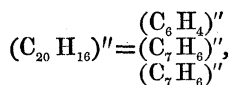
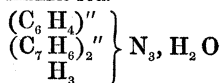


may possibly contain the bivalent radicals *phenylene*, $C_6 H_4$, and *tolylene*, $C_7 H_6$,

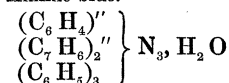


when the molecular construction of the three colouring matters might be represented by the formulæ

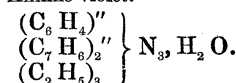
Aniline-red.



Aniline-blue.



Aniline-violet.



We must not, however, forget that this is simply an hypothesis, and that the elements in the complex atom $C_{20} H_{16}$ may be associated in a great variety of other groups. An interesting observation quite recently made by Dr. Hugo Müller, and communicated to me by my friend while these pages are passing through the press, may possibly assist in further elucidating the nature of this class of bodies. Dr. Müller has found that rosaniline and its coloured derivatives are instantaneously decolorized by cyanide of potassium, a series of splendidly crystallized, perfectly colourless bases being produced. The composition of these bodies, which will probably be found analogous to a substance similarly obtained from harmaline by Fritzsche, remains to be established.

November 17, 1864.

Major-General SABINE, President, in the Chair.

In accordance with the Statutes, notice of the ensuing Anniversary Meeting for the election of Council and Officers was given from the Chair.

Mr. Gassiot, Dr. J. E. Gray, Dr. Hirst, Mr. Lubbock, and Dr. Odling, having been nominated by the President, were elected by ballot Auditors of the Treasurer's accounts on the part of the Society.

Among the presents announced was a Photograph of the Moon, from Mr. Warren De la Rue, respecting which an extract of a letter from the Donor was read as follows :—"Except to remove white and black spots, the photograph is untouched. The size of the original negative is about one inch, and from this was taken, in the first instance, a positive on glass nine inches in diameter. The glass positive was used for the production of four negatives, each containing a quarter of the disk. The proper distance for viewing the picture is about six feet, or two diameters."

VOL. XIII.

2 P

The following communications were read :—

- I. "Comparison of Mr. De la Rue's and Padre Secchi's Eclipse-Photographs." By WARREN DE LA RUE, F.R.S. (See page 442.)
- II. "On Drops."—Parts I. and II. By FREDERICK GUTHRIE, Esq. Communicated by Professor Stokes, Sec. R.S. (See pages 444 and 457.)
- III. "On the Chemical Constitution of Reichenbach's Creosote." By HUGO MÜLLER, Ph.D. Communicated by Warren De la Rue, F.R.S. (See page 484.)
- IV. "Researches on the Colouring Matters derived from Coal-tar.—No. IV. Phenyltolylamine." By A. W. HOFMANN, LL.D., F.R.S. (See page 485.)
- V. "On the Spectra of some of the Nebulæ." By W. HUGGINS, Esq., F.R.A.S.;—a Supplement to the Paper "On the Spectra of some of the Fixed Stars," by W. HUGGINS, Esq., and W. A. MILLER, M.D., Treas. and V.P.R.S. Communicated by the Treasurer. Received September 8, 1864.

(Abstract.)

The author commences by showing the importance of bringing analysis by the prism to bear upon the remarkable class of bodies known as nebulae, especially since the results obtained by the largest telescopes hitherto constructed appear to show that increase of optical power alone would probably fail to determine the question whether all the nebulae are clusters of stars too remote to be separately visible.

The little indication of resolvability, the absence of central condensation, the greenish-blue colour, and the intrinsic brightness characterizing many of the nebulae classed by Sir W. Herschel as planetary, induced the author to select chiefly nebulae of this class for prismatic observation.

The apparatus employed is that of which a description is given in the paper, "On the Spectra of some of the Fixed Stars," by the author and Dr. W. A. Miller, to which this is a supplement.

No. 4373*, 37 H. IV. Draconis. A bright planetary nebula, with a very small nucleus. The light from this nebula is not composed of light of different refrangibilities, and does not therefore form a continuous spectrum. It consists of light of three definite refrangibilities only, and, after passing through the prisms, remains concentrated in three bright lines.

The strongest of these occupies a position in the spectrum about mid-

* These numbers refer to the last catalogue of Sir J. F. W. Herschel, Phil. Trans. Part I. 1864, pp. 1-138.

way between b and F , and was found, by the method of simultaneous observation, to be coincident with the brightest of the lines of nitrogen.

A little more refrangible, a second line is seen. At about three times the distance of the second line, a third, very faint line occurs; this coincides in position with Fraunhofer's F , and one of the lines of hydrogen. Besides the three bright lines, an exceedingly faint continuous spectrum of the central bright point was perceived.

The planetary nebula, 4390, Σ 6, Tauri Poniatowskii; 4514, 73 H. IV. Cygni; 4510, 51 H. IV. Sagittarii; 4628, 1 H. IV. Aquarii; 4964, 18 H. IV., the annular nebula in Lyra 4447, 57 M., and the Dumb-bell in Vulpecula 4532, 27 M., gave spectra identical with the spectrum of 37 H. IV., except that in the case of some of these the strongest only of the three bright lines was seen.

It is obvious that these nebulae can no longer be regarded as clusters of stars. In place of an incandescent solid or liquid body transmitting light of all refrangibilities through an atmosphere which intercepts by absorption some of them, such as our sun and the fixed stars appear to be, these nebulae, or at least their photosurfaces, must be regarded as enormous masses of luminous gas or vapour.

On this supposition the absence of central condensation admits of explanation; for even if the whole mass of the gas is luminous, the light emitted by the portion of gas beyond the surface visible to us would be in great measure absorbed by the portion of gas through which it would have to pass, and for this reason there would be presented a luminous surface only. The small brilliancy of the nebulae, notwithstanding the considerable angle which in most cases they subtend, is in accordance with the very inferior splendour of glowing gas as compared with incandescent solid or liquid matter.

The extreme simplicity of constitution which the three bright lines suggest, whether or not we regard them as indicating the presence of nitrogen, hydrogen, and a substance unknown, is opposed to the opinion that they are clusters of stars.

The following nebulae and resolvable clusters gave a continuous spectrum:—4294, 92 M. Hercules; 4244, 50 H. IV. Hercules; 116, 31 M., the Great Nebula in Andromeda; 117, 32 M. Andromedæ; 428, 55, Andromedæ; 826, 26 H. IV. Eridani.

In the spectrum of 31 M., the nebulae in Andromeda, and in that of the companion nebula, 32 M., the red and part of the orange are wanting.

VI. "On the Composition of Sea Water in different Parts of the Ocean." By Dr. GEORGE FORCHHAMMER, Professor in the University of Copenhagen. Communicated by the President. Received July 28, 1864.

This Paper was in part read.