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## The Dark Ring Nebula in Cygnus

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*Drake Municipal Observatory*

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This device consists of two cast-iron end-pieces held on the extremities of two parallel steel rods. One end of the wire under test is clamped rigidly to the smaller of these end-pieces. At the other end a bent lever is pivoted to the frame in such a manner that its four-inch vertical arm extends downward to hold the other end of the wire, over which extends the long, horizontal arm, braced against bending by a diagonal piece, forming the hypotenuse of the right triangle thus constructed. The upper edge of the horizontal member carries nine notches at two-inch intervals (5.1 cm.) to guide a rider weighing 0.88 pounds (400 g.). Twenty inches (51 cm.) from the fulcrum is mounted a rounded point which presses up on the plate of a Starret Dial Test Indicator, carried by a rod mounted on one of the long stringers.

To use the instrument, a wire is placed in the clamps, the sliding weight removed entirely and the indicator moved down upon the rounded point until a reading near the upper limit of the indicator is obtained. If, now, the weight is moved along in the various notches, readings may be taken of the amount of motion at the end of the horizontal arm. The indicator is calibrated to thousandths of an inch, and the lengths of the levers give a reading ratio of five to one, so by estimating to the half of a division, elongations of the wire of one ten-thousandths of an inch (0.00254 cm.) may be detected. Since the mass of the rider remains constant, the force on the wire is dependent entirely upon the distance of the weight from the pivot. From the data thus obtained it may be clearly seen that, for moderate loads, the elongation of the wire is directly proportional to the force exerted upon it, and very consistent values for Young's modulus may, in this way, be obtained.

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## THE DARK RING NEBULA IN CYGNUS

D. W. MOREHOUSE

Since my report on the Dark Ring Nebula in Cygnus,<sup>1</sup> I have received the following communication from Dr. R. H. Curtiss, Acting Director of the Detroit Observatory of the University of Michigan:

"Your article in the February Popular Astronomy on a dark

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<sup>1</sup> Popular Astronomy, Vol. XXXV, No. 2, p. 1, 1927.

ring nebula in Cygnus has led me to look up an excellent slide which we have of that region made from a photograph secured with the 6-inch Willard Lens on October 5, 1893, at Lick Observatory. The dark elliptical ring stands out very beautifully on this slide. I think anyone would notice it but would be strongly tempted to ascribe it to a defect in one of the pieces of glass through which light must pass in making the lantern slide copy.

"On the slide, as also in your reproduction, there is a parabolic formation of stars enclosing the ring on the lower side and extending some distance upward on both sides. Altogether this object is a very interesting one.

"The other less perfect ring further upward and to the left with something of a blotch of stars in the lower part is also shown well on this slide but it does not seem to have the 'ring nebula' characteristics so greatly developed as the other feature which you have described.

"It would be interesting and useful to make star counts inside and outside of the 'ring' to determine the nature of the absorption within the 'ring' due to the ellipsoidal shell of which the 'ring' is the outer, thicker (for us) part."

Under date of March 28, 1927, Mr. T. E. Espin wrote me as follows:

"I do not know whether it is due to your kindness that I received this morning a copy of *Popular Astronomy* of February, 1927, containing your paper on a Ring Nebula (Dark) in Cygnus. Anyway I am glad to have it, and your conclusions thereon. I am sending you copies of two papers of mine published in the *Journal of the R. A. S. Canada* which you may not have seen. The subject is of very great interest and I wish I had more time to follow it up. However it is always a consolation to know that the subject is in better and more capable hands than mine."

In Mr. Espin's article, "Dark Structures in the Milky Way,"<sup>2</sup> two hundred and two of these dark objects are catalogued. Under No. 134 he gives the position of this object on Dr. E. E. Barnard's plate No. 77.

A photograph by Professor Max Wolf of Heidelberg is reproduced in an earlier article.<sup>3</sup> I quote the following:

"The general impression given by the whole is that of a globe surrounded by an absorbing medium, and this in turn composed of a vast number of what are most like absorption vortex rings.

<sup>2</sup> *Journal of the Royal Astronomical Society of Canada*, August, 1922.

<sup>3</sup> *Journal of the Royal Astronomical Society of Canada*, 1912.

seen at all angles and consequently appearing as ellipses. A very remarkable oval is seen at right ascension 20 hours 51 minutes, declination plus 45. This has a major axis of 20 minutes pointing to position angle 350 degrees, and a minor axis of 12 minutes. It is very certain that the object described is the ring nebula."

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### THE PHOTOGRAPHIC ACTION OF IRRADIATED COD-LIVER OIL

JAY W. WOODROW AND G. M. WISSINK

We have previously reported the results of experiments on the photographic action of irradiated oils. This paper gives the results obtained with various arrangements of the screens and the receptacles for the irradiated cod-liver oil.

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### ON THE DYNAMICS OF A SPHERICALLY SYMMETRIC MOLECULE

J. V. ATANASOFF

An attempt is made to postulate a molecular type which bears some relationship to the known facts of monoatomic molecular structure, yet which is simple enough to allow its kinetic theory to be worked out. The molecule chosen consists of a positive nucleus, surrounded by a negatively charged spherical shell. Developments of the distance-force relationship, and of an equation of state are given.

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### DEPARTURE FROM HOOKE'S LAW IN THE TORSION OF RODS

GEORGE SINGER AND EDWIN STEELE

In an experimental study of the behavior of an iron rod fixed at one end and subjected to torsion at the other it was found that there is a marked tendency of the rod to remain in the state of