsody on nature, nor a marvelous store of fish stories. "My province," says he, "is simply to write an Angler's Guide without embellishment; to tell where fish are to be caught, and when and how; to show

the sportsman the shortest route to pleasure, the best means of conveyance, the expense thereof, and the secrets of the commissariat." But in this description of his book the author hardly does himself full justice. There is not a trace of the dullness of a guide-book in his pages. His pictures are drawn with so deft a hand that he carries you into the forests despite yourself. Though while we write the thermometer ranges in the vicinity of zero, the snow lies two feet on the level, and the brooks are all snugly enshrouded beneath icy coverlets, we find ourselves standing in imagination, rod in hand and fish in basket, on the green bank, with the music of the gurgling brook singing in our ears. Mr. Hallock writes with an easy *négligé* elegance which gives his book a peculiar charm, and with a quiet assurance of knowledge which gives it peculiar value, and renders him one of the most charming of all spring-time companions since the days of Izaak Walton. His book is divided into two parts, the first giving a general description of the salmon family—"the only fresh-water fish, excepting the black bass, worthy the name of game fish"—and the proper means for successfully cultivating their acquaintance; the second giving an account of the chief localities where they are to be found, and how to get to them.

Editor's Scientific Record.

SUMMARY OF SCIENTIFIC PROGRESS.

OUR summary for the present month is intended to include the more interesting announcements in theoretical and practical science which have been made since the beginning of the year 1873, or which, belonging to 1872, have but recently come to our notice. There is little to record of special importance, although, as the result of the investigations of the vast multitude of persons constantly engaged in the prosecution of scientific labors, every day yields something of more or less moment.

Astronomy. In view of the importance of concentrating the attention of astronomers of both hemispheres upon the special phenomena of the heavens, and particularly to secure the prompt co-operation of all interested in the investigation of newly appearing asteroids, comets, meteoric showers, auroras, etc., Professor Henry, at the suggestion of eminent astronomers in the United States and Germany, applied to the directors of the Atlantic cable for the privilege of passing such notices over its wires free of expense. A similar application was also made to the Western Union Telegraph Company of the United States. Satisfactory responses were made to these requests, and both companies placed the services of their lines at the disposal of proper parties for such announcements. It has therefore been arranged that notices from the United States are to be forwarded to the Smithsonian Institution, by which they will be transmitted to England, France, and Germany; and similar information from Europe will be sent first to that institution and be thence distributed, by means of the telegraph, to parties interested, or published in the columns of the Associated Press. This arrangement, which

has been hailed with acclamation by scientists in both Europe and America, was first applied to a practical purpose in communicating to Europe the information of the discovery of two new telescopic planets, both of them detected by Professor Peters, of Hamilton College, New York; the first, No. 129, on the night of February 7, and the second, No. 130, on the 19th of the same month. No. 129 is of magnitude 9½, and the other of 11.

Professor Yarnell announces the completion of the catalogue of stars, upon which he has been engaged for many years at the National Observatory. This, when published, will be of great value, and will supply a want long felt.

The American committee for the observation of the transit of Venus in 1874 still continues its labors, and the superintendent of the National Observatory has lately published Part II. of the instructions connected with the proper mode of conducting the observations and determining the results. Nearly all the leading nations are interesting themselves in this matter, and it is with much pride that we claim for the United States a foremost place in the efforts made to utilize the occasion to the utmost.

In the department of *Meteorology and Terrestrial Physics* we have some important suggestions by foreign specialists; among others, Mr. Meldrum, Mr. Lockyer, and Mr. Symons. In regard to the connection between the sun-spot period and the condition of the atmosphere, the anticipation is expressed that we shall be able before long not simply to predict the changes for a few days in advance, but to determine them for possibly an entire season.

A great advance in the system of weather telegraphy in the United States has lately been

made for the special benefit of the farmer, previous arrangements having been more directly serviceable to the mariner. The whole region of the United States has been divided into about two hundred districts, with a central station established in each, to be provided with an observer. As soon as the forecasts are made from the night observations the result for each particular region is to be telegraphed from Washington to the central station in that district, and there printed (in a daily paper or otherwise), and a copy of this is to be mailed at once to every postmaster within easy reach, who is instructed to hang it up in his office, where it can be inspected by any person curious to ascertain the probabilities for the day. As these dispatches will generally be published in a morning paper at the station, they can reach almost any post-office within the district before the information will be too late.

A further extension of the system of weather telegraphy is contemplated to the light-house and life-saving establishments, and the principal fishery stations on our coast, by means of which, among other points, information can be obtained and transmitted in reference to the movements of the food fishes of the coast.

A remarkable electric storm took place in the Western States during the nights of the 7th and 8th of January, the particulars of which are given in our pages, embracing some points of special interest, especially in reference to the disturbance of the telegraphic wires running east and west, and the comparatively trifling action on those extending north and south.

Preliminary to the establishment of a submarine cable between the coasts of the United States and Asia, legislation has been secured from Congress directing the Secretary of the Navy to cause soundings to be made for the most suitable route. This work will probably be entered upon during the present year, and valuable results bearing upon the question of telegraphic construction may be expected.

