

which the source itself is drawn out. It is clearly illogical to suggest, as Dr. Hartridge does, that the prism is responsible for the radiant phenomenon in view of the fact that, in its essential features, the effect is observed even before the introduction of the prism.

Using a sufficiently intense source of light and a prism of small angle with optically good and clean faces, and making the observations in a dark room, it should be easy for anyone to satisfy himself by simple tests of the kind referred to by Dr. Hartridge that he is in error, and that Brewster's phenomenon really arises from the scattering of light in the eye, the prism merely acting as a dispersive apparatus modifying the colour and disposition of the streamers in the halo surrounding the source. Judging from the statements made in his letter, Dr. Hartridge would appear to have been particularly unfortunate in his choice of experimental conditions. Any noticeable imperfection in the optical surfaces of the prism would, of course, give rise to scattering, masking the true phenomenon due to the eye itself. This is indeed clearly suggested in Brewster's own paper.

A further and absolutely crucial test is also available. In my paper on the scattering of light in the refractive media of the eye (*Phil. Mag.*, November, 1919, p. 568), I have described the character of the diffraction-halo arising from this cause in considerable detail. With a source of white light the halo shows a radiating fibrous structure and clearly marked alternations of colour and intensity in its outer parts. A monochromatic source, on the other hand, exhibits a halo with a granular structure and a succession of bright and dark rings. These features are explained in my paper as due to the diffraction of light by corpuscles of more or less uniform size included within the structure of the eye. On this view we should expect one half of the first diffraction ring outside the central portion of the halo to be partially achromatised on the introduction of the prism and to appear as a detached semi-circular arc lying beyond the violet end of the spectrum and the displaced position of the achromatic centre. No mere imperfections or irregularities in optical surfaces could, on the other hand, give rise to such a phenomenon. Actual trial confirms the expectation from theory and puts its correctness on an unassailable basis.

C. V. RAMAN.

210 Bowbazaar, Street, Calcutta, January 4.

The Naming of the Minor Planet No. 907, Barnardiana.

IN NATURE for September 8 last (vol. 108, p. 69), at the end of "Our Astronomical Column," attention is directed to the naming by Dr. Max Wolf of two of his asteroids in *Astronomische Nachrichten*, No. 5116. They are No. 834, Burnhamia, and No. 907, Barnardiana. In commenting on these asteroids NATURE infers that they were named after two American astronomers. While it is true that Prof. Burnham's memory is thus honoured, Barnardiana was not named after me, but in memory of Mrs. Rhoda Calvert Barnard, who died on May 25, 1921. This is evident from the following quotation from a letter to me by Dr. Wolf on the subject:—

"Wenn ich den Vornamen Ihrer Gemahlin gekannt hätte, und—vorausgesetzt, dass er nicht schon verwendet worden ist—würde ich ihn einem meiner Planeten zur Erinnerung an Ihre liebe Frau beigegeben haben. Da das nicht ging, so taufe ich den Planeten 907 1918 EU, auf den Namen: Barnardiana.

For some reason No. 5116 of the *Astronomische Nachrichten* containing these names has only

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very recently reached the Yerkes Observatory. I was unaware until then that it did not distinctly state the planet was named after Mrs. Barnard. Though not actively engaged in astronomical work, in her long life in astronomy she had endeared herself to the many astronomical people she had met by her thoughtful and unselfish interest in them and in their work. Hers was a life of love and sympathy. I am grateful to Dr. Wolf for thus perpetuating her memory.

E. E. BARNARD.

Yerkes Observatory, University of Chicago,
January 11.

The Resonance Theory of Hearing.

DR. HARTRIDGE imputes to me great absurdities which, either in irony or by an excess of courtesy, he terms "slight errors" (*NATURE*, January 19, p. 76). Under (1) he takes my plain words, the result "must always be of the same nature," to mean that the result must always be the same! Of course, the harmonic analysis of his oboe and flute combination will not give the same result as in the case of violin and cornet, but in both cases the result will be of the same nature, in that there will be only one fundamental tone. If the data supplied to the sensorium from the cochlea are simply the result of an harmonic analysis, the two notes must appear to the ear inseparably blended in one note. I have not left binaural audition out of consideration. The ability to distinguish two concurrent notes of the same pitch and different quality seems unaffected by both sources being equidistant from either ear.

Under (2) Dr. Hartridge should know as well as I know that the *pitch* of a note depends solely upon the period of its fundamental tone. The example which I proposed eliminates the possibility of beats, the two notes being in perfect physical unison. And, further, since the note made by the teeth is generated by the other note, it cannot be heard except in the combination. Its perception is, therefore, a cognition, not a recognition. At any instant during the production of the two notes (which may be sustained for twenty seconds easily) it is possible to turn the attention to the note made by the teeth and to hear that its pitch is that of the hummed note. At no instant could the resonators which Dr. Hartridge, outstripping Sir Arthur Keith, "finds" in the cochlea furnish the data for anything but a change in the quality and intensity of the hummed note. This objection remains untouched by Dr. Hartridge's animadversions. It goes to the root of the matter, and cannot "fall to the ground" as a superstructure may.

W. PERRETT.

University College, Gower Street, W.C.1,
January 26.

Aurora Borealis of January 30.

HAPPENING to look out at 11.30 last night I perceived a strong auroral glow extending from N. by E. through N. to W. The light was quite bright, and on going into the garden I noticed that my body cast a shadow and that I could read the headlines of the *Times* quite readily. There were no streamers, but several luminous patches, especially due N., where a blunted cone of greenish light rose vertically up from the horizon to a height of 10°.

The sky was partially, and later almost totally, covered by thin clouds, which drifted up from S. under the influence of light airs. The atmosphere was misty and the temperature decidedly warm.

CHARLES S. LEAF.

7 Grange Road, Cambridge. January 31.