degree distinct and forcible, not merely of the objects themselves, but even of the greatly altered intensities of light under which we view them. . . . Thus the imitation of Nature in the picture is at the same time an ennobling of the impression on the senses."

Let me congratulate you on the fact that here, at all events, the importance of physical science in its relation to art is not forgotten.

J. NORMAN LOCKYER.

LUMINOUS CLOUDS.

IN an article contributed to NATURE on November 20, 1890 (vol. xliii. p. 59), Herr O. Jesse (of the Royal Observatory of Berlin) gave an account of his observations of luminous clouds. He has recently submitted to the Prussian Royal Academy of Sciences a record of later work; and, as the subject is one of considerable interest, it may be worth while to translate his paper.¹

With regard to the results, already briefly noted, obtained in the summer of 1890, I have now to report more precisely, that with the help of the grant made by the Academy of Sciences we were able, during the period when the phenomenon appeared, to secure a collection of photographs which afford rich material for study.

On this as on previous occasions the clouds were visible only between the end of May and the beginning of August. They appeared for the first time, in 1890, on May 26; for the last time—and then there was only a feeble trace of them—at the beginning of August. The phenomenon, therefore, was seen within nearly four weeks of the summer solstice—before and after it—but chiefly after it.

Since my last report, I have received confirmation of the statement that the time when the phenomenon appears in the southern hemisphere has a corresponding relation to the summer solstice there. Unfortunately, however, more precise facts with regard to place, &c., in the southern hemisphere, are still lacking.

During the period between May 26 and July 24, 1890, we obtained altogether 180 photographs of luminous clouds at Steglitz, Rathenow, and Nauen, and at the Observatory of Urania, Berlin. Of these photographs, 75 are suitable for the determination of height, inasmuch as they were secured at the same time in at least two different places. Thirty of the photographs may be used for the determination of the speed and direction of the movements of the clouds, because their representations of the clouds were taken at proper intervals at one and the same place. The remaining photographs are adapted for investigations relating to the dimensions of the clouds and their structure.

The phenomenon was again less bright than it had been in the preceding year. Only when the atmosphere was exceptionally transparent was there an approach to the former brilliancy. The aggregations of these masses of particles are obviously becoming thinner, as may also be perceived from the more distinct appearance of certain relations of structure, like the ridge and rib formations (wave formations) mentioned in my last report. Formerly these were concealed by superposition and apparent interference of a greater richness of analogous strata; now the characteristic lines of the configurations consisting of these ridge and rib formations present themselves more simply and in greater isolation.

It has now been proved more successfully than before that the ridges or longitudinal strips lie parallel to, while the ribs or cross strips are almost at right angles to, the direction of the movement of the entire cloud. Further, we made on different days several series of measurements

of the distances of the ribs (wave-crests) from one another with the following groups of results:—

Mean value of the distances of	9 wave-crests	Kilom.
"	"	8.3
"	"	9.9
"	"	8.4
Average		8.9

Especially striking, last summer, was the difference between the clearness with which the clouds appeared in the morning hours, and that with which they appeared at the corresponding times before midnight.

With regard to the height of the luminous clouds in the summer of 1890 the measurements, so far as they were definitely calculated, gave the mean value of 82 kilom., agreeing almost exactly with the value of nearly 83 kilom., deduced from my photographs of 1889.

The persistence from year to year—now for the first time shown with sufficient accuracy—of the distance, and therefore of the position of the level surface of the phenomenon, would alone deserve to be recorded as a scientific fact of great importance.

As for the speed and directions of the movements, it was again found that the chief component of the movement was directed from east to west, and amounted to nearly 100 metres in the second, while the speed of the revolution of the zone of the earth above which the clouds were placed is about 240 metres in the second from west to east.

There was also a smaller and variable component in the direction of the meridian. This was directed from north to south at the times at which we have hitherto obtained tolerably secure determinations of movement.

The points of view from which the phenomenon of luminous clouds, on the ground of the observations hitherto made, is to be regarded, are already numerous. There is still, however, a wide field for research in connection with the questions, What are the forces which make the phenomenon appear chiefly in the morning hours? and, What is the nature of those forces which cause the movement of the clouds to be mainly from the north-east, and drive them from the northern to the southern hemisphere and back again? Then the question as to the height of the phenomenon in different latitudes is probably of great importance for the constitution of our atmosphere; and not less interesting is the question relating to the material of which the luminous clouds are composed. Unfortunately the interest taken by the scientific world in this remarkable phenomenon is in general so small that during the short time the phenomenon will probably present itself we can scarcely expect to obtain for these questions answers that shall be to any considerable extent satisfactory.

WILHELM EDUARD WEBER.

THE venerable physicist, Wilhelm Eduard Weber, whose death on June 23 we shortly announced last week, was born at Wittenberg on October 24, 1804, the second of three sons of Michael Weber, Professor of Positive Divinity at Wittenberg. He studied at the University of Halle, where Schweigger was then Professor of Physics; he took his Doctor's degree in 1826, became Privatdocent in the following year, and Professor-Extraordinary of Physics in 1828. In 1831 he was called to Göttingen to succeed Johann Tobias Mayer in the Chair of Physics, and remained there till 1837. Among other results of the death in this year of King William IV., there came about serious changes in the University of Göttingen. Queen Victoria being excluded from the throne of Hanover, by the operation of the Salic law, her uncle, Ernest Augustus, Duke of Cumberland, became King of Hanover. This prince held high views as to the

¹ "Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin," 1891, xxvi. Sitzung der physikalisch-mathematischen Classe, vom 28 Mai. "Untersuchungen über die sogenannten leuchtenden Wolken," von O. Jesse, Steglitz.