One peculiarity of the drinking of the black drink is that, so far as I can ascertain, it was not used at their meals as we use tea and coffee, but wholly as a social beverage or at festivals and other public occasions. I do not think the women were allowed to drink it, at least not publicly. Authorities differ on this point.

Among the Creeks the women sometimes prepared the black drink, but Narvaez writes that the Indians on the coast of what is now Texas did not allow a woman to come near it during its preparation.

That a beverage containing caffeine should fall into disuse and become almost forgotten is a singular fact. The use of maté has not decreased from the time of the conquest of South America by Europeans. The reason why the latter is still in use and the former not lies, perhaps, in the fact that the Europeans in South America mixed with the natives, married, and adopted their customs, while the English and French who settled the Gulf States did not associate with the Indians, and adhered to the use of Chinese tea. Now that we know that the leaf of the cassine contains caffeine or theine, can its use as a beverage be revived?

It is not as pleasant in odor and taste as *Thea sinensis*, and this may be against it; on the other hand, it seems to have some salutary properties which the latter does not possess, and may, perhaps, be far more cheaply obtained.

A rough estimate can be made as to the number of square miles upon which it grows. Estimating the coast line from the James River, in Virginia, to the Rio Grande, in Texas — about 2,000 miles — and multiplying this by 20 miles, the extent of its growth inland, we get a total of about 40,000 square miles. On this area could be picked an immense quantity of leaves, and if the trees are not destroyed in the picking the crops could be harvested every year. No estimate can be approximated even of the amount of the crop of leaves which could be gathered, because we can not estimate the number of trees on this area.

It would seem possible that further inquiries on this point and careful experiments in cultivation and manipulation might result in furnishing our market with a product which would be found in many cases an acceptable and useful substitute for the more expensive imported teas.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Rain-Making by Concussion in the Rocky Mountains.

IN connection with the recent discussions of the effects of explosions in producing rain, it ought to be noted that for twenty years or more the Rocky Mountains have afforded excellent opportunities for observing the effects upon rainfall of heavy explosions at high elevations. There are in this region thousands of mines, mining claims with open cuts and adits, and quarries at elevations from 5,000 to 13,000 feet. Nitro-glycerine preparations are now the explosives used in blasting. During the summer there is a great amount of blasting high on the mountains. Several railways and wagon roads reach 9,000 to 12,000 feet, and the grading of these afforded much blasting. I have made considerable inquiry and found no one who had observed any connection between the explosions and rain-fall. Probably few or none were especially on the watch for such connection, but if there were any very obvious connection it would have been observed, since there have been so many years of opportunity.

About two years ago the cog-wheel road was graded to the top of Pike's Peak. Thinking that explosions on a high isolated mountain, rising far above the adjacent country like Pike's Peak, would produce rain if anywhere, I especially noted the weather. Tremendous explosions occurred daily for some months. The reports were often heard 30 to 40 miles, and many of them were at elevations between 13,000 and 14,147 feet. Yet all this happened in one of the dryest years ever known in Colorado, when often for days or weeks there was no precipitation even on the mountains.

G. H. STONE.

Colorado Springs, Jan. 12.

Rain-Making.

IN *Science* for Nov. 27, 1891, appeared an article from the pen of Professor Lucien I. Blake of the State University of Kansas, entitled "Can We Make it Rain?" in which some suggestions are made as to the proper method of conducting experiments to that end, drawn from the discoveries of Mr. John Aitken of Scotland, who has shown that unless there be dust particles in the air the aqueous vapor therein contained will not, in condensing, form itself into drops. Professor Blake argues from this that, instead of using guns or apparatus for producing terrific noises, the better way would be to send up inexpensive fire balloons carrying impalpable powders, which could be thus scattered through the air; or else carrying sulphur or gun-powder, the smoke of which, when they were ignited, would furnish the dust particles, which, it is assumed, are the only requisites for artificially setting in motion the process of nature that brings rain.

