Description of Stations.

Place.	Bank of river.	Observations made.
Omdurman, 200 metres south of steamer workshops	Left	Declination. Dip. Horizontal force.
Kawa (lat. 13° 55′)	„	Horizontal force.
Goz Abu Goma (lat. 13° 23′)	Right	Dip.
Renk	„	Declination.
6 kilometres up stream of Jebel Ahmed Agha	„	Declination. Dip. Horizontal force.
16 „ „ „ „	Left	„ „ „
Near Kaka (lat. 10° 30′)	Right	„ „ „
48 kilometres down stream of Fashoda (lat. 10° 20′)	„	„ „ „
8 kilometres up stream of mouth of River Sobat, on Bahr el Abyad	„	Declination. Horizontal force.
Wood station on Bahr el Abyad, east of mouth of Bahr el Zaraf 12 kilometres	„	Dip. Horizontal force.
Bahr el Zaraf, 20 kilometres from mouth	Left	Dip.
Bahr el Jebel, 10 kilometres	„	Declination. Horizontal force.
South of Hellet Nuer (lat. 8° 9′ 30″)	„	Declination. Dip. Horizontal force.
Kenisa (lat. 6° 46′ 0″)	Right	Dip. Horizontal force.
Wood station, south of Bor on Bahr el Jebel (lat. 6° 5′)	„	„ „
Wood station, south of Kiro on Bahr el Jebel (lat. 5° 15′)		

"Note on the Effect of Mercury Vapour on the Spectrum of Helium." By Professor J. NORMAN COLLIE, F.R.S. Received June 3,—Read June 19, 1902.

Some years ago the author, in conjunction with Professor Ramsay, published the results of some experiments relating to the visibility of the spectrum of one gas in presence of another.*

Since then some experiments have been made on the effect of mercury vapour (when present in considerable quantity) on the spectrum of helium in an ordinary Plücker's tube, under the influence of the electric discharge from an induction coil. When the spectrum of helium is examined in an ordinary Plücker's tube, it appears to be a simple one consisting of only eight lines—two red, one yellow, three green, one blue, and one violet.

The spectrum, however, of the negative glow is much more com-

* 'Roy. Soc. Proc.,' vol. 59, p. 262.

plicated, a large number of other and fainter lines appearing as well. If mercury vapour be introduced into such a tube filled with helium at from 2—5 mm. pressure, the first change noticed is the simplification of the spectrum of this negative glow; and at the same time three of the helium lines disappear from the spectrum of the negative glow, the red 7065, the blue 4713, and the violet 4472, whilst the yellow 5876 becomes very feeble. In the orange part of the spectrum a brilliant new line can now be seen, namely, the mercury line 6151, a line which as a rule does not appear in a Plücker's tube containing mercury vapour when an electric discharge from an induction coil is passed through it. The presence of the orange line of mercury is of interest, as other gases, argon, krypton, hydrogen, &c., mixed with mercury vapour, when examined under the same conditions fail to give it.

Whether this orange line is shown in a neon tube where mercury vapour is present is difficult to say, as one of the bright orange lines of neon almost coincides with it.*

Besides this alteration of the helium spectrum at the negative electrode another curious change can be observed, if a piece of tubing (whose internal diameter is about 4 mm.) be introduced into the centre portion of the Plücker's tube. The spectrum of the gas in this central portion invariably consists of the mercury lines in the yellow, green, and violet, together with one and one only of the helium lines, namely, the green line 4922. This seems to be a most delicate test for minute traces of helium in other gases, and this line can be easily seen when no other helium lines can be detected elsewhere in the tube. A large excess of mercury vapour will also produce the same result in the spectrum of the glowing vapour in the capillary bore tube.

Thus in the same Plücker's tube, containing helium and mercury vapour, helium may be made to yield three distinct spectra:—

(1.) In the narrow bore capillary portion the full spectrum of eight lines.

(2.) At the negative electrode, three lines disappear, one red, one blue, one violet, and the yellow line becomes very faint.

(3.) In the wider bore central portion only one green line is visible.

Of course the mercury spectrum is visible in all portions, but at the negative electrode the orange mercury line becomes the most brilliant.

Another interesting fact is the great purity of the spectrum. In every case there is a marked absence of light between the lines.

Runge and Paschen pointed out in 1895† that the helium spectrum seemed to belong to two systems.

The lines which persist and those which disappear in the negative

* The author has to thank Professor Ramsay for kindly helping him and for supplying the rare gases neon and krypton for these experiments.

† 'Phil. Mag.,' vol. 40, p. 297.

glow coincide with these two systems. For all those lines which disappear in the negative glow, 7065, 4713, 4472, and the yellow line 5876 which nearly does so, belong to that system which, according to Runge and Paschen, is due to the gas helium; whilst these which can be seen at the negative glow with their full brilliance, 6677, 5016, and 4922, belong to the second system.

This differentiation of the helium spectrum brought about by the presence of mercury vapour might at first sight appear as a confirmation of the idea of Runge and Paschen that helium is a mixed gas, consisting of two different elements. But taken in conjunction with the fact that the spectra of argon, neon, and krypton are all altered by the same treatment, no reliance necessarily can be placed on the argument.

In conclusion it is worth while pointing out that a helium-mercury tube containing the merest trace of hydrogen should be of value as a standard tube for spectroscopic measurements. For it contains fourteen standard lines, amongst them (C and F). Moreover all these lines are of brilliance ten, very equally spaced from the extreme red to the violet, and with dark spaces between them.

He	Red	7065	Hg	Green	5461
He	Red	6677	He	Green	5016
H	Red	6563 C	He	Green	4922
Hg	Orange	6151	H	Green	4861 F
He	Yellow	5876	He	Blue	4713
Hg	Yellow	5790	He	Violet	4472
Hg	Yellow	5769	Hg	Violet	4359

"The Seed-fungus of *Lolium temulentum*, L., the Darnel." By E. M. Freeman, M.S., University of Minnesota. Communicated by Professor Marshall Ward, F.R.S. Received June 6—Read June 19, 1902.

(Abstract.)

Darnel (*Lolium temulentum*, L.) has been known since Roman times for the poisonous properties of its grain. It was not, however, until 1898 that the presence of an often considerable layer of hyphæ was discovered just exterior to the aleurone layer of the grain; to the action of this fungus-layer the poisonous properties are presumably due.* Nothing had hitherto been known regarding the method of

* How far ergot and other fungi may be concerned is a disputed point.—[June 24.]