feed-water to about half that proportion, for ratios of expansion approximating six; from one-third to about one-tenth, at a ratio of five; and apparently from twenty to ten per cent at 4.4. In this first case, also, the jacket gives best results, with 110 pounds of steam, when the ration of expansion approximates six. When the steam pressure falls to approximately eighty pounds, the best work of the jacket occurs at a ratio not far from 4.75; while, at a pressure of fifty pounds, the value of the jacket increases through the whole range of the experiments, and not only so, but the indications are of probable improvement indefinitely in the direction of increasing expansion. The highest efficiencies, however, either with or without the jacket, are found, in this case, at the lowest ratios adopted, and indicate a maximum value at about 3 25. The ratios of expansion for maximum efficiency of fluid, in the other cases, are for 110 pounds, about five, and for eighty pounds, about 3 5. Similarly studying the performance of the condensing engine, we find that the best work is done, whether jacketed or not, at about a ratio of expansion of ten (at a steam pressure of 110 pounds), but that the jacketed engine reduces the internal wastes from fifty per cent at highest ratios, and from one-fourth at the lowest ratios, in the case of the unjacketed engine, to five per cent, and, in some cases, probably to within the magnitude of the errors of observation. At a pressure of ninety pounds the best ratio seems to be for this engine, under the given conditions of operation, about 6.5 when unjacketed, and 8.5 jacketed; while the lower pressures still further reduce both the efficiencies and the savings effected by the jacket. The best work of the jacket, as an economizer of heat, is done at high pressure, at a ratio of expansion of twelve or more. In all cases it seems to be the fact, with these engines at least, that the jacket is useful beyond the ratios of maximum efficiency of fluid. The compound engine exhibits the same general effects which have been noted in the cases of simple engines. This discovery of a maximum efficiency of jacket may throw some light upon the causes of the conflicting and sometimes apparently irreconcilable results of trials of engines with and without jackets, and with jackets variously constructed. The discovery may also prove of value to the designer, as aiding him in securing the best proportions and arrangement of his engine.

THE PREVAILING FEVERS OF CHINA.

DR. COLTMAN, writing in the *Medical Missionary Journal* upon the fevers of China, remarks, says the *Lancet*, that but little personal investigation on the subject has been made up to the present time, owing to the comparatively recent advent of foreign medical men, and to the want of confidence on the part of natives to submit for any lengthened period to the treatment of a foreign physician, or, in fact, to any one physician, their rule being to change doctors two or three times a day if they can afford it. Again, there have been but small hospital facilities for studying fevers, and there is an impossibility of obtaining post-mortem examinations. Dr. Coltman considers that small-pox is the most common disease, nearly every person suffering from it at some period of his or her life. Vaccination, although practiced, is done very carelessly. Measles appear to be common, but are somewhat milder than in Europe. Scarlet-fever, although it undoubtedly occurs among the natives, is far less common than among Europeans. Erysipelas is rare. Typhoid-fever is very difficult to diagnose in the short time that a foreign medical man is allowed to attend a case; but Dr. Coltman thinks that when more accurate reports are possible, this disease will be found to be more common among the natives than is now supposed. Typhus-fever is met with all over North China, and as far south as Shanghai. Relapsing fever is found constantly associated with typhus. Dengue does not seem to be known among natives. Cholera occurs as an epidemic every few years, and is very fatal. Diphtheria is severe, and frequently fatal among the natives. Whooping-cough has occasionally been met with. Rheumatic fever is very prevalent in some parts. Chronic muscular rheumatism is common all over China, but is unattended by fever. Malarial fevers appear to be common everywhere, though the prevailing type varies; thus, tertian is most common in Pekin, quartan in Foochow, Swatow, Shanghai, and Hangchow, and remittent in Cheefoo and Tientsin. In Chinanfu, Dr. Coltman has never seen a case of quartan ague; it is all intermittent of the tertian or quotidian type. The treatment, of course, of all malarial fever is by quinine or some other cinchona bark alkaloid. In Hangchow the carbolic acid and iodine treatment has been used successfully as a prophylactic; arsenic is recognized as valuable in the chronic form.

NOTES AND NEWS.