Dr. Carpenter announces many interesting facts in reference to the gaseous contents of the water of the Mediterranean, his recent observations verifying a suggestion already made by him, that in this great sea the water below a certain depth shows a large excess of carbonic acid, and a corresponding deficiency of oxygen. This affects very materially the question of animal life in the water, and it has been found that below 150 or 200 fathoms its amount is unusually small. The prime cause of this, in Dr. Carpenter's opinion, is due to the want of circulation of the Mediterranean, since, while there is an immense volume of water continually pouring in through the Straits of Gibraltar, there is no bottom current outward of any moment; this being prevented, first, by the very rapid evaporation of the water; and second, by the presence of a bar at the mouth of the sea, which cuts off the return current.

In *Mineralogy and Geology* we have the very important announcement of the existence of tin ore in Queensland in great mass. Similar discoveries alleged to have been made on the north shore of Lake Superior are unfortunately considered very questionable, it being maintained that the tin-bearing specimens brought thence had previously been transported from Cornwall!

In consequence of the value of tin for technological and domestic purposes, and its increasing scarcity, any material addition to the number of mining localities of this metal can not fail to exercise a powerful influence upon the interests of the world.

The announcements of new species and varieties of minerals continue to be made, several having been indicated since the beginning of the year.

It is well known that within a few years past we have become familiar with the idea of recent glaciers in North America, principally through the labors of Mr. Carter, Mr. Clarence King, and others. We are now informed of their occurrence in the Merced group of mountains in California, Mr. Muir, who has been engaged in the investigation, being positive that he has discovered genuine objects of this character.

As usual, *Geography* occupies a large place in our summary, including reports of progress of expeditions already under way, and the notes of preparation for others to come. Nothing has been heard from Dr. Livingstone since the beginning of the year, the latest advices from him being in November last. Several expeditions have started, however, to take up the line of African exploration: one from England, known as the Livingstone Congo Expedition, under the charge of Lieutenant Grandy; another, fitted out in Germany, intended likewise to explore the region of the Upper Congo. The Grandy expedition, at last advices, had reached Sierra Leone, and had started for the interior; the German had not yet commenced its labors.

Sir Bartle Frere, who has been charged with a mission in connection with the slave trade in Eastern Africa, has reached Zanzibar, and entered upon his duties. It is also stated that an Egyptian expedition, under General Purdy, was on its way to enter Africa from the same direction. Mr. Blyden has published an account of his journey to Fallaba from Sierra Leone with a view of making a treaty with some of the interior tribes.

Nothing new has been heard from the polar expeditions since the beginning of the year, although the papers have contained an entirely fictitious account of the discoveries of Octave Pavy in Wrangell's Land, off Northeastern Siberia. This account narrates in most minute detail the encountering by Mr. Pavy of herds of frozen mammoths and other remarkable curiosities, but we can assure our readers that the whole story is a fabrication, Mr. Pavy not having yet left San Francisco (according to the papers of that city) on his projected expedition.

Efforts were made by the British scientists to induce their government to fit out an expedition for arctic research during the coming season. In this they have failed, owing, it is said, to the great expense consequent upon the *Challenger* expedition, which has started upon its three years' circumnavigation, having for its special object the investigation of the physics and natural history of the deep seas both of the Atlantic and Pacific oceans.

The results of several important deep-sea explorations during the past year have been published with more or less detail; among them, those prosecuted by Messrs. Verrill, Smith, Packard, and Cooke in connection with the work of

the United States Commissioner of Fish and Fisheries.

Mr. Smith, of the British Museum, whose publication of an Assyrian tradition of the Deluge has excited so much interest, has visited Assyria, at the expense of a London journal, for the purpose of prosecuting additional explorations, and thereby increasing the Assyrian ethnological collection of the British Museum.

The United States has not been behindhand in performing its part in connection with the labors of general exploration. The surveys for a feasible route for a ship-canal across the Isthmus of Darien and through Nicaragua have been resumed during the winter, and are now in active operation. Both of these are under the Navy Department, which has also fitted out two steamers, the *Portsmouth* and the *Narraganset*, for a hydrographical survey of the Pacific Ocean, in connection with which inquiries into the physical and natural history of the sea will be prosecuted.

Dr. Neumayer, of Vienna, is making some progress in his plans toward the exploration of the south pole, and hopes to be able to secure sufficient aid from the government and from other parties to permit him to start during the present year.

The first part of the final report of the German expedition to East Greenland (composed of the *Hansa* and *Germania*) has just been published, and is occupied principally by a history of the measures preliminary to the enterprise, the instructions for the guidance of the voyagers, and a narrative of the disastrous fortunes of the *Hansa*. The succeeding volumes will contain the story of the *Germania*, and a systematic statement of the scientific results.

Professor Orton, who is already known for his explorations in South America, proposes to revisit the region of the Upper Amazon and the Andes, for the purpose of securing additional facts, and also specimens, for Vassar College. He is desirous of receiving contributions toward his object, for which he will furnish duplicates of his collections. Professor C. F. Hart, whose name has long been associated with explorations in Brazil, will again revisit that country, with designs similar to those of Professor Orton.

Numerous reports have been published during the winter of the government explorations in the Western country, these forming either accounts of progress or their final history. Among the expeditions illustrated in this way are those of Lieutenant Wheeler, in Arizona; of Major Powell, on the Colorado; Governor Langford, on the Yellow Stone Fork; Colonel Barlow, on the Yellow Stone River, etc. That of Professor Hayden, detailing the general results of his labors in the Yellow Stone region, it is understood, is in an advanced state of preparation.

