error of the experiment was known. Thus we are informed that the most effective slags are those in which a high percentage of the phosphates present dissolves in citric acid. On looking at the figures, however, we find that the extreme difference in yield is little more than 10 per cent., which is probably well within the experimental error.

Percentage of phosphoric acid soluble
in 2% citric acid ... 93.1 ... 74.2 ... 66.1
Hay obtained, in cwt. ... 9½ ... 9½ ... 8

Again, one of the conclusions drawn from the rotation experiments is that sulphate of ammonia has had distinctly exhausting results except on the crop to which it was applied. The fall in yield, however, is only 7 per cent. In neither case is the conclusion justified by the evidence.

Among the West of Scotland reports is one in which the new nitrogen manures, cyanamide and basic calcium nitrate, are shown to have given valuable returns. Most of the reports deal with different varieties of oats and potatoes. General conclusions cannot be drawn since we are told "that the character of the seasons was found to affect the relative as well as the absolute productiveness of the oat varieties in an astonishing degree." A number of measurements of the straw and grain of these different varieties are recorded, and a good deal of other information has been collected. In the experiments on the manuring of potatoes it generally happened that the best and most profitable crops were obtained after applying ten tons of farmyard manure per acre along with a complete dressing of superphosphate, sulphate of potash, and sulphate of ammonia, a result agreeing with others obtained elsewhere.

The Cirencester experiments on pasture have been going on for eighteen years or more, and show some interesting results worth working up in greater detail, since they differ in several ways from those obtained at Rothamsted. Thus superphosphates alone gave better results than no manure and also encouraged clover; the plot receiving sodium nitrate alone was poor, tufted, and worse than the plot receiving ammonium sulphate alone; *Ustilago* was most prevalent on the plot receiving kainit alone.

The Irish experiments on winter milk production and winter rearing of calves were made to see if either of these schemes would pay. At present Ireland places but little butter on the market during winter, with the result that the summer trade suffers. It is considered that higher prices would be realised in summer if the winter trade could be developed. Satisfactory financial results were obtained. The reports derive considerable interest from the tables of costs, a welcome though rather unusual feature in experiments of this sort.

The Durham dairy investigations were intended to settle certain practical points such as the feeding of concentrated food on pasture and the relative value of moderate and heavy rations for milch cows. It was shown that an increase in food caused an increase, but not a proportionate increase, in milk yield, a result in accordance with Holtmark's very complete investigations in Norway. Brewers' grains were, as usual, found to increase milk production, but no attempts were made to ascertain whether, as is sometimes asserted, they have any physiological action. This is all the more unfortunate since in a second series of experiments the materials for this study seem to have been at hand, the increase in milk yield amounting in the two experiments only to 0.7 per cent. and 3.3 per cent. There is nothing to indicate the magnitude of the experimental error, but as only five cows were taken in each set it cannot have been less than the quantities recorded. The only legitimate

conclusion is that brewers' grains in this particular instance failed to produce their usual effect. Here is just the experiment that the trained investigator would have welcomed in order to follow up the subject. But the author of the bulletin not only misses the opportunity, but draws the wholly unwarrantable conclusion that a moderate allowance of 20 lb. of brewers' grains per day has the effect "of increasing, at all events for a certain period, the daily yield of milk"!

We have directed attention to these defects because they recur not infrequently in the work carried on in the counties. Unfortunately some of our agricultural experimenters have a habit of ignoring or explaining away an unexpected result. If only they would learn that to follow up an unexpected result is the beginning of wisdom in research work, we might make much greater progress in agricultural science than we are doing now. Of course, it may be urged that the object of the experiment is simply to arouse interest or to demonstrate some well-ascertained fact, so that scientific method is not necessary. Even if the experiments have served the purpose for which they were intended it is nevertheless much to be desired that the experimenters should realise their opportunities and make more than they are doing out of their work.

THE TOTAL SOLAR ECLIPSE, MAY 9, 1910.