THE trustees of the University of Pennsylvania have elected Dr. George A. Peirsol, professor of anatomy; Dr. Harrison Allen, professor of comparative anatomy; and Dr. John B. Deaver, assistant professor of applied anatomy.

— Mr. Emil Theilman, a graduate of the Missouri State University, has been appointed to a position as aide on the State Geological Survey.

— Professor Henry S. Munroe is to have charge of the Columbia College School of Mines' summer school of surveying at Litchfield, Conn.

— Professor J. F. Kemp of Cornell University, Ithaca, N.Y., has been appointed adjunct professor of geology at Columbia College, New York.

— The *Engineering and Mining Journal* of this city states that extensive deposits of onyx have been discovered near Marion, Smyth County, Va. Four openings are reported to have been made so far. The stone is said to be of excellent quality.

— The Marine Laboratory of the Johns Hopkins University will be open this summer at Port Antonio on the north-east coast of Jamaica. Professor Brooks and a number of members of his party have already started for the station.

— A writer in *Science Gossip* says that the philosopher Kant one day was passing a certain building in his daily walk, and on looking up, he discovered, as he fancied, that the old birds were actually throwing their young ones out of the nests. It was a season remarkable for the scarcity of insects, and the birds were apparently sacrificing some of their progeny to save the rest.

— The harbor of Salonica, says the *Scottish Geographical Magazine*, is threatened with the same fate as that which has befallen Smyrna. Owing to the alluvial deposits of the Vardar, the harbor is becoming useless as a trading port. The entrance through the sandbanks is very difficult, and the delta of the river has advanced to the neighborhood of Cape Kara-Burun. The prospective value of Salonica to Austria-Hungary may therefore be questioned.

— The recent census of Bengal, says the London *Times* correspondent, in a dispatch of March 27, throws an instructive light on the sanitary condition of the province. The districts showing a decrease in population are mainly those where defective subsoil drainage produces malaria. This is especially marked in parts of Nadiya and Jessor, and is due to the fact that the natural drainage channels have been blocked by injudicious cultivation, and the want of sufficient provision for a water-way in the construction of the railway.

— We learn from the *Scottish Geographical Magazine* that Dr. Konrad Gauzenmüller has published in the *Zeitschrift für wissenschaftliche Geographie* (Bd. viii., Heft 1) a learned and able paper illustrating his hypothesis that the Ukerewe, or Victoria Nyanza, is identical with the Eastern Nile sources of Ptolemy, with the Crocodile Lake of an unknown Greek writer, and with "Kura Kavar" of the Arabs, and that fairly accurate knowledge of the territory of the Nile sources was formerly possessed, but subsequently was lost.

— The collections of fishes made by the "Albatross" in 1887-88, at the Galapagos Islands and in Panama Bay, were reported on by Jordan and Bollmann in the "Proceedings of the United States National Museum," 1889, pp. 149-183. A small portion of the collection, however, failed to reach the authors in time for their report, and has now been listed by Charles H. Gilbert, professor of geology in the University of Indiana. The supplementary list is noteworthy as containing the remarkable new genus *Dialommus* which repeats in the *Blenniidæ* the peculiar structure of the eye seen in the Cyprinodont genus *Anableps*.

— European invalids and other persons in search of quiet and a mild climate for winter are beginning to turn their attention to the oases on the northern border of the great Sahara. The climate is said to be very equable. Railway communication through Algeria makes these places less inaccessible than formerly.

— Dr. A. C. Abbott, assistant in bacteriology at the Johns Hopkins Hospital, has resigned his position, to accept the place of assistant director of the Hygienic Institute in Philadelphia. Dr. G. H. F. Nuttall has been elected to fill the vacancy.

— According to the Boston *Medical and Surgical Journal*, Eternod and Haxiers, from the results of their experiments on the transferrence of small-pox from man to the calf, are convinced that small-pox and cow-pox are caused by the same virus. For the purpose of inoculation, small-pox lymph from cases varying in severity was used, and was rubbed into a moderately large extent of scarified skin in the abdominal region of the calf. The first inoculation was followed in every case by a scanty crop of postules at the spot chosen. This eruption had at first very little resemblance to typical cow-pox, but on transferring the disease from calf to calf it became more and more characteristic, until, in the opinion of the authors, it was impossible to distinguish it from true cow-pox. The calves vaccinated in this way with human small pox lymph were found in every case to be refractory to vaccination with ordinary cow-pox lymph.