The reasoning of Professor Blake in leading up to this conclusion and in combatting the idea that concussion is a necessary factor in artificial rain production, contains much that appears sound from the standpoint of both science and good sense, and yet much that will not bear examination. His contention that thunder does not, to any extent, cause condensation of vopor, but is rather the result of it, is one which I have always held to, for latent heat is given out by condensing vapor, and this heat may appear in the form of electricity, and cause the lightning-flash that makes the thunder. The idea, also, that powder smoke may be a factor in rain production when rain is caused by a battle, is a logical deduction from Mr. Aitken's discovery. Professor Blake also avoids the blunder committed by Professor Simon Newcomb, in his article in the October number of the *North American Review*, where the latter lays himself open to the imputation of being himself guilty of the very thing he charges against the advocates of the concussion theory, viz., of "ignoring or endeavoring to repeal the laws of nature." This he does by asserting that ten seconds after the sound of General Dyrenforth's last bomb had died away "everything in the air — humidity, temperature, pressure, and motion — was exactly the same as if no bomb was fired," thus abolishing at one stroke the principle of the conservation of forces. Professor Blake, with less zeal but greater wisdom, practically admits that the forces brought into action by explosions are resolved into heat, and he does not, like Newcomb, annihilate this heat, though unwilling to admit that it can do work. Professor Blake also has the good sense to recognize the fact that the question of artificial rain production cannot be settled by laboratory experiments — a thing that cannot be said of all the assailants of the concussion theory.

But his contention that if concussion causes rain "the greatest effect — the practical effect — must follow close upon the concussion," cannot be sustained. While I reserve for a more extended article to be published elsewhere a full consideration of this question, I will here say, briefly, that the well demonstrated theory of the late Professor M. F. Maury that there are two great atmospheric currents, the equatorial and the polar, flowing above us in nearly opposite directions, furnishes the basis for a perfect explanation of the reason why the centre of the atmospheric disturbance caused by a battle should remain in the vicinity of the battle-field while the two currents are mixing together and initiating the process that leads to rain — a process which, it is plain, must require time in reaching a state of effective action.

But these points in the discussion are not so much what I desire to consider at this time as the special method recommended by Professor Blake for conducting rain-making experiments. The

advocates of the concussion theory welcome any discoveries that can add to our knowledge of the reasons why battles cause rain, and thus suggest methods for producing it which may be an improvement on these suggested by the battles and their sequences. In this category appears to be the discovery of Mr. Aitken referred to, but it furnishes nothing conclusive on the subject, and, in my opinion, an experiment on the line marked out by Professor Blake would prove a failure. If some of us go to one extreme in relying too much on concussion as the means by which the process of nature that leads to rain can be set in motion, so does Professor Blake go to the other extreme in holding that it is smoke or dust particles alone that can artificially effect that result. We know, as a matter of fact, that simply throwing smoke into the air does not produce rain. There are scores of cities in our land whose chimneys are doing this every day, and yet they do not produce rain. And it cannot be said that the smoke they send up is not of the right kind. It contains a great deal of sulphur and of carbon, and these, according to Prosessor Blake, are among the substances which form dust particles, around which molecules of aqueous vapor most readily collect.

In the light of Mr. Aitken's discovery, however, I am willing to admit the possibility that smoke may not be without its effect in producing the rain that follows battles — an idea, I may add, which, though not original with me, I placed on record over twenty years ago, as may be seen by reference to the letter of Gen. Robert A. McCoy, in the appendix to "War and the Weather." In any future experiments in the field the application of the principle discovered by Mr. Aitken ought to be duly tested. But I see no reason as yet for doubting that force, exerted by means of explosions and expended on the earth and air, is a necessary factor in artificial rain production.

EDWARD POWERS.

El Paso, Tex., Jan. 15.

Eye-Habits.

IN *Science* of Dec. 18, 1891, p. 339, is a note taken from *Nature*, and referring to some experiments of Mr. James Shaw to test the ability of school children to keep one eye open and the other shut at the same time. Having been associated with school children for many years where the microscope was frequently used in the class-room for demonstration, my attention has often been called to their proceedings in this respect, and the impressions may be worth recording, though they are, no doubt, essentially like those of many other teachers in analogous positions. As the use of the microscope was only for a short time to each individual in a particular exercise, it was necessary that an observer looking into the tube of a monocular should by some means close one eye in order that other objects might not be in the field of view of the unoccupied eye and confuse the image. For it requires long practice on the part of one using a monocular stand to examine an object while keeping both eyes open and not be inconvenienced, a training out of question with school children where the time was limited. In the case of such the eye was closed either with or without the use of the hand. Being pupils in a high school their ages ranged from fourteen to twenty or more, the majority from fifteen to eighteen. Statistics were not kept, but I do not recall an instance where a boy could not close one eye without the aid of the hand. If it occurred, it was very rare. But it was quite common for girls to make use of the hand for this purpose, a fourth or more, as mentioned by Mr. Shaw for school children.

