No one can doubt the great advantages of Dr. Wehnelt's instrument in reducing the time of exposure of photographic plates, the brilliancy and steadiness in the fluorescent screen, not to mention its cheapness. The question of disadvantages having been raised, such as control of the instrument, destruction of tubes, &c., I made a few experiments to see how far such would affect its utility. My experiments were made with induction coils of different sizes, the largest being a 28-inch spark, and in each case the principles involved seemed to be the same. Firstly, we can vary the effects in the tube by increasing or diminishing the voltage to the primary coil. Secondly, the current is easily controlled by difference in proportion of the size of the electrodes. Thirdly, the strength of the fluid in which the electrodes are immersed affects the result. Fourthly, by the distance between the electrodes in the electrolyte changes are brought about. Fifthly, variations are got by the number of active electrodes. By modifying these we can vary the length of the spark, also its frequency and thickness, and it naturally follows that we can make use of them in exciting Crookes' tubes. In fact, so easy is it to arrange matters that I have been able to excite small and large tubes of different vacua with perfect safety even when using a large 28" spark coil. So far, therefore, from being afraid of its destructive power upon the anti-kathode or Crookes' tubes generally, I am convinced that the new interruptor will be very easily controlled. I may add that some workers are inclined to think that large coils will no longer be required, but the answer depends entirely upon the work to be done. What we already do know, and what is of greater importance, is that coils of any size can do what was beyond their range in the past—a fact of great value where portability is of consequence, as in hospital work or to the army-surgeon on the field.

So far I have therefore been quite able to confirm everything promised by Dr. Wehnelt. Photographs taken by me of the deep-seated tissues of the body have been obtained with very much shorter exposures than by any other means of interruption. Further, examination of these deep-seated structures has been made much easier by the greater brilliancy and steadiness of the fluorescent screen.

Another question sure to be raised once more by this new instrument is which is the best instrument for X-ray work judged by the comparative advantages and disadvantages of induction coils and influence machines. Hitherto one of the great advantages of the latter has been the brilliancy and steadiness of the illumination of the screen, but this difference may be said to have disappeared with the advent of Dr. Wehnelt's discovery. When the question of the best transformer was discussed at the Röntgen Society last session, I could not see my way to take any side, believing then, as I do still, that each transformer has its advantages and disadvantages. It would possibly be as easy to say whether a gas, oil, or steam engine should be chosen to do a particular piece of work. At that meeting I stated that when we come better to understand coils and influence machines, we shall probably do the same work with either. The selection of the instrument to excite Crookes' tubes in the future will probably be decided by such questions as portability, the primary force at the disposal of the operators, such as batteries, street mains, or mechanical power.

179 Bath Street, Glasgow,
March 5.

JOHN MACINTYRE.

To Calculate a Table of Logarithms.

ON the 23rd ult. you were good enough to publish for me a short account of a method of calculating a table of logarithms which any schoolboy might employ. I find that this method is described in a book published a few days ago, "Measurement and Weighing," by Edwin Edser, an associate of this college. The method was used by Mr. Edser in teaching students of the Chelsea Polytechnic. To find that young teachers are working in the spirit evidenced by such an exercise, gives me many times more pleasure than any that I could derive from credit for priority.

JOHN PERRY.

Royal College of Science, South Kensington, S.W.,
March 1.

Probable Weather Conditions in Spain during the Total Solar Eclipse of May 28, 1900.

THINKING that some information about the climatological conditions of the Spanish towns situated in the track of the shadow during the total solar eclipse of May 28, 1900, may be

welcomed by the readers of NATURE, I have collected the few available observations made at meteorological stations situated near the path. Only two are in the limits of the central shadow: inland, Albacete; and Alicante, on the sea-shore.

Weather Chances towards the End of May, deduced from several Years of Observation.

