and the 'group' serum. It would thus appear to have acquired a uniformly specific character.

It has been shown recently[11] that, in addition to its effect on carbohydrates, periodate may alter or inactivate biologically active proteins. Nevertheless, it seems likely that critical dilutions of this reagent may be helpful in the identification of some carbohydrate substrates. The inactivation of the heat-stable *Psittacosis* antigen by periodate is regarded as confirmatory evidence that the group component is, at any rate in part, carbohydrate.

A report giving full details of these and other observations bearing on the antigenic behaviour of *Psittacosis* is being prepared.

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Æcidia of Barley Rust in Britain

THE æcidium on *Ornithogalum* species in Europe has an interesting nomenclatorial history. At first attributed to *Puccinia liliacearum* Duby, it was recognized by Bubak[1] as belonging to a separate heterœcious rust and named by him *Æcidium ornithogaleum*. Then, in 1914, Tranzschel[2] demonstrated in both directions its connexion with the common brown rust of barley, *Puccinia hordei* Otth. (syn. *P. anomala* Rostr.). This connexion has been confirmed by Mains and Jackson[3] in the United States of America; but, so far as we are aware, the æcidium has not hitherto been found in Britain. According to Sydow[4], it is known to occur in Germany, Austria and Hungary. D'Oliveira[5], who repeated Tranzschel's experiments and produced æcidia on *Ornithogalum* by inoculation from barley, was unable to find the æcidia in the field in England and concluded that barley rust survives the English winter in the uredo state on barley tillers and seedlings.

On March 14, 1948, one of us (N. Y. S.) collected spermogonia on a leaf of *Ornithogalum pyrenaicum* L. in Inwood Copse near Ham Spray, below Inkpen Beacon, on the borders of Berkshire and Wiltshire within the last-named county. These may have belonged to *P. hordei* or to *P. liliacearum*; but their occurrence stimulated our interest and led to our asking Mrs. F. Partridge, who lives at Ham Spray House and was present when the leaf was collected, to keep a watch for æcidia. Two æcidia were found on April 2, and on April 15 we received from her a consignment of thirty-two infected leaves. Twenty-seven of these bore spermogonia associated with teleutosori of *P. liliacearum*, five bore spermogonia and æcidia but no teleutospores. From the latter, inoculations were made at once to seedlings of common barley (unnamed hybrid seed); and on April 23, uredo pustules were visible on the inoculated leaves. They became erumpent on the following day. Subsequent careful search of the copse at Ham Spray has shown that *O. pyrenaicum* occurs there in two distinct patches. One adjoins the corner of an arable field which carried barley in 1947; the other lies between fields which carried wheat and oats respectively. The æcidia were found only in the former patch; *P. liliacearum* occurred in both, but mainly in the latter.

While it appears probable that persistence of the uredo stage is the chief method by which barley rust overwinters in Britain, the æcidia may be important in two ways. In the first place, *O. pyrenaicum* is locally abundant (with a discontinuous distribution) in certain parts of the south and west of England and may be responsible for initiating local outbreaks of brown rust. The plant occurs in north Somerset, west Gloucestershire, Wiltshire, Berkshire, Bedfordshire, Norfolk and Sussex. Secondly, presence of the æcidial stage affords opportunity for hybridization between existing physiological races of barley rust and for the production of new ones. D'Oliveira was able to distinguish five races of this rust in England. We suggest that it may be desirable to survey the known stations of *O. pyrenaicum* next April to ascertain to what extent æcidia are normally produced in Britain. Other species of *Ornithogalum*, especially *O. umbellatum* L., should also be examined for this purpose.

We are indebted to Dr. G. R. Bisby for help with the inoculations, and to Mrs. Partridge for her observations and for sending us material.

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Velocity of Photons

MR. H. FLETCHER MOULTON'S paradox[1] is ingenious, but easily resolved. The energies of two photons emitted at the same place are *not* equal if each energy is measured in the co-ordinate system of the moving body at which it is absorbed. Each observer measures wave-length and velocity in his own co-ordinate system, and deduces the frequency and energy to correspond. The same remark elucidates the 'mystery' of the Doppler effect; but it must be remembered here that each photon does not show this effect. If one single photon could be received, it would presumably show no Doppler effect (or, indeed, wave-length at all—this is the classical deduction from photo-electric phenomena); the wave decides the probability of the photon being found at any given point, or the distribution of the photons if they are present in sufficient numbers.

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DR. GEORGE NOVELLO COPLEY, City Technical College, Liverpool, states that answers to Mr. Fletcher Moulton's questions are given in "A Textbook of Physics", by E. Grimsehl, vol. 5, "Physics of the Atom", p. 240 (Blackie, 1945), where the corpuscular interpretation of the Doppler effect is seen to be analogous to that of the Compton effect.