— In early times Asia Minor was celebrated for its fine breeds of sheep and the high quality of its wool, but for many centuries the fat-tailed variety of sheep has replaced all the finer breeds. United States consul Jewett, in a recent report, says that the well-known characteristic of this breed is the enormous tail, which is one mass of fat. These tails will sometimes weigh as much as eighteen pounds each, and give some weight of credibility to Herodotus's story that in Cilicia the sheep had little carts attached to them, that they might the more easily carry their tails. Some shepherds practise cutting off a part of the tails of lambs, severing them at the third or fourth vertebra. This is done in the belief that a large part of a sheep's nourishment goes to the benefit of the tail. It is said, as an evidence of this, that it has been noticed that during times of drought, when pasturage is scant, the sheep's body in general does not comparatively show the effects of lack of food, but that the tail becomes smaller and thinner.

— A large model in relief of Baltimore and its vicinity has been made by Mr. Cosmos Mindeleff of the United States Bureau of Ethnology, for Mr. H. C. Turnbull of Baltimore. Mr. Turnbull has placed the model in the Baltimore Real Estate Exchange. The area embraced extends seventeen and a half miles from north to south, thirteen and a half from east to west, with the city at its centre. This is two hundred and thirty six square miles, including Green Spring Valley on the north, reaching nearly to Sparrows' Point on the east, extending three and a half miles south of the Relay, and considerably west of Catonsville and Pikesville. The scale of the model is four inches to the mile, making its dimensions four feet eight inches by five feet six inches. Its most noticeable feature is the fact that its vertical scale is the same as its horizontal; i.e., all elevations are represented in relief on a scale of four inches to 5,280 feet or one mile. Since the highest point within the area is only 560 feet above tide, all the relief is modeled within less than half an inch.

— The second number for 1891 of the bulletin of the Ohio Agricultural Experiment Station describes three insects which are doing considerable damage to clover and clover hay. The first of these is the clover-root borer. The adult of this insect is a small, brownish black, minutely-spotted beetle, not quite one tenth of an inch long, which deposits its eggs during spring in the crown of the clover plant, four or five eggs being laid on each plant. These hatch, and the larvæ burrow downward through the larger roots of the plant, feeding upon the inner substance, and filling the galleries behind them with their sawdust-like excrement. Late in summer the larvæ become fully grown, when they are one-eighth of an inch long, with a whitish body and yellow head. The injuries of this insect are sometimes very serious, whole fields of clover being destroyed. The remedy is frequent rotation of crops, thus not allowing the clover fields to stand until they become breeding places for the insects. The second insect is the clover-seed midge, a small, orange-colored maggot that develops in the clover-heads at the expense of the seed. It hatches from eggs laid by a very small, two-winged fly, similar to the Hessian fly in appearance. Clover fields infested by this insect are at once distinguished by the unnatural condition of the heads at the time of blossoming. Instead of being red with bloom the heads are green and dwarfed on account of the undeveloped florets. The best preventive of the injuries of this insect yet suggested is that of mowing the field as soon as the presence of the insect is detected, and before any of the seed has reached maturity. The third of these insects is the clover hay worm. Clover hay that has been standing in the mow or stack for some time is liable to become infested by small brown worms, which web the dried stems and leaves together and feed upon them. In one case, to which the attention of the station was called this spring, the lower half of a stack of clover hay was almost totally destroyed by this worm. These worms are more likely to prove troublesome when old hay is left over from season to season for them to breed in; consequently hay-mows should be thoroughly cleaned out each summer, and new stacks should not be put on old foundations until all the leavings of the previous season are removed. Hay which is infested with the worms should be burned.

— Dr. G. H. Williams left Baltimore on May 25, with a party of graduate students of the geological department of the Johns Hopkins University, on a scientific trip in western Maryland. The purpose of the trip is to supplement the work of the recent expedition in southern Maryland. Special attention will be paid to the geological formation of the region.

