elementary schools, especially in country districts, where it would appear to be even more important than in towns. A boys' or girls' school can obtain the highest credit in the inspector's report, and the highest possible grant of money, without its scholars having ever heard of animal or plant, or of those materials of the world, or of those natural forces, with which the scholars will have to deal all through their lives; and, what is perhaps still more anomalous, those pupil-teachers who are possibly expected to give object-lessons in their schools are never examined in natural history by the department, and may gain a high place in their examinations without the least knowledge of any kind of natural science.

It seems most desirable that every little child who enters school should be led to observe and inquire; its curiosity and activity should be encouraged and directed; only when its senses have been made acquainted with things should it be introduced to the words by which they are called, first orally, then in writing or print. It should proceed from the concrete to the abstract. The works of the Creator are as worthy to be studied as the words of men, and should hold as high a place in any school curriculum.

The reply of the department to such requests as these will probably be, "We cannot assume that the teachers are capable of teaching, or the inspectors of examining science." No doubt there is that difficulty. But many of them are capable, and they are all presumably intelligent men, who would easily learn what might be required of them. Special teachers of science also exist, and special examiners might be appointed. It may not be possible to insist on all these reforms at once, but at least encouragement should be held out to them, instead of the disappointing uncertainties of the code now before Parliament.

HEALTH MATTERS.

Tuberculosis Contagion.

DR. VON DUHRING reports to the *British Medical Journal* a case of tuberculosis which was contracted by wearing a pair of earrings. The patient, a girl of fourteen years, removed the earrings from the ear of a young girl who died of consumption, and wore them in her own ears. Soon after, an ulcer formed in the left ear, the discharge from which, when examined, was found to contain tubercle bacilli, and a gland in the neck also enlarged and ulcerated. The patient developed pulmonary consumption, and at the date of the report was sinking rapidly.

This case is one of great interest as showing another channel by which the bacilli of tuberculosis may enter the system. The inquiry will naturally suggest itself, whether this patient was not already phthisical at the time she began to wear the earrings, and the development of the disease at that time a mere coincidence. This would seem the more probable from the age of the patient, which was fourteen years. Then, too, the report states that these two girls were intimate friends, so that the seed may have been sown during their lifetime. Some years ago either of these explanations would, to most minds, have been sufficient; but, through the researches of Koch, an additional means of determining the question has been made available. This is the detection of the bacilli themselves. The report states that this was done in the case mentioned; and, as the methods are simple and decisive, there is no reason to doubt the accuracy of the report. The enlargement of the gland in the neck is additional evidence that the earrings were the source of the infection. It would be interesting to know whether the ears of the first patient were ulcerated or not.

ELECTRICAL NEWS.

ELECTRICAL COURSE AT COLUMBIA COLLEGE. — In view of the prodigious strides which electricity is now making, it is but natural that the necessity for the establishment of a means whereby its thorough and systematic study can be undertaken should have engaged the attention of educational bodies in this country. Columbia College, which has always occupied a prominent position in science, has now established a course of electrical engineering. As its professors, it has secured the services of two men of excellent repute in electrical and mathematical circles. Mr. Francis B. Crocker, who assumes the instructorship, is no stranger to many of our readers. As one of the inventors of the C. & C. motor, his name has for some time been conspicuously before the public; and his papers read before the American Institute of Electrical Engineers (among which may be specially mentioned that on "Chemical Generators of Electricity," last year) and other scientific bodies have never failed to meet with a welcome. Mr. Crocker is regarded as a rising man in electrical circles; and in this view it is significant that he was, a few weeks ago, elected to the presidency of the New York Electrical Society, which is the oldest organization of its kind in the country. Mr. Michael Pupin is the assistant instructor. From Mr. Pupin's past work and present reputation, great things are expected of him, and he brings to his new sphere of action the additional prestige of having studied under Helmholtz in Berlin.

NOTES AND NEWS.