Sometimes, by request of teachers in primary grades, I have taken a microscope to their rooms, in which the lowest classes were taught, their ages being from six to eight or nine. It was for the purpose of showing something which the teachers desired to use as an object-lesson, like the eye or foot of a fly, or the scales from the wing of a butterfly, things whose forms they readily comprehended, as was shown by their description of them. With them the unaided closing of one eye was exceptional, some of the older boys, perhaps, being able to do so. I have noticed the same difficulty with older people who occasionally look through a microscope; the inability to shut one eye and leave the other open being among the women. This was illustrated but a short time since by a lady nearly eighty years old. She had recently had one eye treated for cataract, and was told to test the perceptive power of it. In order that there might be no interference by the other eye, this was covered by the hand.

This habit of peeping, or looking with one eye open and the other closed, is plainly an acquired one, becoming easy by practice, as is seen by comparing children with adults, and men and women with each other. The difference in the latter is mostly due to the lack of use. Boys early become accustomed to "sighting" in various ways in their play, as in the use of the cross-bow or bow and arrow, toy gun or real gun, or they may wish to line something. They also work more with tools, and, like a carpenter, must see if they are making a straight edge, and thus acquire this ability. There being less occasion for it on the part of girls and women, they may fail to gain it at all. This is not from inherent inability any more than in the case of men, unless heredity becomes a factor working through sex, and facilitating the process.

E. J. HILL.

Englewood, Chicago, Jan. 14.

BOOK-REVIEWS.

Chambers's Encyclopædia. New edition. Vol. VIII. Peasant to Roumelia Philadelphia, Lippincott. Royal 8°. $4.

COMMENT on this encyclopædia may seem almost superfluous, not only because the work is well known, but also because of the uniform excellence of its several volumes; yet one does not like to pass it by without remark. The present volume is noteworthy for the number of its articles on philosophical and religious topics; Professor Andrew Seth writing on Philosophy, Professor D. G. Ritchie on Plato, Professor Sorley on Psychology, Mr. James Oliphant on Positivism, Professor Flint on Religion, Rev. W. L. Gildea on Roman Catholicism, Professor Cheyne on the Book of Psalms, etc. In the very different department of the industrial arts we find articles on Photography, by T. C. Hepworth and W. T. Bashford; on the Plough and the Potato, by James MacDonald; on Pottery, by James Paton; on Printing, by John Southward; and a long one on Railways, by E. M'Dermott. In science strictly so called, Professor Peile treats of Philology, Mr. Norman Wyld of Plants and of Physiology, Professor Knott of Quaternions, Dr. Alfred Daniell of Reflection and Refraction Mr. J. A. Thomson of Protoplasm and of Reproduction; while the minor articles are too numerous to mention. In history and geography the most important papers are perhaps those on Phœnicia, by Canon Rawlinson; on Rome, by Canon Taylor and Dr. Steele; and on Persia and Persepolis, by Gen. R. Murdoch Smith. In this department it seems to us that there is a deficiency of maps. Political and social themes receive their share of attention, Mr. T. Kirkup treating of Political Economy, Mr. Jesse Collings of Peasant Proprietors, Mr. W. C. Smith of the Poor Laws, Sir E. F. Du Cane of Prisons, and Mr. W. Draper Lewis of Protection. Literature and the ideal arts are less conspicuous in this volume than in some of the previous ones; but Mr. Edmund Gosse writes of Poetry, Mr. Stead of Periodicals, Sir Joseph Crowe of Raphael, Mr. P. G. Hamerton of Rembrandt, and Mr. W. Holman Hunt of Pre-Raphaelitism. The number of minor articles on all subjects is so great as to preclude all mention of them individually; yet it not unfrequently happens that these are the most useful of all to the reader It is expected that the two remaining volumes of the Encyclopædia will appear during the present year.

AMONG THE PUBLISHERS.

THE new volume of the Badminton Library, announced by Little, Brown, & Co. for immediate publication, will treat of skating, curling, tobogganing, and other out-door sports. It is written by J. M. Heathcote, C. G. Tebbutt, T. Maxwell Witham, and the Rev. John Kerr, Ormond Hake and Henry A. Buck, and contains several plates and numerous illustrations in the text, by C. Whymper and Captain Alexander.

— John Wiley & Sons announce as in preparation "Elementary Lessons in Heat," by Professor S. E Tillman, United States Mili-