ratio $m : n$ can be expressed by small integers the curve is completely shown by this apparatus. When this ratio cannot be expressed by small, but can by moderate, whole numbers, the curve cannot well be seen, but may be readily photographed. The most beautiful effects are seen when the ratio $m : n$ has almost some such values as 1:1, 1:2, 2:3, or 3:1. The values of a, b, and α vary with every tap of the finger, and thus a single apparatus will show a great variety of curves of one class.

I have not tried projecting these curves with a lantern, but I see no difficulty in the way of such a proceeding.

Clark University. T. PROCTOR HALL.

VALUABLE EXPERIMENTS IN VEIN-FORMATION.

IN No. 3, Vol. XII., of the *School of Mines Quarterly* there appeared a short paper "On the Genesis of Ore-Deposits," by W. H. von Streeruwitz, the chief of the Western Division of the State Geological Survey of Texas.

In these days of hasty conclusions and the overcrowding of scientific literature with opinions and half-developed theories, it is refreshing to run across an occasional example of undue modesty in presenting the results of elaborate experimentation. My excuse for thus tardily calling attention to a marked case of this character, entirely without the knowledge of the author, is the conviction that the gentleman himself will not lay claim to full credit for the work which he has planned and executed in a thoroughly scientific manner. Especially does this action seem fitting as preliminary to an extension of the same investigations by the present writer in the metallurgic laboratory of the Arizona School of Mines. In fact, it is only just to confess that the inspiration of these last experiments, for which preparations are now being made, came originally and wholly from the most interesting results of Professor von Streeruwitz's patient and intelligent observations in his laboratory at Houston, Texas.

In the paper quoted Professor von Streeruwitz does not make very clear how much of the value of his well-fortified conclusions rests upon the skill with which he has himself conceived and executed a most convincing series of experiments. But those who have seen some of the tubes with miniature veins of gold, silver, copper, lead, etc., and others with beautifully formed agates, need only the concise reasoning of the article referred to, in order to understand the originality, perseverance, and devotion to truth with which the investigation has been carried out through several years of diligent experimentation.

In the language of our author, the experiments would, so far, appear to establish the following points, viz.: —

1. It is principally the iron which, in silico-ferruginous fissure veins, brought the other metals from greater to (by mining) accessible depths.

2. Most siliceous ore-leads, carrying also large quantities of iron and having silico-ferruginous outcrops, seem to be deposited from hot aqueous solutions of the metals and silicates.

3. Metals and metal combinations contained in the rock surrounding the fissures and crevices were probably leached out by the hot liquids contained in the fissures and precipitated on and combined with the siliceous iron growing up in the fissures.

4. The fissures could be charged with ore-veins in a comparatively short time, since, no doubt, high temperature and galvanic currents existed in the fissures at the time of formation of the ore-gangues.

5. In contact-gangues the precipitation and deposition of ores was materially facilitated by galvanic currents caused by the contact of different rocks, and it is owing to the prevalence of galvanic currents that in most cases richer deposits at the intersection of two or more leads were formed.

6. The so-called iron outblows ("gossan," "eiserner hut," "Pacos," "Colorados," etc.) are frequently not the product of igneous eruption, but a deposition product from aqueous solutions; and alterations in the rocks contiguous to such outblows are not necessarily the result of eruptive agencies, but of a leaching process.

7. The formation of banded agates does not always take place, as is generally believed, in the cavities of a rock, but can also occur free in solutions; and the thickness of the bands progresses from the centre outwards, although a reverse process by osmosis may be possible under certain conditions.

The bases for these conclusions are somewhat more explicit than might, perhaps, be inferred from a reading of Professor von Streeruwitz's paper alone, but, as he is most careful to insist, the experiments possess their greatest scientific importance in the element of suggestiveness for future inquiry. It is remarkable that so little has heretofore been done in such directions; and, like the admirable flexure tests of the United States Geological Survey in orographic work, they point out little-trodden fields in geology which offer rich rewards to capable investigators who will approach the problems in inductive experimental mood, following the guidance of results as they are gradually manifested.

No one will be better pleased than Professor Streeruwitz to know that others are earnestly engaged in this study. The incidental discoveries, whatever they may be, are liable to prove as interesting and valuable as any which may be directly sought. Indeed, it is impossible at this juncture to predict to what legitimate length the investigation may lead.