DURING the past year the director of the Michigan Weather Service has had compiled the average monthly rainfall for each section of that State, and has had the figures published in the monthly report. Believing that the information thus compiled could be better shown by being charted, the director made a chart of the State, showing the average monthly rainfall for each month and for the year. These charts were made up from the observations of thirteen years, and about four thousand reports were examined and proved, to obtain the data. There were also made the charts of the monthly and annual rainfall for the past year which are to accompany the normal charts. These charts will be of great value to the people of Michigan, as the rainfall can be readily compared with the normal, and thus ascertain in each locality whether the rainfall has been the average or not.

— Professor Rosenthal of Erlangen, at a meeting of the Berlin Physiological Society, March 27, gave an account of calorimetric experiments with which he had been busied for the last few years. He employed in these, says *Nature*, an air-calorimeter of special construction. It consisted of a copper vessel, of easy ventilation, in which the animal was placed; this was surrounded by an air-tight envelope, filled with air and constituting the reservoir of an air-thermometer; external to this was a covering to shield the whole apparatus from any changes in the temperature of the surrounding atmosphere. When the animal gives up to the envelope of air, per unit of time, exactly the same amount of heat as the whole apparatus radiates into the surroundings, the temperature of the air in the envelope remains constant, as also its pressure: hence the heat produced and given off by the animal during any known time could be measured by means of a manometer. Notwithstanding that the dog used in the experiments was fed in exactly the same way at each meal, the quantities of heat produced varied very largely, and any considerable uniformity is only obtained by taking the mean of a long series of observations. Up to about the third hour after the meal, the heat-production diminishes, then rises rapidly to a maximum; and from this point, at about the eighth hour, it begins to fall again slowly, and with irregularities, until the next meal. Over the whole twenty-four hours the heat-production is more uniform during the second period of twelve hours than in the first; about 20 per cent more heat is produced during the first than during the second half of the whole day. When an excess of food was given, the heat produced was always less than that calculated out from the oxidation of the food itself; but, with a uniformly constant diet, the mean value of the heat produced corresponded to the heat calculated for the oxidation of the food. The amount of carbonic-acid gas given off by the animal was found to correspond to the heat given off during the same period only in cases where prolonged intervals of time were taken into account. When the surrounding temperature varied between 5° and 25° C., all other conditions remaining the same, a minimum production of heat was observed at 15° C.: from this point it increased uniformly in both directions, not only when the temperature fell to 5° C., but also when it rose to 25° C. Professor Schweigger demonstrated several pieces of apparatus, which, by the use of small incandescent electric lamps, could take the place of the ophthalmoscope, and even

render a binocular examination possible. They also made the measurement of refraction in the eye both simple and exact.

— We learn from *Nature* that the extraordinary meeting of the Société Géologique de France, which will be held this year in Paris, beginning on Aug. 18, promises to be one of great interest. During the week devoted to the meeting, the collections in Paris will be visited, and there will be a series of excursions to places of interest within easy reach of that city. In the week following the meeting, excursions will be made to more distant localities; among others to the Auvergne and Brittany, — that to the former district under the guidance of M. Michel-Lévy, and that to Brittany conducted by M. C. Barrois. Arrangements will be made with the railway authorities for a reduction of fifty per cent upon the fares; but, in order to secure this advantage, the names of persons intending to attend must be sent to the secretaries of the society before July 1. British geologists, and especially fellows of the Geological Society of London, are cordially invited to be present.

— Professor W. A. Henry, writing in *Agricultural Science* of some weeds that are becoming troublesome in Wisconsin, says, "On the great plateau along the eastern flank of the Rocky Mountains grows *Solanum rostratum*, a homely, harmless sort of plant. The naturalist knows it to be the original food-plant of the Colorado potato-beetle (*Doryphora 10-lineata*). In the year 1872 or thereabouts the beetle, coming across the uncultivated strip of eastern Colorado and western Kansas, found a new food-plant in the common cultivated potato, and spread with marvellous rapidity over the country. *Solanum rostratum* also comes into the fields to conquer, and has spread on cultivated lands in Texas and Missouri, where, with greatly increased size, it proves a troublesome weed. Last summer Mr. L. H. Pammel, one of our agricultural graduates, now professor of botany in Iowa Agricultural College, found this plant growing at Watertown, in this State. It is following up the potato beetle. Will it spread over as large an area as its old acquaintance?"