Under the head of *Zoology* we may mention first what has been done in the department of anthropology. This embraces the announcement of some interesting discoveries in Europe. Among them is that of a remarkable skull, corresponding in antiquity to those of Enghis and the Neander Valley, found at Nagy-Káp, in Hungary, and the finding of specimens of the African money or cowry shell in a prehistoric grave in Pomerania. A prehistoric sacrificial mound has also lately been detected in Aus-

tria, belonging to the bronze period. Implements of this metal, as well as those of polished stone, were found mixed with the remains of animals and of men supposed to have been sacrificed in connection with religious ceremonies.

The celebrated collection of specimens of ancient Phœnician, Greek, and Roman art from the Isle of Cyprus, made by General Di Cesnola, the United States consul in that island, has been secured, after much competition, for the city of New York, and will form a prominent feature in the new Museum of Art in the metropolis.

Discoveries of interest have also lately been made in the Great Pyramid of Ghizeh, consisting of a bronze instrument, a round ball of granite, and pieces of wood, possessing an antiquity of many thousands of years, and probably not seen by any one since the creation of that gigantic monument of history until the present time.

American paleontologists continue their announcements of discoveries of fossil vertebrates in the West, especially Professor Marsh and Professor Cope. In addition to the accounts already briefly indicated by these gentlemen, we have from Professor Marsh a highly important announcement of the existence of a new subclass of birds, which he calls *Odontornithes*. This is characterized by the possession of biconcave vertebræ, probably of a lengthened tail like the *Archæopteryx*, and of teeth in both jaws, the cranium in some respects resembling that of the pterodactyl, but possessing the quadrate bone of the bird. It remains yet to be seen, however, how far this class, or sub-class, differs from the *Saururæ* of Huxley, based upon the *Archæopteryx* referred to.

The births at London during the past winter of a young hippopotamus and a young rhinoceros have excited considerable interest among all classes of naturalists, in view of the rarity of such occurrences in menageries. Unfortunately the rhinoceros did not survive many weeks; the hippopotamus, however, at latest advices, was reported to be in good condition.

Some important *Entomological* publications have appeared in the United States since the beginning of the year, among them, one of great value, is the first part of a work by Professor Glover upon American insects. This is devoted to the *Orthoptera*, and embraces excellent figures of nearly all the known species of our country, especially those intimately related to agriculture. This will be followed by the other orders as fast as they can be prepared, the whole work, including about 250 plates, being in an advanced state of completion.

The work of Mr. Edwards on the North American butterflies has also reached the end of the first volume, which is admirably embellished by illustrations that leave nothing to be desired.

The Smithsonian Institution is printing the third volume of the monographs of American *Diptera*, by Professor Loew, and of *Neuroptera*, by Mr. H. De Saussure.

Professor Edwards, of Paris, has concluded, as the result of a careful examination of the genus *Limulus*, of which the common horse-shoe crab of our coast is the best known instance, that this can be referred neither to the *Arachnida* nor to the *Crustacea*, but that it constitutes the type of a new class in the animal

kingdom, the *Merostomata*, which, though very scantily illustrated at the present epoch, formerly abounded in genera and species.

The discovery of a new *Entozoon*, found in the human blood in certain cases of disease in India, especially of chyluria, has lately been announced. This occurs in such numbers that a single drop of blood taken from any part of the body has been found to include as many as half a dozen. They are extremely minute—much smaller, indeed, than the *Trichina spiralis*, and present many peculiarities of great interest.

As usual, progress continues to be made in the department of *Agriculture and Rural Economy*, announcements of which are made in the popular and scientific journals of the day. No publication since the beginning of the year appears to be worthy of special mention, and to indicate all those of comparative interest would occupy our pages to the exclusion of every thing else. We may state, however, that the ravages of the *Phylloxera vastatrix*, or grape-vine louse, continue to excite the greatest apprehensions in regard to their effect upon the vineyards throughout Europe, those of France, except in a few favored localities, being threatened with destruction. No practical remedy seems hitherto to have been devised, although flooding the roots of the vine with water during the winter season, whenever practicable, seems to be considered with favor. Applications of preparations of arsenic, of soot, of sulphide of carbon, and other noxious substances are also recommended; but unfortunately, in most cases, they destroy the plant quite as effectually as they do the insect.

The question of the *Fisheries* is one of much moment to the nation, as constituting a very prominent feature of its domestic economy. Under this head we have to record the reports of the Fish Commissioners of the States of Maine, Massachusetts, and New Hampshire, in which the measures taken for the preservation and propagation of the food fishes are indicated. These relate principally to the salmon and the shad, the efforts made in connection with these being regarded as most important. The Commissioner of Fisheries on the part of the United States has been occupied toward the same end, and his labors during the winter have been principally connected with the salmon. Of these he has distributed from the stock of eggs obtained at the establishment in Bucksport, Maine, under the direction of Mr. Atkins, large numbers to Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio, Michigan, and Wisconsin, which, when hatched, will be placed in the waters of these several States.

A large importation of salmon eggs was made by the Commissioner from Germany, which, however, owing to the exceptional warmth of the season in Europe during the present winter, came in an unsatisfactory condition, and only a small percentage was capable of being hatched out.

The importance of the fishery interest has caused the initiation of measures by the Legislatures of Michigan, Illinois, Indiana, and Pennsylvania for the appointment of State Commissioners to co-operate with the United States Commissioner of Fish and Fisheries, and with those of other States, in efforts toward the common welfare.

An experiment has been made during the winter in the way of transporting eggs of salmon from London to New Zealand. This consists in the arrangement of boxes of eggs and blocks of ice alternately, in a compartment of the vessel, with an external packing of charcoal. By means of this precaution it is hoped that the proper degree of cold can be retained throughout the voyage, which will probably occupy four to six months.

