to each almanac R. A., and the two reductions which must be added to each almanac Dec., in order to reduce to the system of the *Jahrbuch*.

The catalogue of each almanac, after the application of the systematic reductions from this table, is then compared with the Fundamental catalogue. For the *Nautical almanac*, the mean difference in declination is 0″.395; in R. A. (from 134 stars), 0ˢ.0332. Of the 168 stars common to both almanacs, there are 27 whose R. A. differs more than 0ˢ.067, and 8 whose declinations differ by more than 1″. These differences are, in the main, errors of the *Nautical almanac*, and are largely due to the erroneous proper motions adopted in the Greenwich catalogues.

For the *Connaissance des temps*, the table shows large systematic errors. After these have been eliminated, the comparison shows for 229 stars, common to the *Connaissance des temps* and the *Berliner jahrbuch*, a mean difference of 0″.373 in declination, and a mean difference of 0ˢ.0282 (from 162 stars) in R. A. The errors here, again, are largely due to erroneous proper motions.

The correspondence of the reduced positions of the *American ephemeris* with those of the *Jahrbuch* varies according as one or another basis of comparison is chosen. A complete comparison can only be made for those stars for which ephemerides are given, since the newer stars have their positions derived from several sources, not comparable among themselves.

The declinations of the *American ephemeris* and those of the *Jahrbuch* agree excellently for those stars which have been investigated by Boss. The mean difference (162 stars) is 0″.177. The other 111 stars do not agree so well, there being 12 differences between 0″.5 and 1″. The stars north of 64° depend upon Gould's R. A.; and, of the 36 stars common to both almanacs, 15 differ by more than 0ˢ.15. Of the remaining 126 stars whose ephemerides are given, 8 have differences as great as 0ˢ.067. The mean difference for 100 stars between +40° and −20° is 0ˢ.0127. For the 111 stars without ephemerides, there are seven cases where the difference is more than 0ˢ.067.

For the stars south of −32°, the *Nautical almanac* will give the best positions, on account of its data being derived from the most recent catalogues.

A comparison of the system of the *Jahrbuch*, 1861–82, with the new system, and a general table for the reduction of the data of any almanac to the *Berliner jahrbuch* system, concludes this very important paper.

It is to be hoped that in the immediate future all star positions may be reduced to the system of the *Jahrbuch*, and its admirable list of stars will be amply sufficient for observers in the northern hemisphere. For the determination of time and longitude, the stars of the other almanacs will serve a useful purpose, especially as they may easily be made homogeneous with the Berlin list by tables given by Dr. Auwers in this paper.

EDWARD S. HOLDEN.

Washburn observatory, University of Wisconsin, Madison, July 24, 1883.

LETTERS TO THE EDITOR.

English *ch*.

IN SCIENCE, ii. 452, you assert that the English '*ch* (in *chair*) is not a simple consonant, but a compound,' consisting of '*t* followed by *sh*, as is apparent in pronouncing with 'due lingering emphasis' the words, 'even *such* a man, so woe-begone,' etc. Now, the same length and emphasis may be produced by a prolongation or continuous repetition of the vowel-sound of the word 'such,' and, it seems to me, would be so in the case of anybody who was unacquainted with the *tsh* theory. But even if not, the change from a simple *ch* to a compound *tsh* would not be the only instance in the language, where under special circumstances, such as a prolongation or drawl, a sound is liable to an essential change; and it must be peculiarly so where the sound can be properly made only by an instantaneous movement. *Ch* seems to be caused by such a movement, just as a smack of the lips is, which is certainly a decidedly different sound from the one made in the same way, except more gently and slowly, — a *p* made with inward-drawn breath. The relation between the smack and that *p* seems to be the same as the relation between the English *ch* and *t*, and the difference in each case to depend on the mode of contact and of its interruption, not on any combination or succession of sounds.

Again: it appears quite possible to pronounce the word 'chair' perfectly with the teeth kept slightly open by the finger or a pencil, and held, therefore, in such a position that it is impossible to pronounce the word 'share' correctly, showing that *sh* is not properly a part of the *ch*.

Moreover, if *ch* is the same as *tsh*, or the German *tsch*, the Germans would at the outset have no difficulty in pronouncing the English *ch* in a way not noticeably different by its hissing sound from ours.

It has been said, that after pronouncing the word 'check' to a phonograph, on turning the machine backwards, the sounds re-appear as *kesht*; but is that not wholly due to an incorrect, prejudiced pronunciation of the first word, as if written *tshek*? L. B.

Nov. 9, 1883.

[Argument is out of place in reference to what is a matter of mere observation. The suggested experiment by 'lingering emphasis' ought to satisfy any ear as to the reality of the stopped or shut commencement of the sound of *ch* in *chair*, and of its hissing termination. L. B. evidently associates some meaning different from the ordinary one with the terms 'simple' and 'compound.' *Ch* is compound because its shut commencement and its hissing termination are elementary effects, each of which is susceptible of separate utterance. — EDITOR.]

Report of the Assos meeting.

Henry W. Haynes, Esq., calls my attention to an error in the remarks on Assos made by me at the meeting of the Archaeological institute, Oct. 31, and printed by you in your recent report (SCIENCE, no. 41).

For 'to fight against Ramses III. — the Rhampsinitos of Greek story,' read, 'to fight against Ramses II. — the Sesostris of Greek story.'

May I beg you to make this correction public.

JOSEPH THACHER CLARKE.

Boston, Nov. 19, 1883.