— The annual congress of the German Pomological Society will be held this year at Stuttgart, between the 22d and the 30th of September.

— In 1887 a spot-disease was observed on cucumbers near Geneva, N.Y., which almost ruined the crop. Professor Arthur, says *Garden and Forest*, pronounces it a parasitic fungus similar to one which has been disfiguring peaches in Indiana, detracting from their beauty and hindering their growth. The cucumber-spot did not appear at Geneva in 1888, although it seems an aggressive fungus. It has been named *Cladiosporium cucumerium*. The fungus on peaches has only been recorded before as occurring in southern Austria, where it was named *C. carpophilum*. No remedies for either disease have yet been tried so far as known, but both of them threaten to become dangerous pests.

— A writer in the London *St. James Gazette* objects strongly to the use of footnotes in books, and particularly criticises Mr. Bryce's recent work on this account. He says, "Except for the purpose of relieving the text of references, the footnote has no proper place in any book that deserves to be called a book. It is at best a kind of purgatorio, to which an author consigns such remarks as he thinks unworthy of admitting to full honors, and yet has not the courage to cast out altogether. But there is hardly a page of Mr. Bryce's book without footnotes, and hardly a footnote which might not well have been incorporated in the text. Often, indeed, the footnote contains the very 'plum' of the page."

— According to a report lately issued by the Russian Department of Indirect Taxation, there were, in 1887, 2,775 distilleries in Russia, chiefly engaged in producing spirits from fruit. Compared with the preceding year, the number of these distilleries increased by 483; that is, about 21 per cent. This branch of industry is principally concentrated in the Caucasus, where it is rapidly becoming extended. The province of Elizabethpol takes the first place with 1,265 distilleries, then follows Tiflis with 491, Baku with 465, Erivan with 218, and the territories of Koutais and Daghestan with 108. Among the 2,775 distilleries in question, the industrial establishments, properly so called, amount to the number of 260. The product of the distilleries amounted in 1887 to 39,924,903 degrees of alcohol, which yielded to the treasury a sum of 924,805 roubles in excise and other duties.

— By order of the French minister of public instruction, the International Congress of Elementary Education will be held at Paris from Aug. 11 to Aug. 18, on the occasion of the Universal Exhibition. The following are the chief questions for discussion: 1. Under what form and to what extent can professional (agricultural, industrial, commercial) instruction be given in the elementary schools of the lower and higher grades and in training-colleges? 2. How far should women be employed in elementary education as teachers, heads of schools, and inspectresses? 3. What are the functions and the organizations of the practising schools attached to training-colleges and institutions of a like character?

— The students of the ancient University of Genoa, says *The Educational Times*, must be singularly unlike "our young barbarians all at play" on the banks of the Isis and Cam. The Italian students actually desire a competent professor of mathematics, vigorously protest against the fitness of the existing professor, and in general meeting assembled came to the conclusion of demanding by telegraph from the minister of education the appointment of a new professor. In our ancient universities, the honor students find it a serious waste of time to attend college lectures, and so they desert the lecture-hall for the rooms of their private tutor. The ordinary pass student is also quite indifferent as to the quality of his lectures. He also, like the honor student, seeks the aid of the private "coach" to pull him through his examinations. To think of them in open meeting discussing the proper filling of a professorial chair is simply impossible. The Genoese students are of a very different temper. The education minister taking no notice of their singular demand, the whole body of students joined the mathematical men in a general strike, and declined to attend any lectures. Thus the university is closed until this odd dispute is composed.