The trade in frozen herring in the Bay of Fundy has been active during the past winter, at least one hundred cargoes having been shipped to western points, representing a value probably of \$150,000. Application has been made by the merchants of Eastport, Maine, in view of this trade, for the establishment of a signal station at that point for the purpose of securing early information of impending changes in the weather, which would determine largely the extent to which this business may be prosecuted from time to time throughout the season.

The impending extermination of the seals in the arctic waters has induced persons interested in that trade to urge the establishment of a close time to the business of their capture. The 6th of April has been fixed on as the proper date to begin the fishery, and it is proposed to determine by international treaty that no captures shall be made before that date. The destruction of the very young seals, and of the gravid mothers prior to that time, is considered the great cause of the alarming decrease in the numbers of this useful animal.

Under the head of *Domestic Economy* we have to record the announcement of several comparatively new methods of preserving meats fresh for a considerable period of time. One of these processes is that of Dr. Endermann, which consists in drying the meat in thin slices, at a temperature of about 140° F., and afterward grinding it up into fine powder, which may then be kept, properly secured, for a great length of time, and used in the preparation of soups or other dishes. Boussingault throws out a hint in this connection that may be very important, namely, that if meats and vegetables are hermetically sealed, and exposed to a temperature below zero F., they will keep for a long time. Preparations made by him in 1865 have stood the test to the present day with entire success.

A valuable memoir has been published by the State Department on the cultivation of tea in Japan, giving the indications of the method by which this is accomplished, and presenting suggestions in regard to the article as exported to America. When we consider that this country receives over fifteen millions of pounds annually from that country, while the entire amount sent to other parts of the world is but a few thousand, the importance of such suggestions may be readily understood.

The most notable engineering feat, under the head of *Mechanics and Engineering*, is the perforation of the Hoosic Mountain, the two parties engaged in tunneling having met, near the centre, on the 28th of December, and having made an opening sufficiently wide to pass through. The tunnel itself, of course, will not be finished for some time; but it is hoped that before long trains will run regularly through,

thus greatly facilitating the increase of communication between Eastern New England and the West.

A valuable account of the mining and mineral statistics of the West is furnished by the report of Professor Raymond for 1871. His work, as is known, is prosecuted under government auspices, and the information communicated year by year is considered of great value.

Under the head of *Technology* we have nothing special to indicate, the inventions and announcements being of course numerous, as usual, but none being particularly noteworthy. We may, however, refer briefly to the introduction into the trade of the article known as *ceresine*, obtained by distillation from ozokerite (a fossil wax obtained in Austria), which has the properties of white wax, and makes candles of great illuminating power, and superior to those of any other material.

The process of electroplating tin on metallic objects, with a view of subsequently depositing silver upon them, is also detailed in the journals. This has the advantage of presenting a white surface should the silver coating be worn away. Improved methods of fire-plating, by which a coating of metal is driven into the pores of the subjacent material by the action of fire, are also announced.

Under the department of the *Materia Medica, Therapeutics, and Hygiene* we may refer to the modern use of koumiss as a remedial agent. This is a preparation of fermented milk, originally prepared in Tartary from mare's milk, but which is now manufactured in Russia, Germany, and elsewhere from the milk of the cow, goat, etc. It is claimed to possess remarkable tonic and invigorating properties, which, if sustained, will doubtless cause its rapidly increasing use throughout the world.

Dr. Declat, of Paris, maintains that a hypodermic injection of carbolic acid in small quantity is an almost infallible remedy for intermittent fever, and presents to the Academy of Sciences details of a series of experiments which, in his opinion, substantiate his assertion. The use of nitrite of amyl, a substance comparatively little known to the *materia medica*, is now becoming more common than heretofore. This, which is a coal-tar derivative, is recommended as almost a specific in cases of angina pectoris, and asthma connected with heart-disease, as well as for epilepsy. The bromide of calcium, in the opinion of Dr. William A. Hammond, of New York, is much the best of the bromides, in consequence of the extreme rapidity of its action, and the readiness with which it yields up its bromine to the system.

The department of *Necrology* is, unfortunately, not without its list for the year, and embraces several illustrious names. Among these may be mentioned Professor M. F. Maury, of Lexington, Virginia; Professor James H. Coffin, of Easton, Pennsylvania; Professor Pouchet and Baron Dupin, of France; and Professor Sedgwick, a well-known geologist, of Cambridge, England.

For fuller information in regard to the subjects here briefly referred to we point to the current pages of the "Scientific Record" of the *Monthly* and the "Scientific Intelligence" of the *Weekly*.

SOLAR SPOTS AND PROTUBERANCES.

Père Secchi has lately presented to the French Academy a paper containing some new generalizations on the relations of the solar spots to the protuberances visible with the spectroscope. He begins by referring to the small number of protuberances during the last four months, especially near the poles of the sun, where they were both few and faint. This diminution in the number of protuberances coincides with a diminution in the number of spots. He is led to the following conclusions respecting the relations between these two phenomena:

1. The regions of faculæ and spots are richest in protuberances.

2. There are two kinds of protuberances: the one thin and feeble, spread out like our thin cirrus clouds in the atmosphere; the others, more dense, compact, and brilliant, having a thready structure, and a peculiar optical character.

3. The spectral analysis of this last class shows that their spectrum is very complicated, and that they contain a number of substances, while the others show only the lines of hydrogen and the line D₃.

