and practicable; and its adoption is an important reform, which is deserving of hearty support and encouragement.

LETTERS TO THE EDITOR.

Phalansterium digitatum Stein.

THERE is no published evidence that the infusorial colony here referred to has been seen by any observer except its German discoverer. It is stated not to occur in English waters; and this uncommon animalcule had not been taken in America, until the writer recently found it in considerable profusion, attached to the leaflets of Myriophyllum from a millpond near this city. The colonies and the enclosed zoöids differ from their German relatives in no essential character, the only perceptible divergence being in the somewhat smaller size of the American Infusorium.

The tubular colonies, which take an irregular digit-like form, and branch somewhat dichotomously, are in great part built up of granular digestive rejectamenta remarkable for their coarseness. The distal extremity of each tubule is slightly inflated, each zoöid sitting singly in the hollow thus formed, except after having undergone the reproductive process, when two or more may be present, the flagellum alone extending beyond the aperture.

The conical collar, embracing the flagellum for some distance above its point of origin, is often thickened by an outward flow of the body-sarcode; but whether a regular circulation takes place in the collar substance could not be determined.

Although the zoöids are apparently entirely free from all connection with the walls of the zoocytium, they have the power of suddenly darting back into the tubules for a distance equal to two or three times their length. They seem to exercise this accomplishment at pleasure, but especially when any unwelcome object comes in contact with the flagellum. I have seen a large animalcule glide across the front of a colony, and each zoöid in regular succession, as its flagellum was touched, shoot back into the tube, remaining there some minutes before cautiously reapproaching the aperture.

I have several times witnessed the reproductive process, and have verified the statement that it takes place by transverse fission. An interesting fact in this connection is, that the only other species of the genus reproduces itself by dividing longitudinally, a method directly the opposite of that which obtains with the present form.

The two posteriorly located contractile vesicles pulsate at intervals of about thirty seconds.

DR. ALFRED C. STOKES.

Trenton, N.J.

Solar constant.

I enclose a translation of a portion of a letter to me from Dr. Josef Pernter of the Austrian meteorological service. Dr. Pernter writes: —

"Speaking of radiation, I remember to have read several times in SCIENCE, under the 'letters to the editor,' various things concerning the solar constant, — lately, a letter from John LeConte, but which, like former communications, appears to make the subject a little unclear.

"The solar constant is a quantity of heat, and the number which is the expression for the solar constant must mean calores. If, for example, Violle says the solar constant is 2.54, then it must be 2.54 calores. But since the solar radiation is a summation, during time, extending over space, the duration and the surface certainly come into the question. The minute has been taken as the unit of time, and the square centimetre as the unit of space.

"That the solar constant is 2.54 calores, means, therefore, that the sun's rays bring to the outside of our atmosphere, in each minute, 2.54 heat-units upon each square centimetre. What becomes of these heat-units, or calores, does not belong at all to the conception of the solar constant.

"The new solar constant of Langley, 2.84, signifies, consequently, that the amount of heat furnished per minute per square centimetre by solar radiation is 2.84 calores. But this number, 2.84 calores, must be comprehended. Lately the term 'calore' has been used in two significations, — the large calore, or the amount of heat that raises one kilogram of water 1°; and the small calore, or the amount of heat which raises a gram of water 1°. The latter, or small calore, is applied to the solar constant. Expressed in large calores, the solar constant of Langley would not be 2.84, but .00284 calores; that is, 1,000 times smaller.

"After these explanations, one can immediately say how many great or small calores fall upon the square metre per minute from the solar radiation; viz., 10,000 times as many as on the square centimetre."

FRANK WALDO.

Deutsche seewarte, Hamburg, Germany,
Sept. 16, 1883.

Dissemination of Phlox.

I have had for some time past, on my table, some capsules of Phlox Drummondii, which is so commonly cultivated in gardens. The capsules were picked while still green, and had dried gradually. Several times I have been puzzled at finding small seeds and parts of the capsule of a plant on the table, and could not think where they came from; but, a day or so since, I heard a sharp pop, and, looking up, saw that one of the capsules had burst, and sent the seed several feet away. Since then it has often occurred. This is an evident means for the dissemination of the seed. The most of the capsules I have examined have perfected only one seed, instead of three; and the sudden opening of the capsules have sent the seeds flying far and wide.

JOS. F. JAMES.

Cincinnati, O.

The Iroquois institutions and language.

The very courteous and complimentary manner in which my work on the Iroquois book of rites has been noticed in a recent number of this journal has made me reluctant to take exception to any portion of the review. On further consideration, however, I must beg to be allowed, in the interests of both science and history, to refer to one or two of the remarks of my friendly critic. He expresses the opinion that 'the sceptical reader' may be inclined to regard the portion of the work which relates to 'the league and its founders' rather as 'classic historical romance' than as history; and this on the sole ground (as I understand his suggestion) that the Iroquois cannot be supposed to have been capable, five hundred years ago, of the intellectual efforts implied in this narrative. This suggestion, it will be seen, opens up the entire question of the comparative mental capacity of civilized and uncivilized, or rather unlettered, races.

The question is one altogether too large to be fully discussed in this place. But as regards the particular subject now referred to, I may remark that the existence of the league itself, with all its judicious and statesmanlike regulations, is a fact of which there can be no possible question. Any one can see this remarkable constitution in full and vigorous operation among the three thousand Iroquois on their Canadian reservation. There is ample evidence to show that this league existed in its present form when the people who maintained it first became known to European explorers. It is clear, therefore, that whatever intellectual power was needed for its formation was possessed by the Iroquois before they acquired any tincture of foreign civilization.