The main thing to be desired is the inauguration of a large number of experiments with as widely varied conditions as possible of material, situation, environment, and activity. While co-operation is not really essential, it can do no harm and may result most beneficially. May not some of our zealous young geologists be induced to undertake this work, which should be continued with constant observation for a term of years?

Instruction will gladly be given to any who may require it, and from those who cannot otherwise aid the cause thoughtful suggestions will be most welcome.

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ROYAL METEOROLOGICAL SOCIETY.

AT the meeting of this society on Wednesday evening, March 16, Dr. C. Theodore Williams, the president, delivered an address on the "Value of Meteorological Instruments in the Selection of Health Resorts." He drew attention to thermometers, maximum and minimum, as the foundation-stone on which medical climatology rests, and instanced effects of extreme cold or heat on the human organism. The direct rays of the sun are of the greatest importance, and in health resorts should be utilized to the full; in fact, only climates where, during the winter months, even a delicate person can lie or sit for several hours a day basking in the sunshine are to be recommended for most complaints, and the various forms of sunshine recorders are used to aid the medical adviser in choice of such health stations.

After referring to the value of rain-gauges, hygrometers, and barometers, Dr. Williams stated that many health resorts owe their reputation almost solely to their shelter from cold winds; for

instance, the advantage in climate which Hyeres and Mentone enjoy over Marseilles is chiefly due to their being more sheltered from the mistral, or north-west wind, the scourge of the lower valley of the Rhone from Valence to Avignon. He went on to describe the climate of the Riviera, illustrating it by lantern slides from recent photographs, including views of Hyeres, Costabella, Cannes, Nice, Mentone, San Remo, etc., and he showed the three principal causes of the warm winter in this region to be: (1) the southern latitude; (2) the protection from cold winds by mountain ranges; and (3) the equalizing and warming influence of the Mediterranean Sea, which being practically tideless is always equally potent, not varying with hour and season. Dr. Williams mentioned the weak points of the south-of-France climate, with its blustering mistral, its occasional cold bise, its moist sirocco-wind; but summed up the Riviera winter climate as being, on the whole, clear, bright, and dry, with fog and mist practically unknown, with a winter temperature of 8° to 10° higher than England has, though subject to considerable nocturnal radiation, with about half the number of rainy days and four to five the number of bright ones which she can boast of, with cold winds and cold weather, without which it would lose its health-giving effect.

After the delivery of this address the meeting was adjourned in order to allow the fellows and their friends an opportunity to inspect the exhibition of instruments relating to climatology which had been arranged in the rooms of the Institution of Civil Engineers, 25 Great George Street. The Meteorological Office showed a set of instruments necessary for the equipment of a climatological station, viz., Stevenson thermometer-screen, fitted with dry-bulb, wet-bulb, maximum and minimum thermometers; and also a rain-gauge. Thermometers were also shown for ascertaining the temperatures on the ground, under the ground, and at a distance, as well as for recording temperature continuously. Various forms of sunshine recorders were exhibited, as well as a number of actinometers and solar radiation instruments for ascertaining the heating effect of the solar rays. The exhibition included a large and interesting collection of hygrometers, also several rain-gauges and other instruments. Among the curiosities is a piece of plate glass which was "starred" during a thunder-storm on Aug. 21, 1879; this was not broken, but it has a number of wavy, hair-like lines. The exhibition contains a large number beautiful photographs of clouds, lightning, and snow-scenes, as well as of the damage done by the destructive tornado at Lawrence, Mass., U.S.A.

NOTES AND NEWS.

ON April 16, at the Department of Archæology and Palæontology of the University of Pennsylvania, will take place the opening of the Loan Collection of Objects used in Worship, already referred to in these columns