A careful study during two consecutive years of observation has convinced Père Secchi that it is these brilliant and complicated protuberances with which the spots are connected. Two well-established and very general phenomena have confirmed this conclusion. First, although the hydrogen protuberances are seen all around the solar disk, yet the spots are confined to a determinate region, from which it follows that a hydrogenic eruption can not produce a spot. Second, the brilliant eruptions with numerous metallic rays are confined to the latitudes of the spots. These two facts led him to suspect that the cause of the spots is connected with the spectral constitution of the protuberances. He therefore carefully noted all eruptions having this character, which for brevity he calls metallic, and he found that whenever one of these eruptions is seen on the eastern edge of the sun a spot is sure to appear on the day following. This connection has been so uniform that for several months he has been able to predict the appearance of a spot by simple examination of the spectrum of the eruption. Afterward, by examining his older observations, he has found a hundred similar verifications. In fact, it is hardly necessary to examine the spectrum of the eruption, its peculiar physical character being nearly as good. In the first place the light of the jets exhibits a great brilliancy. The hydrogen ray C assumes a very deep and singular tint. The flames are very dense, terminating in sharp and often straight points; when bent back they are very unstable, changing from one instant to another. The height of the jet is generally but not always considerable; sometimes the jets are low, but very sharply terminated.

From a comparison of these spectra with those of the spots, Secchi concludes that the spectrum of the metallic protuberances is the same with that of the spot, which on the edge of the sun appears by its direct rays, while on the disk the rays are reversed. The spots are produced by masses of metallic vapor bursting out from the interior of the sun. These vapors need not rise to a great elevation; it is sufficient if they rise above the general level of the photosphere. They

then rest suspended and floating in the photosphere itself like islands, but being sunk to its level they look like cavities. These masses are of course coated, and therefore absorb the rays of light and heat, but the surrounding photospheric mass gradually encroaches upon and dissolves them.

Secchi finally remarks that there are still some details to be explained which will require time to work up. He differs completely from Faye, who attributes the spots to revolving storms or solar cyclones, stating that there are not more than five or six cases of spots showing a motion of revolution in the course of a year.

DISCOVERY OF A FRAGMENT OF BIELA'S COMET.

Immediately after the great meteoric shower of November 27, Professor Klinkerfues, of Göttingen, convinced that a fragment of the lost comet must have just passed the earth, telegraphed to Mr. Norman Pogson, director of the East India Company's observatory at Madras, to search near the star *Theta Centauri* for a comet. Pogson did so, and was fortunate enough to find it; but owing to cloudy weather could only observe it on two nights. His observations were at once carefully discussed by Oppolzer, of Vienna, who found that the comet thus strangely observed was really moving in the orbit of the lost comet of Biela, but was more than a month behind where the latter ought to have been. It is therefore, in all probability, a fragment of the lost comet, which has become mysteriously delayed in its revolution.

REPORT ON TEA CULTURE IN JAPAN.

A communication from the Secretary of State has lately been published by Congress, containing an interesting account of the growth, culture, and preparation of tea in Japan and China, being compiled from a series of communications forwarded by the American legations in those countries. The dispatch from Japan was accompanied by a series of drawings, which, however, have not been published.

According to this account, the export of tea from Japan during the year ending May 31, 1872, amounted to over fifteen millions of pounds, of which only 2688 pounds were sent to Europe, all the rest coming to the United States, and showing the importance of a trade which is increasing every year. It is stated that the tea-plant in Japan is propagated from seeds only, and matures for picking in three years. The first picking commences in April, when the leaves are most tender, and continues throughout May and June, but the leaves are then less valuable.

The leaves are dried on furnaces, and subjected to the usual manipulation, after which they are sifted and classified for the market. Each variety of tea is then shaken together to round off the corners, and the dust is separated, when the tea is packed in boxes and carried to market.

For the American market the tea is always re-fired before shipment, this being done by placing the tea in iron pans over a strong charcoal fire, constantly stirring it, for forty-five to sixty minutes. This process gives the so-called "toasty flavor" and the "greenish color," both of which,

with a great increase of dust and broken leaf, are obtained at the expense of that delicate and rich flavor which the tea had after the country manipulation.

In the opinion of Mr. Shepard, the American chargé in Japan, all this re-firing is unnecessary for the voyage to America, or, at least, an extra firing at the first preparation would answer the purpose, and he is quite positive that the preparation in question is a serious injury to the quality of the tea as a beverage. The greenish color demanded in the American market is not an essential to the tea, and is only obtained by strong firing and stirring in pans, or by an admixture of indigo, plaster of Paris, and soapstone, such as the Chinese teas are treated with.

The best Japan tea, in its pure state, is a long twisted leaf, with but little dust or broken leaves in it, and of a brownish-green, rather than a yellowish or grayish green. It is further stated that tea has been used in China, Japan, and Corea more than a thousand years, the first foreign export being to Holland early in the seventeenth century, and to England about 1660.

The very finest teas of Japan are wholly grown by the priests. They are cultivated under mats, to secure the desired degree of shade, and bring from \$5 to \$6 a pound in Japan, none of this quality being exported.

In the article upon the teas of China it is stated that indigo is used for coloring gunpowder tea, and that in the southern districts of China Prussian-blue and gypsum are employed instead of indigo.

BLOOD ENTOZOON.