Analysis of the wild potato.

In the spring we received from Mr. J. G. Lemmon, Oakland, Cal., some tubers said to be of Solanum tuberosum, var. boreale, and collected in Arizona. Of

thirteen tubers planted May 4, nine furnished plants, which bloomed July 12, and in September ripened a crop of tubers no larger than the seed planted, or of the size of small hazel-nuts. The leaves were small, deep grayish-green above, not hairy; the stems, much branched, deep purple at the nodes; the flowers, white and numerous. The tubers were very diffusely spread in the soil.

An analysis of the tubers harvested by the station chemist, Dr. S. M. Babcock, is as below: —

Water	64.44
Ash	1.17
Albuminoid (N. × 6.25) . . .	4.86
Crude fibre	.78
Nitrogen (free extract) . . .	28.62
Fat (ether extract)	.13
	100.00

E. LEWIS STURTEVANT, *Director*.

N. Y. agricultural experiment-station,
Geneva, N.Y., Nov. 14, 1883.

Musical sand.

In September (no. 31) you published a brief abstract of our preliminary paper on the singing-beach of Manchester, Mass. Since then we have continued our investigations, and collected additional data and material. One of us has just returned from a visit to the singing-beach on the west shore of Lake Champlain, four miles and a half south of Plattsburg, Clinton county, N.Y. This beach is about seven hundred feet long, crescent-shaped, and terminates at the south end in low cliffs of limestone, and at the north end in shelving rocks of the same material. About a hundred feet north of the beach the limestone is quarried for building-purposes.

The acoustic phenomena previously described in connection with Manchester and Eigg are reproduced at Lake Champlain quite perfectly. On the occasion of our visit, however, the sand retained traces of moisture, and the noise, indicated by the syllable *groosh*, was less strong than it would otherwise have been. Two tests, however, showed that the sound made by rubbing the sand with the hand, and pressing it on the strata below, could be heard distinctly at a distance of more than a hundred feet. The tingling sensation in the toes, produced by striking the sand with the feet, was also perceived. We failed, however, to obtain sounds by rubbing the sand between the palms of the hands, — a method which yielded remarkable results at Manchester and at Eigg; but this failure is doubtless due to the imperfect dryness of the sand. Having learned, by experience with samples from the aforesaid localities, that they lose their acoustic properties after repeated friction, we tested this question directly on the beach. We found, that, by rubbing a definite quantity of sand continuously, its power of emitting sounds gradually diminished, and finally ceased.

The sand is unusually fine, and its grains of remarkably uniform size, averaging about 0.2 millimetre in diameter. Even to the naked eye their tendency to a spherical shape is apparent; and, when examined under the microscope, they are found to consist, to the amount of about thirty per cent, of round and polished grains of colorless quartz, usually of spherical, ellipsoidal, and reniform shapes; about the same quantity of angular to subangular grains of the same mineral, colorless, reddish, and yellowish, sometimes enclosing scales of hematite, grains of magnetite, and fluid cavities; a considerable number of fragments of a triclinic felspar, angular to subangular, colorless, and sometimes exhibiting cleavage-planes, and lines of striation; many short fibres and fragments of hornblende, and apparently augite, of a deep green color, often irregularly colored reddish brown by decomposition, and possessing strong dichroism; and a few minute particles of menaccanite and magnetite.

In conclusion, we will be greatly obliged to any reader of SCIENCE for information of additional localities of sonorous sand, and especially for samples for microscopical study.

H. C. BOLTON and A. A. JULIEN.

Nov. 19, 1883.

November shower of meteors.

Watch was kept here for the November shower of meteors by myself and a number of students on the mornings of the 13th and 14th, — on the 13th from 2 to 4, on the 14th from 2 to 6. The observers were in a room having southern and eastern exposures, and meteoroids were looked for only in those directions. It was quite cloudy on the 13th, and only one meteoroid was seen; nearly clear on the 14th; and considering the fact that the moon was nearly full, and stars of the fourth magnitude could not be seen without attention, more meteoroids were seen than were expected, nearly all coming from the radiant in Leo. Owing to the fact that their appearance was not frequent enough to maintain constant attention, it is likely that most of those which were near the limits of visibility escaped observation. The maximum seemed to be at about 4.30. At 3.20 a very brilliant one, much exceeding Sirius in brilliancy, was seen.

Michigan agricultural college. L. G. CARPENTER.

SOME RECENT STUDIES ON IDEAS OF MOTION.

Studien über die bewegungs vorstellungen. Von Dr. S. STRICKER, professor in Wien. Wien, *Braumüller*, 1882. 6+72 p. 8°.

THESE studies are efforts in experimental psychology, with accompanying speculations, by a physiologist who has already written upon like subjects in his 'Studien über das bewusstsein.' The style is fragmentary, and not always very clear; and there are some confusing efforts to frame a new terminology. Above all, the author's training in general philosophy is very imperfect; and therefore what he says in the latter half of this essay, 'Ueber die quellen unserer vorstellungen von der causalität,' is almost wholly antiquated and insignificant, having been superseded ever since Hume, whom, in fact, our author seems in one respect to have wholly misapprehended. But in his direct observations of mental facts, Professor Stricker attracts one's attention as having given some independent contribution to the discussions about the relation of the muscular sense to our ideas of motion. Even here, it must be remarked, he pays little attention to the fact that others have been at work before him, and seems to think his ideas quite new. Yet what he has done is to observe, and record his observations; and in so far forth he has done what we want done in the psychological field.