

is probably considerably greater than can be attributed to errors of measurement. Moreover, helium lines occur in connected series, and there is no justification for supposing that one of them would be represented in the absence of other members of the same series. The oxygen line 5330.84, which, it was pointed out, is nearly coincident with neon 5330.90, is one component of a triplet forming part of a series, and would not appear in the absence of the associated lines.

To my mind the proper conclusion to be drawn from the comparisons is that the respective spectra are quite distinct, and that the approximate coincidences are entirely accidental. A. FOWLER.

South Kensington, March 3.

The Influence of Icebergs on the Temperature of the Sea.

PROF. BARNES, in NATURE of February 20, gives an important piece of information which seems to me to enable us to clear up the confusion at present surrounding this subject, as it explains the reason for the different results obtained by Prof. Barnes in his earlier and later observations, and why his results differ from those of previous observers; and it also helps us to an explanation of the puzzle of the rising temperature of the sea on approaching icebergs, found by Prof. Barnes. The earlier observers made their tests in the cold but weak sea-water floating on the surface. Prof. Barnes's first tests were made at a depth of 5 ft. The first part of his curve, Fig. 1 (NATURE, June 20, 1912), gives the temperatures of the sea as the thermometer passed under the outer edge of the cold surface water, and was thus made in the ordinary sea-water, and gave the temperatures below the cold surface water, until the ship arrived within a mile of the iceberg, where the increasing depth of the cold surface water began to affect the thermometer, and from that distance, the thermometer being now in the cold surface water, the temperature fell rapidly as the ice was approached. The thermometer in Prof. Barnes's second ship, he tells us in his last letter, was placed at a depth of 18 ft. below the surface, and seems to have been always too deep to get into the cold surface water.

We now come to the question as to why these last observations of Prof. Barnes show a constant rise in the temperature of the water as icebergs were approached. We can scarcely imagine ice to have any heating effect, and solar radiation does not seem to meet the case. It would, however, appear that we do not require to call in the aid of sunshine, or other outside source of heat, to explain this rise in temperature, as it can be more simply accounted for by the indraught current near the surface having to dip below the cold surface water, its upper warmer water being thus carried downwards towards the thermometer. By this explanation there is no heating of the water as it approaches the iceberg, but the warmer surface water coming from outside the cold surface area is carried underneath the cold water to lower levels, so giving a rise of temperature at these levels.

If the above explanation be correct it would appear that the surface cold current is the one to be mainly depended on for indicating the presence of ice, because, unless there is some depth of cold surface water, there will be no depression of the inflowing current, and therefore no rise of temperature on approaching the iceberg. Perhaps the best method of observing would be to have two thermometers, one near the surface and the other at a depth of, say, 18 ft., writing on the same paper. Under ordinary conditions these two would show nearly a constant difference, but would

tend to diverge on the approach of ice, so checking each other, and magnifying the indications.

JOHN AITKEN.

Ardenlea, Falkirk, February 22.

Systems of Lines obtained by Reflection of X-Rays.

IN continuation of the experiments of Mr. W. L. Bragg (NATURE, December 12, 1912, p. 410), we have investigated the reflection of X-rays by mica and rock salt. In these experiments we found that in general two dark spots are obtained in consequence of the reflection, one of which is crossed by equally-spaced lines, which run at right angles to the plane of reflection. The distance between the different lines increased with increasing distance of the photographic plate from the crystal, and appeared greater with rock-salt than with mica. In some photographs the second spot was also striated.

The plates cut from the crystals were fastened down to aluminium foil 0.2 mm. thick. Successful photographs were only obtained with rays of grazing incidence, an angle of about 80° being used in most cases.

The regularity in which the fringes were distributed suggests that the phenomenon is due to interference. Further experiments are, however, required before this question can be definitely settled. Since Prof. Barkla and Mr. Martyn (NATURE, February 13, 1913, p. 647) have recently described similar results, it may be desirable to publish our preliminary results, of which a more complete description will soon be communicated to the German Physical Society.

E. HUPKA.

W. STEINHAUS.

Physikalisch-technische Reichsanstalt,
Charlottenburg, February 23.

Four-horned Sheep in Scotland.

So little seems to be known regarding the early occurrence of Scottish four-horned sheep that the following record will bear repetition. It occurs, almost as an aside, in the account of the parish of Moffat, in the lowland counties of Dumfries and Lanark, published in Sir John Sinclair's "Statistical Account of Scotland," vol. ii., p. 292, 1792. The writer of the account, Rev. Mr. Alex. Brown, says:—"It is not long since the sheep in this part of the country, were of the four-horned kind; a few of which, it is said, remain still in some parts of Nithsdale. Their body is smaller, but their wool finer than those of the present breed. Their want of weight for the butcher, and greater difficulty and danger in lambing have banished them from this place."

This lowland four-horned race agrees with the Hebridean in the characters of fineness of wool and smallness of body. It also appears to agree in the less tangible character of maternal inefficiency, for of an experiment carried out in a small Western Islands' flock in the Isle of Man a few years ago Prof. Wallace says ("Farm Live Stock," p. 521, 1907):—"The animals weighed only 5 lb. to 6 lb. per quarter, and they proved to be such indifferent nurses that they were eventually put away"—causes remarkably similar to those which "banished them" from south Scotland. At any rate, it would seem clear that the four-horned breed of sheep, the last remnants of which in Scotland were isolated on the Hebridean and Western Islands, had at a comparatively recent date considerable outposts on the mainland.

JAMES RITCHIE.

The Royal Scottish Museum, Edinburgh,
February 26.