A blood entozoon has lately been described by Dr. T. R. Lewis as occurring in a patient suffering from a tropical disease called *chyluria*. The worms appear to be present in very large numbers in the blood, and in some of the secretions; indeed, they were first observed in the urine. Nothing, so far, is known of their manner of development, nor how they gain entrance to the body. Their average length is 0.175 of an inch, and they are therefore much smaller than the *Trichina spiralis*.

PYRO-PLATING.

The term pyro-plating has been applied to a method of coating one metal with another by the action of heat, to distinguish it from the electroplating, close-plating, and amalgamation processes; the peculiarity being that the coating, after deposition, is driven into the surface of the metal by the aid of heat and atmospheric pressure. It is used, therefore, wherever the other processes indicated are unsuited or impracticable, and is applicable not only for coating with silver, but also with gold, platinum, aluminium, copper, aluminium-bronze, etc.

The object to be coated must be rendered chemically clean, this being effected in various ways, according to the metal to be operated upon. Thus articles of iron or steel are first boiled in caustic alkali, and then cleaned, under water, with emery and wire brushes, and finally by generating nascent hydrogen upon the surface, the articles being suspended in a hot alkaline solution, and made the negative pole of a somewhat powerful battery. When perfectly clean they are transferred to the plating bath, and the

proper amount of metal is deposited upon them in the usual way.

The peculiar stage of the process consists in submitting the articles to the operation of firing. For this a bright red heat is commonly employed, at least for articles that do not require tempering. For cutting instruments the heat is more carefully watched, and not allowed to rise above 450° or 500° F. When the articles have attained a proper temperature they are withdrawn, and instantly quenched in cold water.

THE CRUST OF METEORIC STONES.

Simultaneous but entirely independent investigations by Professor Reinsch, of Tübingen, and Meunier, of Paris, led them to the conclusion that the black crust of gray meteoric stones is not the result of fusion during their passage through the atmosphere. The Krähenberg meteorite was examined by Professor Reinsch, and his results communicated at the German Scientific Association during its recent meeting at Leipsic. Microscopic examination of thin sections of the crust showed that it was composed of two entirely distinct portions. The external, highly porous layer, filled with channels and cavities, seldom contains metallic iron, magnetic pyrites, or other minerals; while the interior, highly lustrous, compact layer, decidedly distinct from the gray granular mass of the stone, often incloses metallic iron and magnetic pyrites. In rare cases particles and laminae of metallic iron penetrate both layers, and are slightly changed by oxidation as far as they extend into the outer layer. The ground mass of the stone consists of particles, more or less spherical, of a light or dark gray material (silicate of magnesia), in which metallic iron, magnetic pyrites, and different silicate minerals (the latter without distinct crystals) are imbedded without any recognizable order. The globules generally are made up of several minerals, but even when they contain only one, they exhibit under the microscope small inclosed masses of magnetic pyrites, either in isolated aggregations or filling vein-like fissures. When simple in structure they are perfectly spherical, but when more complex less spherical, and in the latter case the different substances are not arranged according to their specific gravities. The iron and magnetic pyrites, when both are present, are generally found in the external, seldom in the central, parts. Professor Reinsch therefore concludes that these meteoric stones could not have been at a red heat, even for a short time, in an atmosphere containing oxygen, as the magnetic pyrites would have been converted into ferrosulfuric oxide, and, in contact with metallic iron, into a lower sulphide, and that the crust can not consist of the fused mineral ingredients, since, at the temperature of fusion of silicates, the magnetic pyrites in contact with metallic iron would have suffered change. The incomplete crystallization of the mineral ingredients, and the deviation of the globules from the spherical form, in cases of complex composition, indicate that they assumed the solid form suddenly, without time for the arrangement of the substances according to their specific gravities.

Meunier communicated the results of his investigations of the meteoric stone of Pultusk to the Paris Academy in August. Exhaustive

qualitative examination of several parts of the crust, differing in appearance, agreed in revealing the presence of olivine, augite, and a black decomposable coloring matter. The specific gravity was precisely the same as of the interior portions. Upon microscopic examination the crust, like the mass it covered, appeared crystalline instead of vitrified. At a few points there were exceedingly delicate glassy fibres, which seemed to form a net-work, sometimes amounting to a continuous layer. These had certainly been fused, but were of uncommon fineness, and, as well as the external layer, were entirely colorless and amorphous. Any term applied to this coating that implies its fusion must, therefore, be a misnomer. At the first glance it presents in some places a blistered and sluggy appearance, but closer observation shows that it is only wrinkled like the surface of fracture of the gray portions, and the enlargements on the surface at certain points, attributed to the accumulation of melted matter, prove to be due to the accidental shape of the stone at those points, for a section perpendicular to their surface shows the dark crust to be no thicker here than elsewhere. The splintery appearance of the surface, which in many cases suggests scoriification, results from the sudden cooling which the warm surface experiences on contact with terrestrial bodies. Attempts to imitate the black crust confirm the conclusion that it does not result from fusion. A splinter of the gray material before the blow-pipe gives, in general, nothing similar to the black crust, but by oxidation becomes more or less ochre brown, and fuses with difficulty to a brown glass on its thin edges. A very small splinter in the reducing flame acquires at first a dark color, and then fuses to an almost colorless glass, dotted with dark spots. This experiment shows the phases in the change of the surface of the stone from its normal to a vitrified condition. Heating, as usual in experiments on metamorphism, also indicates that the crust is simply a metamorphosed, not a fused, mass. The thinness and regularity of the crust are explained as doubtless being due to the exceedingly low temperature of the stones at the moment they strike the earth's atmosphere. To this same excessive cold must be ascribed the cohesion of the carbonaceous meteorites which penetrate the earth, or rebound from it at their fall, while, under ordinary circumstances, they fall to pieces under the least blow.