— A very intense light, such as is required for photographic or occasionally for medical purposes, may, as is well known, be readily obtained by burning magnesium ribbon, which has, however, the disadvantage of being somewhat expensive. An excellent substitute, according to *Lancet*, has been found by a French chemist, M. Villon, in aluminium, which is about a third of the price of magnesium, and which may be utilized in the same manner by burning it in a spirit lamp, or, if a flame of much more intense brilliancy is required, in a coal, gas, or spirit flame supplied with a jet of oxygen. In these it burns without emitting fumes, in which respect it is superior to magnesium. The light given by aluminium has a high actinic power — nearly as high, indeed, as that of magnesium. The most convenient way of obtaining a very intense light, according to M. Villon, is to use a lamp provided with a jet of oxygen at the centre of its flame, into which powdered aluminium mixed with a quarter of its weight of lycopodium and a twentieth of its weight of nitrate of ammonium can be projected by means of a tube furnished with an air-ball. This gives an exceedingly intense light, without smoke. A mixture of aluminium powder with chlorate of potash and sugar can be ignited, giving an intense light by means of gun-cotton, but is somewhat dangerous. Probably the best plan for medical photography, or for laryngoscopic and auroscopic and other demonstrations, would be to burn a ribbon of aluminium in an ordinary spirit lamp. Of course, if oxygen and an oxy-hydrogen, or an oxy-alcoholic, lamp were at hand a much more intense light could be obtained.

— The London *Times* of March 24 printed the following communication from a correspondent: Under the direction of the Austrian Government an interesting series of deep-sea explorations has been conducted recently in the eastern parts of the Mediterranean, by a scientific party on board the "Pola." At one point, about 50 nautical miles south-west from Cape Matapan, the "Pola" found a depth of 4,400 metres (2,406 fathoms), followed within a few miles further east by a depth of 4,080 metres (2,236 fathoms), which are the greatest depths recorded in the Mediterranean. They have received from the Austrian Hydrographical Board the name of Pola Deep. The great depression of the Mediterranean must thus be shifted considerably east from its former central position on the maps. Another deep area was explored between Candia and Alexandria—the depths attaining from 3,310 metres (1810 fathoms) some twenty miles south-east of Grandes Bay, and from 2,392 metres (1,208 fathoms) to 2,120 metres (1,322 fathoms) within a short distance from Alexandria; the maximum depth sounded being 3,068 metres (1,678 fathoms) in 28° 39′ 30″ north latitude, and 33° 19′ 54″ east longitude. The highest temperature was found during the first part of the voyage, at depths of 1 to 50 metres, the highest being 80.8° Fahrenheit at 1 metre; the lowest temperature, 52½°, was observed at the issue from the Adriatic Sea, at a depth of 760 metres. In explorations conducted some two years ago in the Central Mediterranean, it was observed that the density of the water and its saturation with salt increased with depth, and the same was noticed in the western part of this year's cruise. But in the Eastern Mediterranean the density of water varies but very little in the different strata, and it is higher on the whole than in the west. The transparency of the water is very great in the Eastern Mediterranean. Altogether the "Pola" made no fewer than 50 deep sea soundings, 27 of which touched depths of more than 1,000 metres.

— P. Blakiston, Son, & Co., Philadelphia, announce that they will soon publish "Physical Education," by Frederick Treves, F.R.C.P. The subject of physical education as a hygienic measure has recently attracted so much attention from school boards, the medical profession, and sanitarians generally, that it now ranks in importance with the various branches of study pursued in our public schools and colleges. To the average city man or woman of sedentary occupation physical exercise is of quite as much consequence as it is to school children and college students. It is, however, often taken up unwisely and to the lasting harm of those who in ignorance attempt methods that are unsuited to their physical condition. It has therefore been thought advisable to publish, from the advance sheets of "A Treatise on Hygiene," this paper by one of the best known medical writers of the day, that it might be within the reach of those who would not perhaps care to purchase the larger work in which it will be included.

— Houghton, Mifflin & Co. announce that Mrs. Olive Thorne Miller adds to her two excellent books about birds already published by this firm a third, to which she gives the title, "Little Brothers of the Air." It describes between twenty and thirty different birds, and for all lovers of birds, who are happily very numerous, this little book has special attractions. Professor Child has prepared the eighth part of his remarkable edition of "English and Scottish Popular Ballads." It was originally expected that the work would be complete with the eighth part, but Professor Child has been successful in discovering a good deal of material which he had hardly anticipated finding, so that at least one more part is necessary to complete the work. "The Satchel Guide for the Vacation Tourist in Europe" has been revised for 1892, and, as heretofore, holds the first rank among Guides for those who wish to cover only a part of Europe, and make a tour instead of a thorough continued study of many places.