The *Gegenschein* Observed at Sea

ON March 14, during a cruise on board R.M.S. *Almanzora*, I saw the Zodiacal Light strongly in the west when off the coast of Portugal in lat. 32° 30′ N. The season being favourable, I hoped to see the *Gegenschein*, or counterglow, which I had never observed. Realising the importance of unbiased vision in localising a faint luminosity, I was careful not to ascertain beforehand the distance of the sun below the horizon. Thus I did not know whether the sun's antipode was in Virgo or in Leo. I was also unaware which stars in these constellations lay upon the line of the ecliptic.

Looking eastwards, I saw a conspicuous band of light resembling the Milky Way which traversed Virgo and Leo and extended as far as the Praesepe

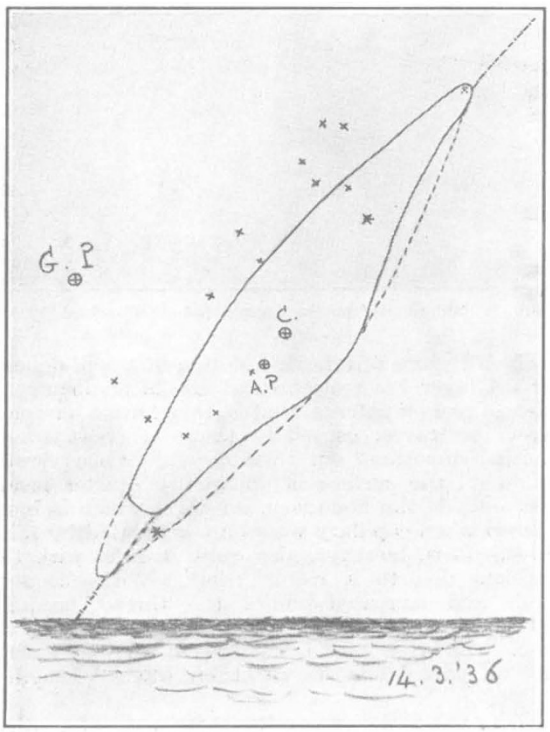

FIG. 1.

in Cancer. It rose steeply, slanting to the right, from about 15° above the horizon. Below this level the sky was pale.

I noticed also that at greater altitudes there was more illumination from the starry sky on the right hand than on the left, or north side of the band, where the interspaces were notably black. I was unaware at the time that the Galactic Pole (G.P.) was situated to the north of the luminous band, in the position shown in the accompanying drawing (Fig. 1).

After about an hour's observation, I marked the limits of the luminous band upon a star atlas, as shown by the continuous line in the drawing. The measurement of the drawing and the determination of the sun's antipode were done after the observations had been completed.

The length of the luminous band was 70°, the brightest part a nearly circular patch half way between Regulus and γ Virginis, extending 18° in this direction, the centre of brightness being in R.A. 170°, very slightly to the north of the ecliptic. This is 41° from the preceding, but only 29° from the following extremity of the luminous band. The latter was broader and blunter than the former. Marking a point upon the ecliptic (shown as a broken-and-dotted line) 41° following the centre of brightness, and prolonging the sides of the band from the lower end, the preceding extremity is seen to be repeated here with fair accuracy, and the form now becomes symmetrical about the transverse axis.

There remains a remarkable disparity of form on the two sides of the longer axis. If, however, the positions at 41° preceding and following the centre of brightness be joined to the right-hand bulge of the centre, the figure becomes perfectly symmetrical.

The distribution of brightness in the sky above, below, right and left to which I have referred was exactly such as to account for this encroachment upon the boundaries of an area the intrinsic luminosity of which was symmetrically disposed.

Having ascertained the position of the sun, I marked the antipode (A.P.) upon the drawing. This was 5° following the centre of brightness and 46° from the preceding extremity of the *Gegenschein*. It is conceivable that as the sun sank farther below the horizon, the centre of apparent brightness might have coincided with the antipode, but the matter could not have been tested on the evening of March 14 as the rising of the moon was due shortly.

My drawing shows the axis of the *Gegenschein* to be slightly north of the ecliptic, but the distribution of brightness in the sky deprives this fact of any significance in relation to the theory of the actual plane of symmetry.

On this evening when the counterglow reached a point 46° preceding the sun's antipode, the apex of the Zodiacal Light was at 53° following the sun.

VAUGHAN CORNISH.

Inglewood, Gordon Road,
Camberley, Surrey.
April 7.

Enhancement of Red Lines and Bands in the Auroral Spectrum from a Sunlit Atmosphere

IT is a well-established fact that the intensity distribution within the auroral spectrum is subject to considerable variations. In 1923 one of us (Vegard) found that the negative nitrogen bands as compared with the strong green line were considerably enhanced with increasing altitude.

In 1926 one of us (Vegard) showed that the red aurora of Type *A* owed its red colour to the enhancement of the red line or group of lines at 6300 A., which may probably be referred to the transitions $^1D_2 - {}^3P_{123}$ of oxygen. The red aurora of Type *B*, characterised by a red bottom edge, has been found to owe its red colour to the enhancement of some red bands belonging to the first positive group of nitrogen. Some diffuse auroral forms also show enhancement of the red bands and lines.

In 1929 Størmer obtained a spectrogram from rays which were still under the action of sunlight. His spectrogram, being taken on an orthochromatic plate, did not contain the red part, but only the green line and the negative nitrogen bands. It indicated a considerable enhancement of the latter bands as compared with the strong green line. It was, however, pointed out by one of us (Vegard), that this effect might be accounted for entirely by the altitude