Perhaps a study of the metamorphosis of meteorites will reveal an approximate measure of the temperature of the interplanetary space, in regard to which there are such contradictory estimates, and the thickness of the metamorphosed crust, which is independent of the size of the stone, may possibly, by means of a few readily suggested experiments, give us an indication of the internal temperature of the stones when suddenly exposed to the effects of heat, from which the temperature of the regions whence they came may be derived.

The form of the meteorites, and especially the evident contrast between the front and back parts, are generally construed as arguments in favor of the action of fusion in the formation of the crust, but the facts already given completely contradict the opinion that the matter has been melted away from the blunt edges, as the tem-

perature necessarily implied would have left its impress in the mass of the stone, while many decidedly rounded meteorites have remained perfectly white—for example, that of New Concord, in May, 1860. This rounding of the front face seems due to erosion by the air, as truly as that of rocks to erosion of water. The furrows and folds are the result of sculpturing, and the crust is produced in the bared portions in proportion as the heat penetrates. According to this view many meteorites manifest a striking general resemblance to some Scandinavian islands, scraped out by glaciers on the north, while they have been protected on the south.

EFFECT OF HEAT ON THE TEMPERATURE OF ANIMALS.

An investigation of the effect of a high temperature upon animals has lately been published by Professor Rosenthal, of Erlangen. As the result he found that if rabbits be introduced into inclosures the atmosphere of which is 52° to 90° F., the temperature of the animal under treatment does not vary, excepting for some slight transitory oscillations between 79° and 90°. From 90° to 97° the temperature of the animal rises to 106° or 107°, and then is stationary; the animal becomes prostrated, and pants for breath, with its limbs stretched out and widespread, the pulsations of the heart very frequent, and the cutaneous vessels much dilated. With an external temperature of 97° to 104° the temperature of the animal rises rapidly to 112° or 113°, the phenomena already referred to are more decided, the pupil of the eye is dilated, the muscles are relaxed, and death intervenes in a very short time.

On removing the animal in season, and exposing it to the ordinary heat of the apartment, its temperature falls to 97° or below, and remains low for several days. When it has come back to its average temperature, however, the experiment may be repeated upon the animal, which will be found to resist these agencies much better than before. It is true that it loses much water, but in dry air, as well as in that saturated with moisture, the animal becomes heated much less than when first exposed to the action of a high temperature. At the same time, however, it shows signs of indisposition, loses its appetite, and becomes sluggish, producing less calorific than in a state of health.

THEORY OF "TAKING COLD."

Professor Rosenthal gives the following explanation of the pathogenic action of exposure to cold. Suppose an individual to have been subjected to an elevated temperature, such as that of a ball-room or theatre, or to have engaged in violent muscular exercise: the cutaneous vessels are dilated, and in a state more or less akin to paralysis, and in all cases more slow to contract than usual. If at this moment the same person be exposed abruptly and without any intermediate transition to a low temperature, especially to a current of cold air, a considerable loss of heat will be observed upon the surface of the body. The blood which has been thus cooled externally comes back into the internal organs and cools them suddenly; which circumstance alone may, in an organ predisposed to disease, become the active cause of some severe malady. The

cutaneous vessels, on their part, become contracted, driving out the blood which they contained, and thus produce a kind of hyperæmia, which in itself may exercise a morbid action. This cause, however, is usually only an accessory one, at least in cases where the temperature has been much elevated. The vessels have lost their tonicity, and do not contract suddenly. But if the danger from collateral hyperæmia is thus diminished, that from refrigeration is increased.

CINCHONA IN JAMAICA.

It is well known that the various species of cinchona-trees, when transplanted from their native region in South America, although retaining their botanical characteristics, do not always furnish the same quantity and quality of alkaloid, this being influenced by latitude, moisture, and other conditions. A recent examination of cinchona bark from trees growing in Jamaica has, however, proved very satisfactory, the total amount of alkaloid obtained being considered reasonably large, and likely to improve with the age of the trees. The *Cinchona calasaya* is the most promising, exhibiting a percentage of quinine of great economical importance. In this respect it had a decided superiority over the same plants cultivated in India. On the other hand, the *C. officinalis* is less valuable than the Indian product.

REGULATION OF TIME BY OBSERVATORIES.

During the past few years inconveniences arising from the constant changes of local time, and the conflicting errors of local clocks on connecting railroads, have been felt with increasing frequency by the traveling public, and still more by the roads themselves.

The aid of astronomical science has been lately invoked by some of the leading railroads, and several observatories have been requested to furnish exact time by the telegraph; but to how very great an extent abstract science has been thus already utilized few even of those who benefit by it are perhaps aware.