— In 1887 the population of Bulgaria amounted to 3,154,375, or 31 inhabitants to the square kilometre. The population of the principal communes was distributed as follows: Philippopolis, 33,412; Sofia, 30,428; Rustchuk, 27,198; Varna, 25,256; Shumla, 23,161; Slivno, 20,893; Zagora, 16,039; Tatar Bazardjik, 15,659; Vidine, 14,772; Plevna, 14,307; Sistov, 12,482; Silistria, 11,414; Tirnova, 11,314; and Kustendjs, 10,689 inhabitants. As regards nationalities, the population of 1887 was composed as follows: Bulgarians, 2,326,250; Russians, 1,069; Servians, 2,142; Turks, 607,319; Greeks, 58,338; Jews, 23,546; Gypsies, 60,291; Germans, 2,245; French, 544; and 80,074 persons belonging to other nationalities.

— The University of Munich has been celebrating the ninety-ninth birthday of its famous professor, Dr. Ignatius Döllinger. For sixty-three years Dr. Döllinger has filled the chairs of ecclesiastical history and canon law. As a politician in the Bavarian parliament, and as leader of the Catholic party in the German parliament at Frankfort, he has played a conspicuous part.

— Floating exhibitions seem to have taken, at least so far as Germany is concerned. The German Export Company has decided, says *London Engineering*, to apply the sum of £250,000 (5,000,000 marks) to the building, equipment, and working of a very large steamer, which is to serve as a floating exhibition. The vessel in question will be called "Kaiser Wilhelm," and the principal dimensions are as follows: length, 564 feet; breadth, 66 feet; depth, 46 feet; so the question is not of a small craft. The steamer is to have four engines, entirely independent of each other, and four propellers. She is to be fitted in exceptionally good style. The expenses for a two-years' tour are calculated at £157,000, while the takings for hire of room and profits on sale are expected to reach £363,000, leaving the very handsome profit of more than £200,000. The steamer will, according to the present arrangements, be ready to start in the spring of next year. A previous undertaking of a similar nature, the steamer "Gottorp," despatched from Hamburg, is understood to have given a satisfactory result. Not only are German goods being shown in many different parts of the world, but the staff accompanying the steamer has ample opportunities for studying in each place the various local and special requirements,

and to see to what extent and in what manner the different wants are being supplied, either by home or by other foreign makers.

— Several friends of the late Dr. F. A. Paley, the eminent classical scholar, have purchased his classical library, and presented it to Cavendish College, Cambridge, England.