Towns	Barometer	Temperatures			Wind Direction	Velocity	Days of			Rain num.	Humidity per cent.
		Max.	Min.	Mean			Clear	Cloudy	Overcast		
Albacete ...	702.5	21.0	9.3	15.9	S.E.	5	9	15	9	8	49
Alicante ...	759.4	25.3	11.4	18.9	S.E.	5	15	14	3	4	28
Caceres ...	719.2	22.8	10.0	16.4	S.W.	4	8	10	4	11	114
C. Real ...	707.2	23.7	8.5	14.9	W.	4	10	11	10	9	50
Murcia ...	755.6	25.1	12.5	19.0	S.E.	5	8	18	3	5	39

The Spanish astronomer, Mr. Landerer, has drawn up the times of contacts for the towns expressed in the following table. (Madrid mean time.)

Localities	External contacts	Totality			
		Contacts			Duration
		h.	m.	s.	m. s.
Oporto ...	2 3 28	3 27	00		0 55
	4 34 37	3 27	55		
Ovar ...	2 3 30	3 27	3		1 33
	4 35 9	3 28	36		
Vizeu ...	2 7 42	3 30	58		1 31
	4 38 28	3 32	29		
Plasencia ...	2 18 48	3 41	14		1 29
	4 47 36	3 42	43		
Navalmoral ...	2 21 44	3 44	3		1 28
	4 50 20	3 45	31		
Argamasilla ...	2 35 59	3 56	59		1 22
	5 1 58	3 58	21		
Albacete ...	2 43 31	4 3 38		0 40	
	5 7 26	4 4 18			
Tobarra ...	2 45 31	4 4 48		1 20	
	5 9 6	4 6 8			
Novelda ...	2 49 40	4 9 24		1 18	
	5 13 15	4 10 42			
Elche ...	2 50 18	4 9 59		1 19	
	5 13 56	4 11 18			
Alicante ...	2 51 25	4 10 52		1 12	
	5 14 43	4 12 4			
Santa Pola ...	2 51 9	4 10 38		1 18	
	5 14 29	4 11 56			
Argel ...	3 11 47	4 29 25		1 9	
	5 31 41	4 30 34			

AUGUSTO ARCIMIS.

Instituto Central Meteorológico, Madrid.

A Remedy for Bookworms.

REFERRING to the letter from Mr. J. Ewen Davidson on this subject (NATURE, vol. lix. p. 126). In my experience of keeping books in Fiji and various parts of Australia, I have only had to contend with the attacks of rats, cockroaches, "silverfish" (*Lepisma*), and a small boring beetle; all of which attack the binding, probably for the sake of the starch paste, &c.

The solution of corrosive sublimate, recommended by Mr. Davidson, will undoubtedly prove *permanently* effective without the thymol.

Some objection may, however, be taken to the use for this purpose of a powerful poison like corrosive sublimate.

I have attained the same end by giving the bindings a dressing of strong shellac in spirit. This is easily applied by means of a soft brush, and dries quickly, when it is scarcely noticeable even on fine bindings.

Where large numbers of books have to be cared for, as in libraries, "silverfish" and cockroaches are, in this climate, the enemies perhaps most to be dreaded. These lurk and breed in the spaces between the woodwork and the walls, and in crevices and crannies about the shelves.

Mr. J. J. Fletcher, Secretary to the Linnean Society of N.S.W., has effectually rid the library of the Society of these pests by freely dusting into the crevices ordinary powdered Paris green. Wherever there was a space in which the insects could lurk, Mr. Fletcher applied the powder, and now the books, which were formerly much disfigured by the insects nibbling the bindings, remain entirely free from damage because of the extermination of the pests,

THOS. STEEL.

Colonial Sugar Refinery Company, Sydney, January 31.

Radiation in a Magnetic Field.

IN the very interesting summary of our present knowledge of the Zeeman effect, Mr. Preston has interpreted a number of results I obtained by the interferometer and the echelon spectroscope in such a way as to cast a general doubt over the performances of these instruments. Some of these interpretations are undoubtedly the result of misunderstandings due to my own want of clearness. I venture, therefore, to present a summary of the principal results, emphasising where necessary the points which require further explanation.