UNFORTUNATELY, the news to hand regarding the observation of this eclipse, visible in Tasmania, tells us that all the observing parties experienced unfavourable weather conditions. According to the *Times* of May 10, a Reuter telegram from Hobart (Tasmania), dated the previous day, states, "The observation of the total eclipse of the sun from Bruni Island has failed, owing to dense clouds and rain. Mr. Baracchi, the Victorian Government astronomer, reports that the darkness during the period of totality might be compared with that of a starlit night."

A cablegram from Mr. McClean, dated May 10, shows that this party also met with no success, on account of bad weather. The message was as follows:—"Eclipse invisible, steady rain all day. Only two fine days last fortnight. Terrific gales and thunder frequent."

While it is most disappointing that no observations of this eclipse have been secured, yet it was rather anticipated that such would be the case, owing to the unfavourable time of the year for satisfactory weather conditions. Nevertheless, Mr. McClean deserves high praise for getting a party together, with a fine outfit of instruments, and going so far to make the attempt to secure observations. While he returns on the *Orvieto*, which leaves Melbourne on May 18, he has made arrangements to leave all his instruments out there so that he can pick them up for the total eclipse of next year. This eclipse will be best visible from some of the islands in the western Pacific, but it is not yet settled which particular one will form the basis of operations.

The last mail from Australia has brought some details as to the station which Mr. McClean is just leaving and the preparations he made, and it is hoped that these will be published in a subsequent number of NATURE.

W. J. S. LOCKYER.

PROF. E. F. W. PFLUGER.

THE name of Pflüger has been made known to many generations of students as belonging to some inhuman agency by which, to their confusion and vexation, an edict was enacted known as "Pflüger's law." To how many of those students has the human picture ever been presented of the untiring

young *privat-docent*, working alone in his single room night after night for two years without an interruption until, in 1859, he published his accumulated results in a bulky volume, "*Untersuchungen ueber der Physiologie des Elektrotonus*," Berlin, 1859?

By the side of this picture of the active young searcher in the 'fifties of last century might be placed a picture of the no less active learner of the 'nineties who, at the age of seventy, with forty years of service behind him as professor of physiology in the University of Bonn, and with no worldly reward in front of him of money or position or of fame, day by day and month by month carried out with his own hand the mechanical *minutiae* of daily quantitative estimation of nitrogen necessary to satisfy his mind as to the balance sheet of nitrogen of a dog under physiological conditions strictly supervised by himself, and, as is shown by the 131 volumes of Pflüger's *Archiv*, of which the first volume appeared in 1868 and the 131st in 1910. His faithful service to physiology continued for ten years longer, to the fifty-first year of his ordinary professorship, to the eighty-first year of his life.

Eduard Friedrich Wilhelm Pflüger, born in 1829, a pupil of Johannes Muller, is the last of the great German school of physiological and biological workers—Hæckel, Lieberkühn, Du Bois Reymond, Henle, Ludwig, Brücke, Helmholtz, Pflüger.

Pflüger lived a retired life, devoted to his work in the laboratory and in the library, which he hardly ever left, and in which he did not welcome the interruption of the visitor; *no one admitted except on business* might well have been the inscription upon his door, and he was never seen at physiological congresses. I count among one of the pleasantest recollections of my life a day spent in Pflüger's laboratory with Pflüger himself and Heinrich Herz, whose simple demonstration of Maxwell's forecast had been made in the previous year, and whom death so soon cut short. We spent the day watching the movements of Lippmann's capillary electrometer, and the time passed unnoticed; there was no inhumanity in connection with the author of Pflüger's law when the accuracy of a physiological assertion of fact was to be scrutinised.

To the scientific world Pflüger's permanent monument consists in the 131 volumes of Pflüger's *Archiv*. Many workmen have contributed to that monument, and, among the mass of contributions, the work of Pflüger himself stands good as well and truly laid. The mechanism of spinal action in the frog, and his law of reflex action as studied upon the decapitated animal, were his earliest subjects of study, and are to-day still classical. We cannot discuss the mechanism of nervous coordination without at once appealing to the experiments of Pflüger and the decapitated frog more than fifty years ago, in preface to our discussion of the experiments of Sherrington on the spinal mammal which belongs to the last decade.