— We have given a list of many of the congresses and conferences to be held during the Paris Exhibition; but recently an official circular has been issued, giving detailed particulars. Further information concerning these congresses can be obtained by applying to their respective presidents, whose names and addresses are given: accidents to workmen (Sept. 9–14), M. Linder, 38 Rue de Luxembourg, Paris; advanced teaching (Aug. 5–10), M. Gréard, The Sorbonne, Paris; aëronautics (July 31 to Aug. 3), M. Janssen, Observatoire de Meudon, Seine-et-Oise; agriculture (July 3–31), M. Méline, Palais Bourbon, Paris; alcoholism (July 29–31), M. Bergeron, 157 Boulevard Haussmann, Paris; applied mechanics (Sept. 16–21), M. Philips, 17 Rue des Marignan, Paris; architecture (June 19–22), M. Bailly, 19 Boulevard Bonne-Nouvelle, Paris; artistic proprietary rights (July 25–31), M. Meissonnier, 131 Boulevard Malesherbes, Paris; assistance publique (July 28 to Aug. 4), Dr. Roussel, 64 Rue des Mathurins, Paris; baking (June 28 to July 2), M. Cornet, 34 Rue de Rochechouart, Paris; bibliography of mathematical science (July 16–26), M. Poincaré, 63 Rue Claude Bernhard, Paris; care of the blind (Aug. 5–8), M. Marten, 56 Boulevard des Invalides, Paris; celestial photography (no date); cheap dwellings (June 26–28), M. Siegfried, 6 Rond-Point de Champs Elysées, Paris; chemistry (July 29 to Aug. 3); chronometry (Sept. 2–9), M. de Jonquières, 2 Avenue Bugeaud, Paris; colonies, M. Barbey, 22 Rue du Regard, Paris; commerce and industry (Sept. 22–28), M. Poirrier, 105 Rue Lafayette, Paris; co-operative stores (Sept. 8–12), M. Clavel, 2 Rue de Bourgogne; criminal anthropology (Aug. 10–17), M. Brouardel, Ecole de Médecine; dentistry (Sept. 1–7), Dr. David, 180 Boulevard St. Germain; dermatology and syphilography (Aug. 5–10), Dr. Hardy, 5 Boulevard Malesherbes, Paris; electricity (Aug. 24–31), M. Mascart, 176 Rue de l'Université, Paris; ethnography, M. Oppert, 2 Rue de Sfax, Paris; female work (no date); fire departments (Aug. 27 and 28), M. Wolff, 18 Avenue Bosquet, Paris; geography (Aug. 6–12), M. de Bizemont, 184 Boulevard St. Germain, Paris; homœopathy (Aug. 21–23), Dr. L. Simon, 5 Rue de la tour des Dames, Paris; horticulture (Aug. 16–21), M. Hardy, 4 Rue du Potager, Versailles; hydrology and climatology (Oct. 3–10), M. Renon, St. Maur, Seine; industrial proprietary rights (Aug. 3), M. Tesserenc de Bort, 82 Avenue Marceau, Paris; legal medical science, Dr. Brouardel, Ecole de Médecine, Paris; literary societies (June 17–27), M. J. Simon, 10 Place de la Madelaine, Paris; marine work (Oct. 7), M. Bernard, 43 Avenue du Trocadero, Paris; mental medical science (Aug. 5–10), Dr. Falret, 114 Rue du Bac, Paris; meteorology (Sept. 19–25), M. Renon, Observatory de St. Maur, Seine; methods of construction (Sept. 9–14), M. Eiffel, 60 Rue Prony, Paris; mines and metallurgy (Sept. 2–11), M. Castel, 144 Boulevard Raspail, Paris; money (Sept. 11–14), M. Magnin, The Bank, Paris; otology and laryngology (Sept. 16–21), Dr. Duplay, 2 Rue de Penthièvre, Paris; participation in profits (July 16–19), M. Robert, 15 Rue de la Banque, Paris; peace, M. Passy, 8 Rue Labordère, Neuilly-sur-Seine; periods of rest from work, M. Léon Say, 21 Rue Fresnel, Paris; pigeon-training (July 31 to Aug. 3), M. Janssen, Observatoire de Meudon, Seine-et-Oise; photography (Aug. 6–17), M. Janssen, Observatoire de Meudon, Seine-et-Oise; physical exercises in education (June 15), M. J. Simon, 10 Place de la Madelaine, Paris; physiological psychology (Aug. 5–10), Dr. Charcot, 117 Boulevard St. Germain, Paris; popular traditions, M. Ploix, Quai Malaquais, Paris; prehistoric anthropology and archæology (Aug. 19–26), M. de Quatrefages, 36 Rue Geoffroy St. Hilaire, Paris; primary education (Aug. 11–19), M. Gréard, The Sorbonne, Paris; protection of monuments (June 24–29), M. C. Garnier, 60 Boulevard St. Germain, Paris; saving of life (June 12–15), M. Lisbonne, 3 Rue St. Vincent de Paul, Paris; state aid in emigration (no date); state intervention in labor contracts (July 1–4), M. Donnat, 11 Rue Chardin, Paris; state regulation of the price of food (July 5–10), M. F. Passy, 8 Rue Labordère, Neuilly-sur-Seine; statistics, M. Levasseur, 26 Rue Monsieur-le-Prince, Paris; stenography (Aug. 4–11), M. Grosselin, Palais-Bourbon, Paris; share companies (Aug. 12–19), M. Larombière, 16 Rue d'Assas, Paris; technical commercial education (July 8–12), M. Gréard, The Sorbonne, Paris; therapeutics (Aug. 1–5), Dr. Moutard-Martin, 136 Boulevard Haussmann, Paris; unification of time, M. Faye, 95 Avenue des Champs Elysées, Paris; utilization of rivers (Sept. 22–27), M. Guillemain, 55 Rue Bellechasse, Paris; veterinary medicine (Sept. 19–24), M. Chauveau, 10 Rue Jules Janin, Paris: workmen's clubs (July 11–13); zoölogy (Aug. 5), M. Milne-Edwards, 57 Rue Cuvier, Paris.

