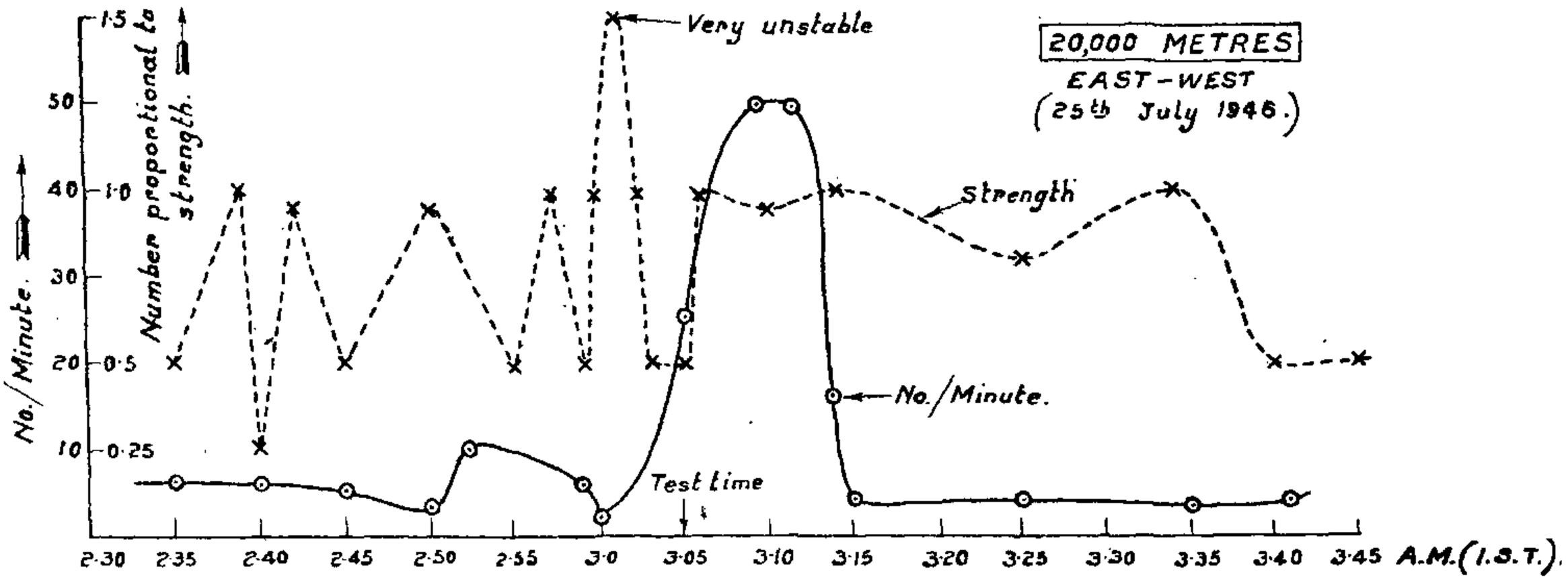


Results of observation on the American station on 25·3 metres have shown the following:—(*a*) The electric field intensity at Bangalore decreased considerably at about 3.05 a.m. and remained at a very low value from 30 seconds to 1 minute with the result that Signal/Noise ratio became extremely poor for reception. (b) The electric field intensity at Bangalore became negligibly small (similar to that in a "radio-fade out"), and the noise level very high from 3.52 a.m. to 3.55 a.m. so that the station was completely masked for about 3 minutes. From 4 a.m. onwards, the reception of the same station was fairly good, as before 3 a.m.

No definite conclusions regarding ionization either at lower (below 'E' layer) or greater heights or over the surface can, however, be drawn from the results of the above experiments due to a few uncertain factors. The note is meant to be a record of the effects observed on the reception of radio signals and atmospherics between 2.30 and 4 a.m. on the 25th July 1946.

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## THE APPARENT ENLARGEMENT OF THE SUN AND THE MOON NEAR THE HORIZON

IT is a matter of common experience that the rising or setting sun and moon appear oversized when near the horizon. It is hard to believe, but true, that they are no bigger at the horizon than when they are at the zenith. The explanation for this phenomenon cannot be sought in atmospheric refraction; for, such refraction has the effect of causing not an enlargement, but indeed a slight diminution in the horizon sizes of the sun and the moon.[1] If we ignore this slight diminution, then there is hardly any change in the sizes of the images of these luminaries on the retina, as they move across the horizon. To explain this observation on purely geometrical grounds is thus impossible. The view that is generally held[2] seems to be that this illusion is an error of interpretation by the eye, which unconsciously adopts different scales for the measurement of objects in the sky according to their distances from the zenith. Due significance does not, however, seem to have been given in this connection to the sharp variation in the apparent luminosity of the sun and the moon when passing the horizon. The considerations set forth in this note would show that the tendency for the eye to employ diverse scales for the estimation of the sizes of the sun and the moon at the zenith and the horizon can be traced to the sharp variation in the apparent luminosity of those bodies as they move across the horizon.

For the sake of simplicity, we shall first consider the case of the setting sun. During the process of the apparent movement of the sun in the sky on any day, it is easily seen that the physical distance separating the earth from the sun is unchanged. The actual diameter of the sun is also an invariant quantity. The angle subtended at the eye by the sun is therefore constant, neglecting the slight detractive effect of atmospheric refraction. The apparent brightness of the sun in contrast with the background is, however, very much more at the zenith than at the horizon. For, as the sun nears the horizon, there is increasing absorption and scattering of the sun's light by the atmospheric constituents. As a result of this, the intensity of the light reaching the eye from the sun is reduced and the setting sun becomes increasingly red. The sun would thus seem to lose its brilliancy as it nears the horizon.