— The Workingman's School, on West Fifty-fourth Street, New York, was founded in 1878. It was started as a free kindergarten for the children of the poorer classes in the tenement house district. The number of pupils during the first weeks after the opening of the kindergarten was thirty-three. The school has now between three and four hundred pupils, divided into five grammar, three primary, and three kindergarten classes; and it owns a substantial five-story building, containing more than twenty large rooms, a lecture hall, machine shop, etc. Besides the ordinary branches, its course of study embraces manual and art work, a complete course in elementary natural science, gymnastics, music, etc., and a kindergarten normal department has been added to the school proper. The normal kindergarten class will re-open Sept. 14, 1891, and continue till the end of the following June. Applicants for admission must be at least eighteen years of age. The general requisites are, a good English education (high or normal school or their equivalent), ability to sing, and a real interest in and love for little children. The course includes psychology and a study of child-nature, history of education, the principles and methods of Froebel's system, together with practice in the use of the gifts and occupations. Practical work with the children, under the direction of experienced kindergarteners, occupies the mornings; and several afternoons a week are devoted to the theoretical studies. The tuition fee, including all materials, is $65 for the entire course, payable semi-annually. No entrance examination is required, but each student is received on trial for a few weeks, in order that her general fitness for the work may be determined. Regular examinations are held at the end of the course, and certificates given to those who complete it satisfactorily. Further information may be obtained from Miss C. T. Haven, principal of the kindergarten, and, after June 1, from the superintendent of the school, Mr. Maximilian Groszmann, 109 West Fifty-fourth Street, New York.

"A Description of Materials used in Making Commercial Fertilizers," "Fertilizing Materials produced on Farms," and "Fertilizing Composition and Valuation of Various Products," are the titles of articles contained in Bulletin 32 (new series) of the New York Agricultural Experiment Station, of which Peter Collier is director. These fertilizer bulletins are intended to explain such facts as will make farmers familiar with the different terms used to express the composition of fertilizers, and also to enable them to understand some of the more general principles involved in the use of fertilizers, together with such other infor-

mation as it is thought farmers would like to possess. In order that an attempt may be made to cover all points about which information is desired, farmers are urged to send to the station any inquiries in this line in regard to which they desire specific information. This series of bulletins is issued for the benefit of the farmers of New York State. As each bulletin will be a continuation of the preceding one, it will be well for those interested to preserve the early issues for future reference. These and all other bulletins issued by the station will be mailed to any citizen of the State, on application.

— The London correspondent of the New York *Times* writes that the principal biologists and scientists of England, headed by Lubbock, Lister, Lockyer, Playfair, Roscoe and others, to the number of a hunded and fifty, and backed by strong letters from Huxley and Tyndall, recently waited on Sir Michael Hicks-Beach, president of the Board of Works, for a second time, to beg that a license be found for the British Institute of Preventive Medicine, and for a second time met with a refusal. Their eloquent speeches laid stress upon the national disgrace of a situation in which English students of bacterial growths were compelled to go to Paris, Berlin, and Vienna to study their science, and intelligent inquiry and experimental research were forbidden on English soil, as if it were an impious thing to seek for wisdom in the science of saving human life. Sir Michael Hicks-Beach gave an evasive and roundabout reply, which the London *Times* editorially translates as meaning that the anti-vivisectionists have many times more votes in England than all its men of science put together. English laws pay great attention to conserving the rights of rich men to breed hares, rabbits, and game-birds for annual slaughter and maiming by shooting parties, but they sternly punish a man of science who chloroforms one of these rabbits for purposes of experiments having no earthly purpose but to increase knowledge as to saving human life.