But why should their capacity for forming such a government be questioned? The Iroquois tribes, when

first known to Europeans, and doubtless for centuries before that time, were in a social stage at least as far advanced as that of our German ancestors in the days of Tacitus. We know that these barbarians, if we choose so to style them, had evolved a regular system of government, combining very ingeniously the methods of democracy and aristocracy, and comprising the germs of the English constitution. On this point the often-cited passage of Montesquieu will bear to be requoted and emphasized. "In perusing," writes the great legist, "the admirable treatise of Tacitus 'On the customs of the Germans,' we find it is from that nation the English have borrowed the idea of their political government. *This beautiful system was invented first in the woods.*" Will any one reply that the German barbarians, being of the Aryan stock, must be supposed capable of intellectual achievements which barbarians of the Indian race could not be expected to compass? I think the able and liberal-minded reviewer will agree with me, that reasoning of this 'high priori' sort, which assumes the very point in question, would be any thing but logical or satisfactory.

The reviewer is kind enough to say that many of the chapters in my volume "indicate immense research, and are of great value both ethnologically and philologically." I can assure him that equal diligence was exercised in preparing the chapters on the league and its founders, and I know of no reason why they should be deemed less accurate or less valuable. In these, moreover, as well as for the other portions of the work, I have been careful to indicate the sources of my information. Nothing will be easier than for any one who has doubts as to its correctness to repeat my inquiries, and to satisfy himself on that point. But I am happy to say that the communications which reach me from many quarters seem to show that no such doubts are likely to be entertained; at least, by any well-informed persons. Writers of the highest authority on American and Indian history receive the statements of the book as entirely authentic, and speak of it in terms too flattering for me to repeat.

Let me conclude by expressing the pleasure with which I have learned from this review that the valuable work of the excellent and indefatigable missionary-linguist, the late Father Marcoux, on the Iroquois language, is about to be published by the Bureau of ethnology. The idioms of the Huron-Iroquois group stand, perhaps, at the head of the best-known Indian languages as subjects of philosophical study. It is doubtful if even the Quichua or the Aztec equals them in comprehensive force, or in subtlety of distinctions. More than two centuries ago the learned missionary Brebeuf was struck with the resemblance of the Huron to the Greek; and in our own day Professor Max Müller, after a careful study of the Mohawk tongue, has expressed the opinion that the people who wrought out such a language 'were powerful reasoners and accurate classifiers.' The works of M. Marcoux, in conjunction with those of his distinguished pupil and successor, M. Cuoq, will afford ample means for the study of one, and perhaps the finest, of this remarkable group of languages.

In connection with this subject, it is proper to refer to the doubt expressed by the reviewer as to the correctness of the linguistic works of the French missionaries. It is suggested that they have made mistakes in grammar, and in particular that they have not been able to distinguish between the feminine and the indeterminate inflections. Now, it must be remembered that the intelligent and well-educated missionaries, whose competency is thus questioned, have for many years spoken and written the Iroquois language almost as familiarly as their native speech, and have published many books in that language for the use of their converts. Their predecessors, whose experience they have inherited, had been engaged in the same work for more than two hundred years. To suppose them so grossly ignorant of the grammar of the language as is now suggested is much the same as supposing a professor of Latin in an English or American college to be unable to distinguish between the genitive and the accusative cases in that language. If the work of Marcoux is so erroneous, it is clearly unfit to be published in a national series like that of the Ethnological bureau. In justice both to the missionaries and the bureau, I am glad to be able to show, by the best possible evidence, that the suspected errors do not exist. The Iroquois must be supposed to know their own language. The text of their Book of rites, fortunately, presents a test which is conclusive. In preparing the translation of this text, with the aid of the best native interpreters, I had occasion, as the appended glossary shows, to make constant use of the publications of M. Cuoq on the Iroquois tongue, and found them invariably correct. In particular, I may mention, the indeterminate form frequently occurs, employed precisely as indicated by him. The bureau may therefore safely add the work of M. Marcoux to the other valuable publications which have done so much credit to the scholarship of their authors and to the liberality of the government.

H. HALE.

THOMSON AND TAIT'S NATURAL PHILOSOPHY. — I.

A treatise on natural philosophy. By Sir WILLIAM THOMSON LL.D., D.C.L., F.R.S., and P. G. TAIT, M.A. Vol. i., part ii., new edition. Cambridge, *University press*, 1883. 25+527 p. 8°.

THE first edition of vol. i. (23+727 p.) of this work was published by the delegates of the Clarendon press at Oxford, 1867. The authors then intended, as appears from their preface, to complete the work in four volumes. The remaining three volumes have, however, never appeared, much to the regret of all students of mathematical physics; and the authors state that the "intention of proceeding with the other volumes is now definitely abandoned."

In 1879 a new and enlarged edition was published of a portion of vol. i., entitled part i. (17+508 p.), including that part of the first edition contained in the first 336 pages; and now we have the remainder of vol. i., entitled part ii., which has been enlarged by important additions from 390 to 527 pages.

At p. 22 will be found a schedule of the alterations and additions in part i., and, at p. 24, those of part ii. "The most important part of the labor of editing part ii. has been borne by Mr. G. H. Darwin," whose remarkable papers in the Philosophical transactions upon the mathematical physics of the earth,