While investigating the apparent shape of the sky at sunset, the author has found that, with gathering gloom at sunset, the horizon appears gradually to drift into the distance.[3] In a recent paper on the apparent shape of the sky,[4] the author has put forward arguments for the view that the human eye tends to place darkening objects at increasing distances from the eye. The waning luminosity of the setting sun would thus incline the eye to feel the sun to be moving farther away.

The subjective estimation of the size of any object is based primarily on the angle subtended at the eye by the object and its apparent distance. If two spherical objects, both

equally bright but at different distances, subtend to the same angle at the eye, the eye has learnt to associate a greater size with the more disant object. Let us suppose that, while the angle subtended at the eye by the same object remains unchanged, its apparent distances increases. Then, the farther the object seems to recede, the bigger would be the size the eye would associate with the object. The sun subtends practically the same angle at the eye throughout its apparent journey across the sky but would seem to go farther away from the observer as its brightness decreases at sunset. This apparent increase in the distance of the sun from the observer, while the subtended angle remains virtually constant, would have the effect of causing the illusion of an enlargement in its size.

The setting sun appears largest when its luminosity reaches its minimal value. Further, on days when the sun's luminosity is greatly reduced, as by a hazy atmosphere, we feel the sun's apparent diameter to be correspondingly enhanced. The apparent enlargement of the setting sun may thus be an effect arising out of the variation of its apparent luminosity relative to the background illumination.

The over-estimation of the sizes of the rising sun or moon and the setting moon may be similarly explained as originating in the waxing or waning luminosity of those bodies. Again, the illusion of the full-moon looking larger than the sun though both these bodies subtend about the same angle on the average at the eye of an observer on the earth, may be attributed to the small luminosity of the moon compared with that the sun has at the same elevation above the horizon.

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1. Sir John Herschel, *Outlines of Astronomy*, 1878, 35. 2. Sir William Bragg, *The Universe of Light*. 1933, 62. 3. Venkateswara Rao, D., *Curr. Sci.*, 1946, **15**, 40–41. 4. —, *Effect of Illumination on the Apparent Shape of the Sky* (under publication).

## AN INSTANCE OF THE OCCURRENCE OF *MONILIA ALBICANS (CANDIDA ALBICANS)* IN DENTAL CARIES

It is nearly a century since informations on the nonascusporogenous and filamentous yeasts called "*Monilias*" began to accumulate, but we cannot as yet say that our knowledge regarding them has gone beyond a mere beginning of a systematic study. These micro-organisms have been shown to be associated with a number of pathological conditions and other habitats. From 1853[1] onwards scores of papers have been published in connection with these organisms, but no attempt will be made here to review all the important literature. The year 1923, however, marks an important date, as it is in that year that Berkhout[2] suggested the generic name *Candida* for these micro-organisms till then loosely classified among monilias. For it is recognized by all medical mycologists that it is incorrect to use the term monilia as a generic term. Benham,[3] however, is of the opinion that the name established by usage in medical literature be retained. Whatever generic term may be kept, it does not in any way minimize the intrinsic difficulties encountered in their identification or lower their significance in medical mycology. The more recent publications of Stelling-Dekker,[4] Langeron and Talice,[5] Lodder,[6] Martin *et al.*,[7] Langeron and Guerra,[8] Martin and Jones[9] and Conant[10] have, however, dispelled a great deal of difficulties and led to a more accurate recognition of these micro-organisms.

The monilias are usually associated with thrush, but recently they have been suggested to have a role in dermatoses and pulmonary diseases. They have been also isolated from cases of carcinoma, tuberculosis and even from individuals with no definite or demonstrable pathologic lesions. Even though it is not the intention of the present authors to assign any ætiological role to *Monilia albicans* in the occurrence of dental caries, nevertheless, this species had been once isolated from a case of dental caries of a molar in its third degree of decay.

The presence of this organism within the pulp of the tooth is interesting from more than one point of view. Firstly, even though yeast and yeast-like organisms have been associated with buccal flora, there is not in evidence, so far as these authors are aware, a case where monilia have been found within the tooth or associated with dental decay. Secondly, this organism was isolated from carious lesion after the tooth had been subjected to a drastic chemical sterilization process not hitherto employed for animal tissues, but which has been employed with success for isolating bacteria from the root nodules.[11] This process was employed with great success by the authors in connection with their work on dental caries[12] and in one case a monilia was isolated.

It was with great deal of difficulty that the isolated organism could be identified as monilia. It presented difficulties because of its slight but successive changes in morphological and cultural characters. When it was first isolated, it microscopically appeared exactly like a yeast—round or oval yeast-like budding cells that are rather irregular. Colonies were moist and creamy. But gradually the structure and consistency of the colonies changed, and dry well-developed "tree-like" mycelium with chlamydosphores became the feature of the colonies. In the beginning a smear could be made easily from the colonies and stained with any of the stains such as Loeffler's methylene blue; but when the transformation was complete, it was not possible to make a smear and constantly the morphological features had to be studied by the split-disc method of Vernon[13] and examined after staining with lactophenol. Such changes had been observed by several workers.

A complete physiological examination conducted on the lines recommended by Martin