— "The last thing that it would be proper for me to do," said Professor Huxley recently, in writing of himself and his aims, "would be to speak of the work of my life, or to say at the end of the day whether I think I have earned my wages or not. Men are said to be partial judges of themselves — young men may be, I doubt if old men are. Life seems terribly foreshortened as they look back, and the mountain they set themselves to climb in youth turns out to be a mere spur of immeasurably higher ranges when, with failing breath, they reach the top. But if I may speak of the objects I have had more or less definitely in view since I began the ascent of my hillock, they are briefly these: To promote the increase of natural knowledge, and to forward the application of scientific methods of investigation to all the problems of life to the best of my ability, in the conviction, which has grown with my growth and strengthened with my strength, that there is no alleviation for the sufferings of mankind except veracity of thought and of action, and the resolute facing of the world as it is when the garment of make-believe by which pious hands have hidden its uglier features is stripped off. It is with this intent that I have subordinated any reasonable, or unreasonable, ambition for scientific fame which I may have permitted myself to entertain, to other ends, — to the popularization of science; to the development and organization of scientific education; to the endless series of battles and skirmishes over evolution; and to untiring opposition to that ecclesiastical spirit, that clericalism, which in England, as everywhere else, and to whatever denomination it may belong, is the deadly enemy of science."

— An interesting discovery has just been made at Rome in the process of excavation for the Tiber embankment. An oblong column, or very thick slab, was uncovered, on which is inscribed the official record of the public games celebrated by Augustus in the year 17 B.C. The decree of the Senate and the regulations enforced by the executive committee are followed by a list of the necessary prayers and sacrifices and the order of the contests. Then comes an announcement that a choir of twenty-seven youths and as many maidens will sing the Carmen Seculare, written by Quintus Horatius Flaccus. In the same locality the workmen have discovered twenty-five additional fragments of the great map of the old city which formerly stood in the Forum of Augustus. When this map was destroyed by fire or earthquake, many of the pieces were thrown into a heap of broken building materials, and finally found their way into the walls of the old Alfieri palace which have just been unearthed.

— The *Kölnische Zeitung* reports that the investigations which the expedition sent out by the Vienna Academy of Sciences has been carrying out in the eastern portion of the Mediterranean have been very successful, and have given important results. In all, the investigations concerning the depth and general characteristics of the sea, and the presence of life in it, were carried out at seventy-two distinct points. The greatest depth (3,700 metres) was found near the great depression which runs between Mola and Cerigo, — a deep valley running in a north and south direction, and with a depth varying from 3,500 to 4,000 metres, the descent being much more abrupt on the Greek side than on the Italian and Sicilian side. Experiments as to light showed that the waters are more transparent near the African coast than in the northern portions. There, white metal plates were discernible at a depth of nearly 144 feet. Sensitive plates were still found capable of being acted upon by light at a depth of nearly 550 yards, at a point 200 nautical miles north of Benghazi: on being drawn up they were found to have been blackened. The acid constituents of the sea-water seem to be the same at the greatest depth as near the surface, nor is any difference in the quantity of ammoniacal constituents perceptible between the upper and the lowest levels, with the exception that everywhere close to the bottom the quantity of ammonia is notable. The deep sea region of the eastern Mediterranean is very poor in animal life. A dredge at a depth of 3,000 metres brought up no animal specimens at all; but at a depth of 2,000 metres leaf-formed algæ were discovered similar to those found at the same depth in the Atlantic by the Plankton expedition.

— The climatic conditions in Corea are imperfectly known; but the *Annalen der Hydrographie* (i., 1891) publishes some valuable meteorological observations (*Scottish Geog. Mag.*, June, 1891) that were made at the Corean ports of Chimulpo, Juensan, and Fusan. The two latter lie on the east coast of Corea, and the former is on the west coast. The chief features of the Corean climate — if one may judge from observations extending over only three years — appear to be the following: Atmospheric pressure at the three stations, mentioned above, is comparatively high from November to February (winter), and low from May to September (summer). Whilst the west coast is somewhat cooler than the east coast, the temperature of the air is rapidly lowered from south to north. The mean annual temperature is much the same as that of places in the same latitude on the east coast of North America. The summer temperatures at the three stations are much the same; but the winters at Chimulpo and Juensan are much colder than at Fusan. At Chimulpo the mercury fell below the freezing-point during the months of October to April; in Juensan, from October to March; in Fusan, from December to May. The mean temperature of the warmest months (July or August) was 26.2° C. in Chimulpo, 26.8° C. in Fusan and Juensan; and of the coldest months (January or February) 5° C. in Fusan, — 4.4° in Chimulpo, and 5.1° C. in Juensan. The prevailing wings are of a monsoon character: on the east coast, easterly; on the west coast, south-westerly. The rainfall decreases from south to north, and is heavier on the east than on the west coast. The rainy season is in summer, the dry season in winter. In Juensan the rainfall was *nil* in January and February of the three observed years. There was no snowfall in Fusan.

