partial coincidence would have betrayed the existence of the snare.

Finally, there is a fallacy in Mr. Howard's last sentence—"It is obvious in such questions that nothing can be gained by the application of formulæ and figures to the results obtained by poor agriculture". There is no question, of course, of connecting the half-drill strip method of experimenting with poor agriculture; its great merit lies in the fact that in its present form it is ordinary farming practice: if, however, that practice were poor agriculture, it would be a mistake to carry out trials by methods conforming to better standards: field trials must be capable of being considered a random sample of the practice, not of the theory, of agriculture.

This may seem a hard saying, but an example will make my meaning clear. After a long series of experiments the Irish Department of Agriculture decided to introduce Dr. Hunter's Spratt-Archer barley as being the best suited for the country. This was almost everywhere a great and outstanding success; yet in one district, which shall be nameless, the farmers refused to grow it, alleging that their own native race of barley was superior to it. After some time the Department, to demonstrate Spratt-Archer's superiority, produced a single line culture of the native barley and tested it against the Spratt-Archer in the district in question. To their surprise, they found the farmers were perfectly right: the native barley gave the higher yield. At the same time the reason became plain: the barley in question starts more quickly and is able to smother the weeds, which flourish in that not too well farmed land; Spratt-Archer, growing less strongly at first, is, however, the victim and not the conqueror of the weeds, and the original experiments, carried out on well-farmed land, were definitely misleading when their conclusions were applied elsewhere.

Taught by experience, the Department is now engaged in breeding a barley to meet these conditions; and this barley, when obtained, will rightly be tested by "results obtained by poor agriculture".

STUDENT.

REFERRING to the effect of increased depth of sowing, "Student" writes "When seeds do not germinate, it is equivalent to a light seeding rate". . . . This is true, but changes in depth of sowing give rise to changes not only in the percentage germination but also in the time of germination. It is my experience that yield may be affected by both these factors.

My description of the field at Aarslev as "apparently uniform" would seem to be justified by Dr. Sanders' statement that "This oscillation *apparently* arose as a legacy of the old practice of ploughing in high ridges" (italics mine)—appeal was made to the history of the field for an explanation of the curious periodicity.

I am in complete agreement with the concluding part of "Student's" communication, summed up in his own phrase, "field trials must be capable of being considered a random sample of the practice, not of the theory, of agriculture". This is too often overlooked by those who use special machinery and methods for field experimental work.

THE WRITER OF THE ARTICLE.

Vacuum Spark Spectra to 40 A.: the Spectra of Be III, Be IV, B IV, B V, and C V.

THE series of hydrogen- and helium-like spectra, which was previously traced [1] to Be IV, has now been completed with B IV, B V, and C V, and the limit of optical spectra brought down to 40·28 A.

The vacuum spark was produced by a capacity of 0·3 μF charged to 60,000 volts. Half an hour with about 30 sparks a minute was sufficient for an exposure. The plates were taken with the same metal grating as was used before,[1] but now set up in a new spectrograph at a glancing angle of 5·4°. Comparing the results with those from a glass grating [2] at 6°, there seems to be no reason to prefer this material to speculum metal in the shortest wave-length region.

Fig. 1, *a*, shows the spectrum obtained with metallic

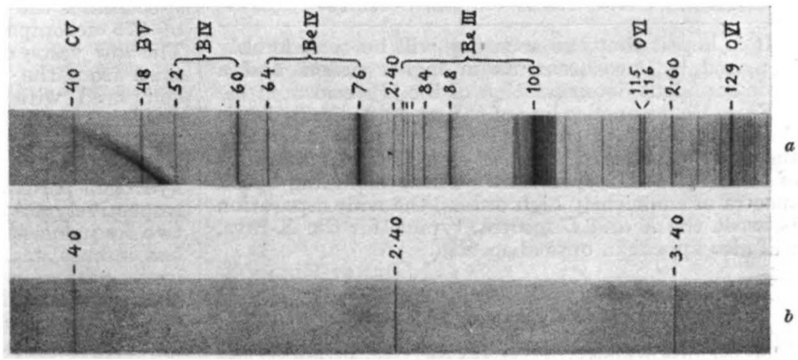

FIG. 1.

beryllium as the negative electrode against a tube of Acheson graphite filled with boron nitride. A spark between pure graphite electrodes gave the spectrum of Fig. 1, *b*, consisting of one single carbon line at 40 A. in the first three orders.

Of the series $1\,^2S - n\,^2P$ in the hydrogen-like spectra, there appear two lines of Be IV and one of B V. The wave-lengths in the table were calculated with regard to the fine structure according to the formula given by Penney,[3] and used as standards.

	Be IV.		B V.	
	ν	λ	ν	λ
$1\,^2S - 2\,^2P$	1,317,084	75·925	2,058,247	48·585
$1\,^2S - 3\,^2P$	1,560,962	64·063		

As shown in the second table, the helium-like series $1\,^1S - n\,^1P$ is considerably more strongly developed. The relative intensities can be estimated from Fig. 1, *a*.

	Be III.		B IV.		C V.	
	λ	ν	λ	ν	λ	ν
$1\,^1S - 2\,^1P$	100·25	997,500	60·31	1,658,100	40·28	2,482,600
$3\,^1P$	88·30	1,132,500	52·68	1,898,300		
$4\,^1P$	84·75	1,179,900				
$5\,^1P$	83·19	1,202,100				
$6\,^1P$	82·37	1,214,000				

From the series of Be III the quantum defect for the ^1P terms is calculated as $n - n^* = -0{\cdot}013 \pm 0{\cdot}001$. A comparison with He I and Li II indicates the numerical value to be constant or slightly diminishing with increasing atomic number. The simple assump-