

consideration to be hopelessly inconsistent, we have been inspired by no other feeling than a desire to see the philosophy we admire purified from an error that greatly mars its beauty. Let it be accepted that states of consciousness really stand outside the circuit of motions and therefore can never be a cause of any movement, and the occasion of all the confusion of which we have spoken disappears.

Mr. Spencer, who has been so kind as to read the proof of this article, tells me by letter that he thinks I have not quite remembered his point of view and its implications. He says:—"The implication of your argument seems to be that I identify motion as it actually exists with motion as manifested to our consciousness. Did I do this there would be the inconsistency you allege in the supposition that feeling is transformable into motion and motion into feeling. . . . But that transformation which I assume to take place (though without in the least understanding how) is the transformation of the subjective activity we call feeling (unknowable in its ultimate nature) into the objective activity we call motion (also unknowable in its ultimate nature)." On the metaphysical question my own view probably does not differ much from Mr. Spencer's; but I would have it kept distinct from the question of ordinary science, which deals only with the relations of things as manifested to our consciousness. And I leave it to Mr. Fiske and his readers to determine whether in the passages I have quoted from his work he means motion and feeling as known to us—the motion and feeling of science, or the ontological entities of the metaphysician, with which in his preface he has told us his system "has nothing whatever to do."

DOUGLAS A. SPALDING

#### OUR BOOK SHELF

*Notes on the Fertilisation of the Cereals.* By A. S. Wilson. (Reprinted from the "Transactions of the Botanical Society of Edinburgh.")

NOTWITHSTANDING the practical importance to the farmer of a knowledge of the mode in which our cereal crops are fertilised, it is singular that different views still prevail on several essential particulars. One point appears to be generally conceded, that insects have nothing to do with it; the ovules are either self-fertilised, or cross-fertilised by the agency of the wind. Dr. Boswell-Syme and the present author incline towards the former; Delpino and Hildebrand to the latter view, at all events in the case of wheat; and Belgian farmers still trail ropes over their flowering wheat to insure complete fertilisation. Although we cannot altogether agree with Mr. Wilson's conclusions, he has added some most valuable observations to our knowledge of the subject, especially with regard to the remarkable extension of the filaments immediately previous to, or concurrently with, the discharge of the pollen. If a rye-flower, he states, is opened a moment before the natural time of flowering, the filaments will be found to measure about one-sixteenth of an inch in length. In the course of five minutes, or less, from the instant the pales begin to open, the filaments will, in many cases, have grown to twelve-sixteenths, and the whole of the pollen will have fallen out; and this rapid extension is not a mere straightening out of a doubled-up thread, but an actual growth. In oats and barley a similar extension takes place; in the latter case the filaments may be seen, under an ordinary pocket lens, to be visibly growing at the rate of six inches an hour. The result at which Mr. Wilson arrives is, that the "European

cereals are self-fertilised, and that the act of fertilisation, in those cases in which the flower opens, is probably performed in the opening, and is necessarily confined to the twenty or thirty minutes during which the flower remains open." We must confess that we are not convinced of the validity of the train of reasoning which led the author to this conclusion. The remarkable phenomenon of the extension of the filaments would appear to be quite useless for this purpose, Mr. Wilson's drawing showing that its effect is to remove the anthers from the immediate proximity of the stigmas to a considerable distance from them. The whole mechanism of the "versatile" anthers, lightly suspended at the end of very slender filaments, the immense quantity of light dry pollen, and the sudden jerk by which the flowers are opened, appear to lead *prima facie* to an opposite conclusion, and to suggest the agency of the wind. On two other points Mr. Wilson seems to us to have been led into some confusion by an incorrect use of terms. He speaks of the meaning of the word "fertilisation" as being "partly a matter of convention; it may mean that act of the anthers by which they project or discharge the pollen, which, falling directly on the pistil, shall produce the embryo; or it may mean the falling of the pollen on the ovule after being carried a distance by the wind; or it may apply to the instant in which the elements of the pollen set up that action in the ovule which produces a new plant;" and he employs the word throughout in the first of these meanings. Now we believe that all our best writers use the term as synonymous with "impregnation" or "fecundation;" and that the correct expression for the falling of the pollen on the stigma—the German "Bestäubung"—is "pollination"; Mr. Wilson's "fertilisation" being simply the discharge of the pollen from the anther, which may or may not "pollinate" the stigma and "fertilise" the ovules. He also finds fault with those botanists who distinguish between "cross-fertilisation" and "self-fertilisation"—the fertilisation of ovules by pollen from a different or from the same flower—without being able to define accurately the physiological difference between the two processes. The terms are, however, currently used, and we think quite correctly, to express an actual external difference, which we know from experience to be frequently accompanied by results of a different character; even though we are not at present able to trace this difference to its physiological causes. Notwithstanding these points, to which we have felt bound to call attention, the present treatise is one of the most important contributions yet made to our knowledge of the remarkable phenomena connected with fertilisation.

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*Official Guide to the Kew Museums; a Handbook to the Museums of Economic Botany of the Royal Gardens, Kew.* By Daniel Oliver, F.R.S. Sixth edition, with additions by J. R. Jackson, A.L.S., Curator of the Museums. (J. R. Jackson, Museum, Kew. 8vo., 92 pages.)

ALTHOUGH this is by no means a complete catalogue or guide to all the objects exhibited in the museums at Kew, very few substances of commercial importance have been overlooked. Necessarily in so small a book, little is said of the relative value, &c., of different fibres and other vegetable substances; but it will be found useful to all interested in applied botany, inasmuch as it embodies all recent discoveries of interest to the druggist, manufacturer, or artist. The products are arranged in families according to their affinities, and by means of this guide, which has a complete index of trivial and technical names, the visitor can readily find any article of which he may be in search. One thing, however, is certain, the Government might, by a small grant in aid of a more comprehensive publication, render the fine collection of vegetable products at Kew of infinitely more service to the general public.