— According to the London *Educational Times*, Professor Jean Servais Stas, who recently completed the fiftieth year of membership of the Royal Belgian Academy of Sciences, Literature, and Arts, has been congratulated on that event by the Chemical Society of London in an address which refers to the researches that have placed the name of Stas so high amongst scientific investigators. Among the fundamentally important investigations which have helped to raise chemistry to the dignity of an exact science, are mentioned his "incomparable determinations of the atomic weights of a large number of the more important elements." Not only do the results supply numerical data of the

utmost value, but the "researches are models which must ever serve to show how such determinations should be effected, and the innumerable precautions which must be taken" His refutation of the celebrated hypothesis of Prout, at least in its original form, is noted; as also the services rendered to the chemist by his teaching how to prepare pure re-agents, — the methods devised for the purpose being themselves, in many cases, important contributions to chemical science. The address concludes thus: "Your 'Recherches sur les Rapports reciproques des Poids atomiques' must be handed down to future generations as one of the most valuable classics of the exact sciences. Apart from the intrinsic value of your work, you have, through it, exercised a beneficent influence on your colleagues throughout the world, the importance of which cannot be over estimated, and in the eyes of chemists generally you are ever regarded as an honor to science, to your country, and to the distinguished academy of which you have been an ornament for half a century."

— The monthly report of State Geologist Arthur Winslow of Missouri is at hand. From it we learn that during the month of May examinations of clays and structural materials have been continued in Franklin, Warren, and St. Charles Counties: and the mineral springs of Barry, McDonald, Vernon, Cedar, Henry, Benton, and Camden Counties have been visited, and samples of their waters have been collected for analysis. The examinations of clays and structural materials have further been extended into Ralls, Pike, and Marion Counties. Detailed mapping has been prosecuted in the south-east in Madison County, and west in Ray and Johnson Counties, and about a hundred and ninety square miles have been covered. Examination of coal deposits have been made in Marion County, and samples of coals have been collected for test. In the laboratory, analyses have been made of coals and mineral waters, and the experimental work on clays has continued. Much material has been collected for the report on the pal eontology of the State, and, in this connection, public and private collections in St. Louis, Hannibal, Sedalia, Columbia, Kansas City, and Tabor were visited and studied.

— Lieut. Reed of the United States Artillery stated in a recent paper that photography has been largely used for surveying in Canada under the direction of Mr. E. Deville, the surveyor-general. The Dominion survey made in the ordinary way proved very expensive and slow when the Rocky Mountains were reached, and photography was accordingly resorted to The camera used, as described in *Engineering*, was a carefully made mahogany, brass bound, rectangular box, half-plate size. When in use it was placed on a tripod furnished with levelling screws, and levelled by means of two ordinary tube levels attached at right angles to each other, and which could be placed on that face of the camera which happened to be uppermost. The means for determining the horizon and principal lines were the images of four fine combs, one midway on each side, attached to the camera immediately in front of the plate, the use of small stops making these images clear. The lens used was a Dallmeyer wide angle, No. 1, A. of 5¼ inches focus, affording a horizontal angle of sixty degrees when the plate was disposed with its longer edge horizontal. Six double plate holders were employed. But one adjustment of this camera is required, namely, to insure the verticality of the plate when the tube-levels indicate that the camera is level. The best way to effect this is to substitute for the plate a good plane mirror, face to the rear; then set up a transit in the vicinity. The axis of the telescope being horizontal, observe a distant point intersected by the cross wires, also its image in the mirror: if the latter is also intersected, the mirror is vertical; if not then the tube levels need adjustment. This box camera being rigid, and the focus therefore permanent and suited to distant views and the lines on the faces indicating the field of view, no ground glass or cloth is needed. Care is taken to make the plate-holders exactly alike, a condition which, so far as distance from lens to plate is concerned, is ascertained by measurement Orthochromatic gelatine plates give the best results. Mr Deville considers that a survey made in this way is as accurate as a plan plotted with a very good protractor or made with a plane table. A good deal of attention has been devoted to the subject in France by Dr. Gustave le Bon, who has shown how to obtain all the survey details from a single photograph and one compass observation, provided any one distance contained in the photograph is known.

