

requires relatively warm conditions (68° F. or more) for spawning and good growth; thus it is not unlikely that the general conditions intervening between the north-west and the south of Africa have acted as a natural barrier to the spread of this species of oyster in a southerly direction.

It is not improbable, therefore, that the artificial transplantation of the Portuguese oyster into South African waters might add a valuable economic product to that region.

Whether private individuals would undertake an experimental venture of this kind is somewhat doubtful, and the Union Government would probably have to finance the experiment, at least in its early stages, if after due consideration the undertaking were considered economically promising. It is possible that transplantation might be successful, but the experiment an economic failure, unless the economic factors are carefully borne in mind.

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¹ NATURE, 123, p. 451, Mar. 23, 1929.
² J. M. Marchand, Report No. 7, Fish. and Mar. Biol. Survey, Union of South Africa, June 1929.

Deep Focus Earthquakes.

IN a report, issued by the Air Ministry and included in NATURE of Feb. 28 (p. 320), of an earthquake which was registered at Kew Observatory on Feb. 20, it was stated that the shock originated from a focus about 250 miles below the normal depth. It may be of interest to explain how it was possible to obtain this information from the records of a single station.

The first indication of deep focus was obtained from the comparatively feeble development of the surface waves. H. Jeffreys and others have pointed out that on theoretical grounds the amplitudes of surface waves should fall off very rapidly with increasing focal depth. For normal earthquakes the ratio of the maximum amplitude (as it appears on a Galitzin seismogram) of the surface waves to the amplitudes of the preliminary impulses is about 10 or 20. For the disturbance in question, the ratio is only about unity. It is difficult to recognise any well-defined maxima on the records.

The second indication is based on the results of an investigation which I have just completed and of which a detailed account will be published shortly. This research has shown that for earthquakes of deep origin, additional phases may be produced by reflection at points near the epicentre. To distinguish these waves from the ordinary reflected waves, *PP*, *SS*, etc., I have called them *pP*, *sP*, *sS*, etc. The times of transit have been calculated for various depths of focus. Some of these supplementary phases were recognised on the Kew records of the shock on Feb. 20 and confirmed the belief that the focus was abnormally deep. The estimate of the depth was obtained from the time intervals, which are as follows (*P* was recorded at 5 h. 44 m. 22 s. G.M.T.):

	Observed.		Calculated.	
	m.	s.	m.	s.
<i>pP</i> - <i>P</i>	1	19	1	24
<i>sP</i> - <i>P</i>	2	2	2	4
<i>S</i> - <i>P</i>	9	19	9	20
<i>sP</i> - <i>P</i>	11	47	11	48

The calculated times are those corresponding to an epicentral distance of 77.5° (5370 miles) and a depth of focus of 0.06 of the earth's radius (that is, 250 miles), greater than normal.

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The Audibility and Lowermost Altitude of the Aurora Polaris.

FROM his very interesting account of the various observations on the aurora borealis, Prof. S. Chapman¹ concludes that doubt still exists regarding the audibility and low altitude of some auroræ.

On Aug. 10, 1928, I was at Fort Smith on Slave River in the Canadian north-west (lat. 60° N.), and witnessed a remarkable auroral display in the evening, about 11 P.M. In my notes at the time, it was likened to waving curtains illuminated by a slowly moving searchlight. The day had been uncomfortably warm and the aurora was a surprise, as I had always connected it with low temperatures. It was also quite different from the auroræ I had seen in Nova Scotia many years before.

In the constantly changing tints of this aurora, green and, to a less extent, yellow were the most conspicuous colours. Time after time these coloured streamers moved slowly across the sky, frequently almost horizontally, each one gradually slackening speed until it came to rest, and its movement was clearly accompanied by a low hissing or swishing sound like that of gas escaping from a tap under pressure. The sound, too, gradually died down with slackening speed of the streamer. Several of us watched this display for more than an hour. We were on the deck of a small steamer at the riverside, from which the bank sloped steeply upwards for some hundreds of feet. This afforded some basis for estimating the height of the aurora, and it seems certain that it could not have been greater than a fraction of a mile. The fact that there was no perceptible lag between sight and sound, shows that the distance could not have been great.

Finally, this aurora was in striking contrast with others which I had witnessed as a youth in Nova Scotia in winter. These 'northern lights', as I remember them, consisted mainly at least of white light, and were often like the streamers from searchlights projecting upwards into the sky. They were sometimes accompanied by low crackling sounds, and gave the impression of being far away to the northward. Thus it appears clear that there are two quite distinct types of aurora.

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Mar. 9.

¹ NATURE, Mar. 7, 1931, p. 341.

Faraday Relics.

THE Institution of Electrical Engineers and the Royal Institution are combining to commemorate, in September next, the centenary of Faraday's discovery of electromagnetic induction, and in connexion with the celebrations an exhibition is being arranged at the Albert Hall.

The Royal Institution is contributing to this exhibition Faraday's original apparatus and illustrations of his experiments. In addition, it is hoped to arrange at the Royal Institution itself a smaller exhibition of relics of a more personal character.

The Managers of the Royal Institution would be glad to hear of personal relics, apparatus, and manuscripts of Faraday; and those who possess any such objects and are willing to lend them for exhibition are asked to communicate with the General Secretary, Royal Institution, 21 Albemarle Street, W.1.

W. H. BRAGG
(Director).

The Royal Institution,
21 Albemarle Street, London, W.1,
Mar. 18.