The tenth volume of Pflüger's *Archiv* (1875), containing his paper, "*Ueber die Physiologische Verbrennung in den lebendigen Organismen*," has played an important part in our knowledge and notions as to the chemical respiration of the tissues.

Pflüger's bloodless and salted frog continuing to discharge CO_2 in an atmosphere of nitrogen or in vacuo is clear evidence that CO_2 is not due to the immediate action of oxygen, but that it is formed from the dissociation of some storage compound, or, as Pflüger expressed it, previously absorbed oxygen has helped to wind up the physiological clock, the CO_2 discharged at the moment is a sign that the clock is running down. In discussing the latest contribution to our knowledge of this subject, those, for instance, brought out by Leonard Hill as regards the

beneficial effect of oxygen upon muscular work, we are obliged to refer to Pflüger's teaching.

Nutrition, its debtor and creditor account in the body in terms of nitrogen and of carbon; glycogen, its relation to carbohydrate antecedent and its questionable relation to protein antecedents; fat, its absorption, relation to carbohydrate, the problem of diabetes and the origin of diabetic sugar, formed the principal field of Pflüger's unceasing labours during the last twenty-five years of his life.

Pflüger died on March 17, aged eighty-one, at the end of over sixty years of single-minded and unswerving devotion as a student of physiology, fifty years of which were spent as ordinary professor of physiology in the University of Bonn.

A. D. WALLER.

NOTES.

IN consequence of the lamented death of the King, and out of respect to his memory, many scientific meetings and other functions have been postponed or cancelled. The *soirée* of the Royal Society, announced for May 25, will not take place. The meetings of the society will not be resumed until May 26. The president of the Royal Institution has decided that the lectures and evening meetings be discontinued until further notice. The anniversary dinner of the Royal Geographical Society, which was arranged for May 23, will not be held; the anniversary meeting will be held as arranged, at 3 p.m. The meeting of the Royal Meteorological Society which had been fixed for Wednesday, May 18, has been postponed to Wednesday, May 25.

WE notice with regret the announcement of the death of Prof. S. Cannizzaro, Foreign Member of the Royal Society and professor of chemistry in the University of Rome, at eighty-three years of age.

At the meeting of the Royal Society on May 5 the following candidates for fellowship were elected into the society:—Mr. J. Barcroft, Prof. G. C. Bourne, Prof. A. P. Coleman, Dr. F. A. Dixey, Dr. L. N. G. Filon, Mr. A. Fowler, Dr. A. E. Garrod, Mr. G. H. Hardy, Dr. J. A. Harker, Prof. J. T. Hewitt, Prof. B. Hopkinson, Dr. A. Lapworth, Lieut.-Colonel Sir W. B. Leishman, Mr. H. G. Plimmer, and Mr. F. Soddy.

Now that our returning summer migrants are being eagerly looked out for, and the arrival of many of them has been recorded during the last few weeks, the question arises in the minds of many people, "Do the same individual birds which nested last year come back to nest in the same place?" This is a question, of course, which might be equally well asked of our "resident" birds, but in the case of migrants, such as the swallow, which we know for certain does not winter anywhere north of Africa, actual proof that the same individual returns after its long journey to and fro, and its sojourn in its far off winter quarters, to the very same spot in which it nested the year before is sensational. Such proof in the case of one swallow, in any case, is just to hand. Dr. C. B. Ticehurst records the following in the last number of *British Birds*:—"On April 12, 1910, the first swallow (*Hirundo rustica*) was seen at 4 p.m. passing the house at Huntbourne, High Halden, Kent, which lies in the line of a small migration-route; at 6 p.m. a small flight of swallows passed over to the north, and from it four birds separated, and after flying round the house and settling on the chimney-pots, finally went to roost in a shed where two pairs bred last year. Two days afterwards I caught a