— The kryokonite collected by Nordenskjöld in Greenland in 1883 has been investigated by Wülfing, and, according to the *Engineering and Mining Journal*, has been found to consist mainly of feldspar, quartz, mica, and hornblende. Garnet, zircon, magnetite, augite, sillimanite, together with a nitrogenous organic substance, are also present in it. The larger part of the dust is thought to be a sediment from the air, and to have been obtained by it from a region of crystalline schists. But the most interesting constituents of the dust, little chrondri of opaque, isotropic, transparent, and double-refractive material, are considered to be of cosmic origin, owing to their similarity to the chrondri obtained in deep-sea soundings. If the amount of dust collected from the snow in Greenland represents the fall in one year, the total amount falling upon the entire surface of the earth in this time is 125.000,000 kilograms, equivalent to a cube of 31 yards on a side.

— Herr P. von Stenin has given a description in *Globus* (Bd. lviii. No. 12) of the Tcheremis, a synopsis of which appears in the *Scottish Geographical Magazine* for June. The details are taken from a monograph written by Professor Smirnoff, of Kazan University, who visited this people in the spring of 1888. The main body now dwells between the Volga and Viatka: they are also found on the Kama, the Bielaja, and its tributaries. Their country falls into two distinct divisions — the "mountain land," stretching from Vassilssursk on the west to Ilyinka on the east, and the "meadow land," much larger in extent, bounded on the west by the Vetluga and its tributaries, the Yuronga and the Usta, on the north by the Viatka, on the east by the Ilet, and on the south by the Volga and the lower Kama. The number of the Tcheremis is given by Smirnoff as 312,591. The mountain land is well clothed with woods of fir and pine, and possesses a very fertile soil; and its inhabitants, who are taller, more powerful, and handsomer than their lowland brethren, follow agricultural pursuits, while the meadow-land Tcheremis, seventy per cent of whose territory is covered with forest, maintain themselves chiefly by the chase. Little in the villages of the Tcheremis is of native origin. Their houses, clothing, dishes, etc., are copied from their Russian or Tartar neighbors. A hut of thin planks, roofed with shingles and used as a summer dwelling, is a peculiarity of the Tcheremis' farm-house, and the women's dress shows some marks of originality. Polygamy still prevails among the pagan Tcheremis. Professor Smirnoff believes that it was not introduced through Mohammedan influence, but is a modification of hetairism, under which system all the women of the tribe were common property. In some districts it is still the practice to carry off a wife by force, and in others the customs observed at the marriage indicate its former existence. The purchase of wives succeeded to rape, owing to Turkish influence, the price being at first regarded as an expiation, as is indicated by the name it bears. The Tcheremis believe in a life after death, and credit the dead with the power of returning to the world. Accordingly, they place food and drink in the coffins, and on certain festivals prepare feasts for their departed relatives. In a child's coffin they place a string, on which is measured the height of the father or mother, at the same time expressing a hope that the child will grow up to be an efficient workman; and they lay bridal garments in the coffin of a girl. From the ranks of the dead are recruited a vast host of evil spirits; e.g., various kinds of fever are caused by the spirits of spinsters. The gods of the Tcheremis are also very numerous. There are the God of Heaven, the God of the Dawn, the Ruler of the World, the Mother of the Bright Sun, and many others. All those deities which stand in close relation to men — such as the gods who give rain, guard the cattle, and protect the fruit and fish — are propitiated with sacrifices. At the present day, however, the Tcheremis offer part only of the victim, the head or heart, and in some districts substitute cakes made in the shape of a horse. The place of sacrifice is usually a grove, and is chosen by a supposed sign from the gods, such as the bursting forth of a new spring. Among the mountain Tcheremis the Greek Church has made considerable progress.