In the article to which Mr. Preston refers (*Phil. Mag.*, vol. xxxiv. p. 280, 1892), it was shown that the visibility curve, in the case of about twenty radiations examined, showed peculiarities from which the character of the spectrum could be inferred, and a considerable number of "lines" were shown to be double, triple, or more highly complex. Mr. Preston remarks: "This structure has never yet been observed by means of any ordinary form of spectroscope, and accordingly it has been suggested that it does not exist in the light radiated from the source, but is imposed on the spectral lines by the apparatus used, namely, the interferometer."

It might be replied that such an explanation would be very difficult to accept, in view of the very great constancy of the results, with instruments of different construction and dimensions, with different observers, and with different forms of vacuum tubes employed. But, if I am not mistaken, the only attempt at explanation of the peculiarities of my visibility curves, was that which attributes them to diffraction effects; which, however, would necessarily be of a totally different character, and indeed in most cases entirely insignificant.

The real reasons for the absence of confirmation of these results by the spectroscope are probably that the resolving power is insufficient; or where the resolving power is insufficient the radiating substance is not in a vacuum tube, and the consequent broadening of the lines under atmospheric pressure is so great as to mask the details of structure; or, finally, if the substance is placed in a vacuum tube, the light is not sufficiently bright.

Turning now to Mr. Preston's criticism of the results obtained in the investigation of the Zeeman effect, the following remarks may help to clear up the "most surprising statement that the separation of the lines in the triplets produced by the magnetic field is independent of both the spectral line and the substance."

The law referred to is stated thus: "The separation is proportional to the strength of field, and is *approximately* the same for all colours and for all substances."

But on p. 137 of the same article (*Astrophysical Journal*, vol. vii. No. 2, 1898) will be found the further modification:

"The following table shows that the law . . . is only approximately true. In fact, owing to the complexity of the spectra, there is considerable latitude in the choice of the distance between the outer groups. If this correspond to the brightest components the law can hardly be said to hold at all; but if the distance be taken between the centres of gravity of the light areas, a fair agreement is found. The table gives separation in tenth-meters for a field 10,000. The lines marked

with an asterisk are less accurate than the others on account of broadening:

*Hydrogen	...	Red	...	0.48
*Lithium	...	Red	...	0.60
Cadmium	...	Red	...	0.42
Zinc	...	Red	...	0.42
Mercury	...	Yellow	...	0.36
*Sodium	...	Yellow	...	0.50
*Helium	...	Green	...	0.37
Mercury	...	Green	...	0.40
Cadmium	...	Green	...	0.41
*Thallium	...	Green	...	0.36
Cadmium	...	Blue	...	0.40
Zinc	...	Blue	...	0.33
Mercury	...	Violet	...	0.33

"Taking into account the uncertainty alluded to, the results show on the whole a fair agreement, from which it may be concluded that the separation is independent of the radiating substance and of the colour."

A number of radiations have been examined since the foregoing was published; and while there are undoubted exceptions

FIG. 1.—A, plane of polarisation, Equatorial.
B, " " " Axial.

to the law, I still think, keeping in mind the limitations referred to, it is in the main correct.

These results and others obtained by the interferometer, as Mr. Preston states, have been verified by the echelon spectroscope; and I think the explanation of apparent differences between results obtained by these methods and by other forms of spectroscope are to be explained, not by an actual variance, but by a misunderstanding of the degree of approximation the results

FIG. 2.

are intended to show, except where the resolving power of the other spectroscopes is insufficient.

Mr. Preston states: "With apparatus which reveals structure or multiplicity in the ordinary spectral lines, it is to be expected that multiplicity would be readily revealed in the constituents produced by the magnetic field; yet in the case of some lines, the amount of finer structure revealed does not appear to be as great as that observed with a good grating. . . ." In reply to