From an article by Professor Langley, in the November number of *Silliman's Journal*, describing the system introduced at the Alleghany (Pittsburg) Observatory, we learn that the exact time is thence daily distributed by electricity over some thousand miles of main and branch roads by a purely automatic process. For technical details the article cited may be referred to; and we briefly state that continuous lines of telegraph, which extend from New York on the east, and Chicago on the west, are carried into the observatory at Pittsburg, where the wires terminate in its principal mean time standard clock, which is made to send an electric impulse through them with every swing of its pendulum. An audible sound is thus made simultaneously at every station on the Southern lines connecting New York with the West, and a clock regulated with astronomical exactness is thus virtually to be heard ticking in New York and Chicago, and at hundreds of intermediate points, at the same instant. The means employed are here alluded to, however, less in connection with the abstract interest of the method itself than to that of the practical and economical results which are secured by such uniformity and exactness, hitherto generally

unattained. Among the competing lines for the immense amount of railway freight which passes between the East and West, those which can be run with a regularity most like clock-work will be the favored ones; but this essential benefit, growing out of such a system of time distribution, is still second to its utility as a security against accidents, and for the preservation of human life.

The special apparatus of the observatory devoted to these ends is the gift of W. Shaw, Esq., of Pittsburg, but a recognition is due to the intelligent policy which has led the managers of these roads to avail themselves of scientific help so extensively in promoting both the safety of passengers and the rapidity and economy of transportation.

ACTION OF COD-LIVER OIL.

Dr. Decaisne, who has been investigating the therapeutic action of cod-liver oil, reports as the result of nearly one hundred observations that it is in rickety patients, as previously shown by various writers, that cod-liver oil has its most positive and curative action, but that it cures neither scrofula nor consumption. In these three affections, as in all others in which it has been tried, it acts as a restorative and reconstituent, and may be applied to the treatment of all such conditions of the system as exhibit a general cachexia, without being addressed to any particular malady.

Wishing to verify as much as possible the conclusions of Dr. Pollock in reference to the fattening of calves, pigs, and sheep with cod-liver oil, Dr. Decaisne weighed a number of children slightly affected with scrofula and rickets, before, during, and after treatment, and ascertained that whenever the dose exceeded a certain limit, variable with the individual, the growth ceases, and that the cessation of growth is attended with loss of appetite and a reduction of nutriment. He has been enabled to verify the experience of Greenhow, who maintains that the increase of weight always ceases in individuals attacked with consumption whenever by the use of the cod-liver oil they have attained their normal weight.

He furthermore maintains, contrary to the views of other writers, that the oil treatment is only useful in the first stages of consumption, and when there is little or no fever. On the principle, now perfectly admitted, that the digestion and minute subdivision of fatty matter is one of the functions of the pancreas, the functional activity of that organ is always connected with that of gastric digestion, and he therefore always administers the oil with the food, and not in the intervals between meals.

LAUGHTER AS A REMEDIAL OPERATION.

At the recent meeting of the German Scientific Association, at Leipsic, Dr. Hecker made some remarks upon laughter. He stated that tickling, which he styled a variable, intermittent excitement of the nerves of the skin, produced irritation of the sympathetic nerves, with the result of an expansion of the pupil and a contraction of the blood-vessels, and that the consequent diminution of pressure on the brain, permeated with blood-vessels, is so considerable as not to be without danger. Powerful expiration operates against such a diminution of pressure, and therefore laughter, which consists simply in intermit-

tent forced movements of expiration, must be recognized as a decided remedy for the effects of tickling.

Laughter due to a sense of the ludicrous, according to his experiments, is also to be accounted for as the result of an intermittent cheerful excitement, accompanied by similar bodily manifestations, which may be referred to stimulation of the sympathetic nerves. Laughter thus seems to have a remedial office.

PROCESS FOR SILVERING GLASS VESSELS.

Dissolve 61½ grains of nitrate of silver and 38½ grains of aldehyde-ammonia in separate parts of 1¼ pints of distilled water, mix the solutions, and filter. Cleanse the article to be silvered from every trace of grease by washing with a solution of carbonate of potash, rinse with alcohol and with water in succession, fill it with the silvering solution as high as it is to be silvered, and hang it in a water-bath. The latter must be heated very gradually. When the temperature of the water reaches 122° F., the silver begins to separate, and little time is then required to complete the deposit. At first, while thin, the film appears dark, but increases in brilliancy until a beautiful silvered surface is produced, when the object must be removed, emptied, and washed with distilled water, or its brilliancy may be impaired. The aldehyde-ammonia may be prepared by passing dry ammonia gas through aldehyde.

DOLOMITES OF THE UNITED STATES.

Dr. Feuchtwanger communicates to the *Engineer and Mining Journal* a paper upon the dolomites of the United States, and calls attention to their very great value in the arts. Chemically considered, these rocks are composed of carbonate of lime and carbonate of magnesia, and are not to be confounded with magnesite, which consists only of magnesia. The American dolomites are used largely in architecture, the favorite white marble of Vermont being composed of it. The Rosenthal cement is said to owe its powerful hydraulic properties to the mixture of clay with the dolomitic material.

BENEFITS OF VACCINATION.

The small-pox epidemic has been very prevalent for some time past in Vienna, and numerous cases are constantly occurring, taxing the abilities of the medical profession and the capacity of the various hospitals to the utmost. The benefit of vaccination, however, is shown by the unanimous testimony of those who have been most concerned in the treatment of the disease. The general result is summed up as follows: 1. The mortality has been ten times greater in the unvaccinated than in the vaccinated. 2. The intensity of the disease has also, as the general rule, been very much greater in them. 3. Cases of hemorrhagic small-pox occurred much more frequently in the unvaccinated. 4. In the Children's Hospital, where the mortality has been so enormous, and has specially prevailed in the hemorrhagic form, its fatal course has chiefly been among the unvaccinated. These facts will, at a later period, be demonstrated by the publication of the full statistical data, and it is hoped they will teach the opponents of vaccination a much needed lesson.