— The "Report of the General Board of Studies at Cambridge" (England), while curtailing the demands of the special boards, estimates the additional expenditure imperatively required, either at once or within a very few years, at a high figure. Under the head of "Annual Expenditure" come (1) increase in the salaries of lecturers, demonstrators, and assistants, at the least £1,000; (2) new chairs or lectureships of ancient history, Roman law, English palæography, general jurisprudence, and physiology, for which £1,500 seems a very modest allowance; (3) superannuation pensions for teachers and lecturers, say £1,000. Besides this, a capital sum must shortly be raised of £45,000 for new buildings and plant. This is apportioned between anatomy and physiology (£15,000), geology (£7,500), history (£3,000), library (£3,000), Botanic Gardens (£2,200), and the purchase of the Perse School (£12,500). The last item has already been agreed to by the Senate, and it is hoped that the plans which have been prepared for buildings to be erected on the purchased site—an anatomical museum and physiological laboratory—will be passed before the long vacation. The Medical School at Cambridge has grown within a generation from a few scattered students, mostly Caius men, to over four hundred.

— The latest number of the "Johns Hopkins University Studies in Historical and Political Science" is a pamphlet on "English Culture in Virginia," by William P. Trent. It is really an account of the foundation of the University of Virginia, and especially of the labors undergone in obtaining the earliest professors, most of whom had to be brought over from England. The information given in the pamphlet is derived in the main from the letters of a man named Gilmer, who was sent to England by the university authorities to engage the professors. The work can hardly be said to have any but a local interest, and we confess to have found Gilmer's numerous letters rather dry reading. If the University of Virginia was like those of Oxford and Berlin, its early history would have more general importance; but, as it is, a hundred and forty pages about the hiring of a few professors is rather too much. However, the work will doubtless be interesting to Virginians, and especially to graduates of the university.

— A parliamentary return dealing with the subject of railway collisions during 1888 has recently been issued. It shows that during the past year accidents to trains and rolling stock in Great Britain had caused the death of 11 passengers and 7 servants, compared with 25 passengers and 8 servants the year before; and the injury to 594 passengers and 93 servants, compared with 538 passengers and 109 servants in 1887. There were 101 collisions reported, 53 of passenger-trains leaving the rails, 20 of trains running into stations and sidings at too high a speed, 131 cases of trains running over cattle, and 57 of trains running through gates at level crossings. There were six fires in trains, and three fires at stations. Besides the casualties named above, 96 passengers and 389 servants of companies were killed, and 814 passengers and 2,100 servants injured from other causes. Fifty-three persons were killed and 24 injured through passing over railways at level crossings; 295 trespassers, including suicides, were killed, and 114 injured; and 54 were killed and 84 injured who are not classified. The total was 905 persons killed (a decrease of 14 in number) and 3,826 injured (an increase of 236 compared with 1887). This total is still further increased to 977 killed and 8,807 injured by other accidents, such as those occurring by falling down steps, on and off platforms, from the kicks of horses, and other causes. During the year, 24 horses, 3 ponies, 47 beasts and cows, 73 sheep, 2 donkeys, 4 hounds, 1 goat, and 1 dog were run over and killed.