generally found in French grammars, I have treated, in each of those exercises, one special subject.

I have made a synoptic table of thirteen lines, by which all verbs, regular or irregular, are conjugated, thus saving the student the monotony and annoyance of studying the verbs from memory by a new combination and arrangement. The student is thereby saved loss of time in writing endless conjugations of verbs.

To make attractive and instructive a study which is too often wearisome and sterile, I have given, in the third volume of my series, a vocabulary, divided into chapters, each containing an interesting outline of stories bearing on a special subject, and comprising a list of the most useful and important words of the language in daily use. Thus a natural chain of ideas is formed, easily remembered, and which can be made the subject of a conversation and composition, the student gaining in this way a thorough knowledge of the practical framework of the language. As soon as the student knows a few words of the vocabulary, these outlines are made the subjects of conversations between teacher and pupils, and, later on, between the pupils themselves. They are also employed in the form of narratives, by joining them together; and, by degrees, they are enlarged upon more and more. The fourth volume of my series, 'The modern French method,' comprises a series of words, idioms, and proverbs, forming skeleton narratives of travel, incident, and scenes, — romantic, dramatic, and comic, — all fitted to elevate the mind and inspire noble thoughts: there are also sketches in geography, biography, and history to be used in conversation and composition. By the study of this work, the learner acquires the framework, words, and idioms for literary style; and as every word, idiom, and proverb is properly located, the student will comprehend all their bearings by the context, and will know how to use them in their full meaning. A vast number of idiomatic questions are put upon the above-mentioned outline, and the answers are furnished by the student from the skeleton, or framework, upon which he enlarges at will. In order that the learner should acquire self-reliance, and be able to express himself freely on literary subjects, and should get an elegant style of his own, he sets down in narrative form each lesson previously treated conversationally, by which means he can give free play to his imaginative faculties.

The pupil, being constantly imbued with French ideas, and accustomed to look at things from a French point of view, adapts himself to them, and necessarily expands his mental vision: and as a great number of the subjects he treats of arouse his moral sensibility, and are fitted to excite in his heart tender compassion, brotherly love, devotion to his fellows, and self-denial, his moral capacities must be, as a matter of course, enlarged. This method is easy and simple, interesting, natural, and practical; and it relieves the student from much irksome and monotonous labor. It trains the ear to the apprehension of the spoken language, and, by a systematic training of the vocal organs, gives to the speaker a faultless Parisian pronunciation. The pupil is presented with a vocabulary so constructed that all the words, idioms, and proverbs form an intelligible outline of scenes and sketches, which the mind grasps and retains, while bringing out fully their individual and conventional meanings. The pictures are made so vivid and obvious, and the words are so suggestive, that the memory is greatly assisted, and the aquirement of a stock of words becomes a mere pastime. These words are fixed in the mind of the student by frequent and pleasant repetition, and thus memory is cultivated without straining; while, by means of idiomatic questions, educing appropriate answers, the learner is made acquainted with the peculiar genius of the French language. No English is either written or uttered during the course. The pupil finds in the book ample English explanations, and is never left in the dark; yet by degrees he becomes accustomed to think in French.

Joseph D. Gaillard.

New York, Feb. 11.

Inertia-force.

In *Science* of Feb. 11 Professor MacGregor has very courteously criticised my use of the idea which I have sought to express by the term 'inertia-force' in a pamphlet recently published. Professor MacGregor misunderstands me, however — or I misunderstand him. He quotes from my pamphlet the following passage: "If one of the opposing applied forces is greater than the other, the greater will prevail, and a change of motion will occur, occasioning an inertia-force, which will work *with* the smaller applied force *against* the greater," and then says, "The inertia-force, therefore, is supposed to act on the body by which it is exerted."

I am at a loss to understand how Professor MacGregor makes this inference from the passage he quotes. I meant that the inertia-force works ('acts' would be a better word) with the smaller applied force *against the agent which* exerts the greater force. Take this example: a train is being started by a locomotive. The forces *applied* to the train are the pull of the locomotive, and the smaller, opposing, force of friction. The pull of the locomotive prevails, but in prevailing it must deal not only with the resistance due to friction, but with the reaction (which also I call resistance) due to the inertia of the train. The friction resistance would be nearly the same whether the acceleration of the train were great or small; but the resistance due to inertia, the *inertia-resistance*, or *inertia-force*, would be always proportional to the acceleration.

The term 'centrifugal force,' although I do not like it, does not excite in me the horror which Professor MacGregor evidently thinks it should occasion. I certainly should not say that a ball swinging in a circle at the end of a string connecting it with the centre of the circle is *acted on* by 'a force directed from the centre,' but I certainly should say that the ball *acts upon the string* with 'a force directed from the centre,' — a proposition which seems to me so plainly true that I think all difference of opinion as to its truth must arise from different interpretations of the word 'force.'

I suspect that Professor MacGregor and I do interpret that word somewhat differently. The following quotation from Maxwell's 'Matter and motion,' p. 78, seems to me to express my view with sufficient accuracy: —

"As soon as we have formed for ourselves the idea of a stress, such as the tension of a rope or the pressure between two bodies, and have recognized its double aspect as it affects the two portions of matter between which it acts, the third law of motion is seen to be equivalent to the statement that all force is of the nature of stress, that stress exists

only between two portions of matter, and that its effects on these portions of matter (measured by the momentum generated in a given time) are equal and opposite. *The stress is measured numerically by the force exerted on either of the two portions of matter*" (the italics are mine).

In making this quotation, as in making other quotations from the same authority in my pamphlet, I appeal from Maxwell the critic to Maxwell the author. The passage just quoted meets so many of the points raised by Professor MacGregor, that I shall trench upon your space no further now, except to thank Professor MacGregor for his general commendation of my pamphlet, and to say that I made my quotation from Minchin, not to suport my use of the term 'inertia force,' but because of its recognition of what Minchin there calls the 'kick' of a body 'against change of motion.' E. H. HALL.

Cambridge, Mass., Feb. 13.

German constructions.

Permit me a few words apropos of the various letters called forth by my remarks about German scientific writings. To Mr. Eggert, who found fault with me so abundantly, there was no possibility of reply, as his motives were emotional, and criticism has nothing to take from emotion except sympathy to understand. Mr. Eggert wrote, "'M' assumes to judge of the literary qualifications of people who use a language with which he himself is less familiar than he is with French and English." I regret that he made this erroneous statement. But experience has shown, that, when people express opinions on subjects they know nothing about, they are not unapt to make serious mistakes, and so Mr. Eggert has blundered about my knowledge of languages.

In regard to Mr. Lea's sentence with the six pronouns in execrable succession: is it much worse than the following sample of what is grammatically good English?—"He said *that that that that that* man used was incorrect."

Mr. Frazer gives a sentence, which he kindly admits to be obscure, although it follows upon the expression of his admiration of the lucidity of that kind of *emboîtement* phraseology. He admires even this sentence, Dem, der den, der die, das Verbot enthaltende Tafel abgerissen hat, anzeigt, wird hierdurch eine Belohnung zugesichert, — "because it says in eighteen words and ninety-five letters what *cannot* [*sic!*] be literally translated into English in less than nineteen words and one hundred and four letters." A very small difference! Suppose one exclaims 'tram' 'Pferdebahnwagen,' — one word and four letters, and one word and fifteen letters; or 'woodmaster' and 'Holzversorgungsinspector.' In Austria the full title of the official is kaiserlich-königlich-Staatseisenbahnholzversorgungsinspector. Such petty comparisons are, of course, only *jeux-d'esprit*, and have little argumentative value.

To return: the English of Mr. Frazer's perspicacious phrase might be; in strictly literal translation: "A reward is hereby promised to whomever tells who removed the warning sign," — thirteen words and sixty-two letters; or if we put, as would be natural in English, 'notice' instead of 'warning sign,' twelve words and fifty-seven letters. There is some difficulty, as there is no exact equivalent for *Verbot*. In English, 'die das Verbot enthaltende Tafel' might well be 'notice to trespassers,' or something of the kind. It would be interesting to known what Mr. Frazer's lengthy translation was: it can hardly have been any thing but a ludicrous rendering of word for word, and not real English at all, either in spirit or construction. The example will serve my purpose: German permits very lengthy and involved sentences, — I think of my friend, a distinguished professor, who rejoiced that the twelfth part of a work on mineralogy had come; it completed, he said, the first volume, and he hoped to find the verb in the second! — a mere droll exaggeration. But what must be the possibilities of a language when such a joke about it makes one laugh? The gist of the whole matter is, that a great many German writers do display the bad possibilities of their tongue; and when Mr. Frazer says that the *best* writers seldom or never use the involved sentences, he makes an implication about the good and mediocre writers which shows that he agrees in reality with the general opinion that German authors have too frequently a faulty and obscure style. I commend to his notice Matthew Arnold's criticisms on the Germans, or Rivarol's. M.

Boston, Feb. 10.

On certain electrical phenomena.

At one time it was very hard for me to believe, indeed, that any person living possessed such a power as being able to shuffle across the carpet of a room, and light the gas as it issued from the jet of the burner, by simply touching it with the tip of the finger. I have at present, however, two friends, at least, among my acquaintances, who seem to be capable of performing this feat at all times, and under any circumstances. Now, I find similar phenomena exhibited to a very high degree in my own person, at Fort Wingate here. This point is over 6,000 feet above sea-level; the only water in the neighborhood is a small pond — a puddle, really — and a few insignificant springs. The air is usually clear, and highly rarified; indeed, all the conditions seem to be favorable to the exhibition of electrical appearances.

Only the other day, while pacing my room, passing, as I did so, each time, over a large woollen Navajo blanket that lay spread out on the floor, a circumstance arose which called upon me to touch the cast-iron urn that ornamented the top of a small wood-stove in the apartment, and which had a fire in it at the time. Before the tip of my index finger touched it, by a distance of fully a centimetre, there was displayed in the intervening space a brilliant electric flash, accompanied by a report that could be distinctly heard in the adjoining room above ordinary conversation. The experiment was repeated three or four times, but the display became more and more feeble with each trial; it regained its original force, however, after I paced across the blanket on the floor a few times. Additional experimentation went to show that this electrical discharge was considerably greater from the tip of the index finger than from any of the others of the hand, and gradually diminished in regular order as we proceeded to the little finger; and, further, it seemed in my case, more evident in the left index rather than in the right one. When all ten finger-tips were drawn together and then brought up to within a centimetre's distance of this stove-urn, the flash and report appeared no greater than it did from the index finger alone.