design. But in making these observations, I desire also to say, that, in my opinion, the question is not, as in most cases, a mere selection from several plans, but is reduced to the alternative of adopting the plan now suggested as the only one that has a chance of success, or the entire abandonment of the design, to mark the position of the dangerous shoal in question.

The plan of operations for the erection of the lighthouse calls for four and a half years, thus distributed: one year and a half in constructing and setting up and taking down the work at the foundry, and transporting it to the selected harbour of refuge and departure; the first season at the shoal in establishing the foundation section at the site: the second season in raising and bracing the pile-framing, and forming the iron work of the dwelling, &c; and the third and last season in finishing the interior of the dwelling, &c., completing the lantern, and setting up lighting apparatus, constructing hoisting-davits, &c., putting up fog-bell and striking-machinery, water and oil-tanks, &c, furnishing, painting, &c., and lighting. The plan of operations for the erection of the beacon covers three years, employed as follows: one year at the foundry in forming structures, &c.; the first season at the shoal in fixing the foundation section; and the second and last in building up and bracing the framing and forming the cage, &c.

Conceiving, as already remarked, that the placing of the foundation constitutes the main obstacle to a successful issue to the proposed project, a description of the operations to carry it out will be confined to an outline of what would probably be the course in regard to that measure. It is necessary previously, however, to state, that although there is as little as 8 feet at low water on the shoal, and an area of considerable extent within the two fathom curve at the same stage of the tide, it has been thought advisable to design the work for a point in a depth of 14 feet on the land-side, and midway of the length of its crest, which standing in the relation somewhat of a breakwater, will afford a partial protection to the work against the deep-sea wave It should also be stated that as Nantucket, the nearest harbour to the shoal, has but 6½ feet at low water at the entrance, Edgartown, the next nearest, with 15 feet at the same stage of the tide, is selected as the harbour of departure and refuge in the proposed undertaking.

The precise site of the work on the shoal having been marked out by disc-buoys, having mooring anchors laid down, &c., and the double section composing the foundation put together on the camels, a favourable state of the weather, with the wind offshore, should be taken to set out from the harbour—so timing the departure as to reach the shoal, distant, as already stated, forty-two miles, by the dawn of day. The time required to make the trip will depend, of course, on the speed at which the steam-tugs can tow the camels with their burden. This will probably be found to be somewhat between three and a-half and seven miles per hour; but this point should be settled previously, by one or more experimental trips off the mouth of the harbour. These trials may also be found necessary to ascertain how the camels carry in a sea-way, so as properly to adjust the burden on them, &c. As the draught of the foundation structure, as carried on the camels, is less by 2½ feet than the depth at low water at the point at which it is proposed to found the work, the arrival at the shoal need not be governed by the stage of the tide, though high-water is preferable, as all other conditions being the same, the swell of the sea, in consequence of the greater depth is then least. Having arrived at the shoal, the operation of depositing the foundation at the site is one which, in case the weather continues propitious, should require but little time to accomplish. As the plan of the work is based on a regular figure, and may consequently take any position relatively with the shoal, the steam-tugs should tow the camels into place on the direction of the current as it then runs, when the anchors will be let go, and the other appliances prepared for the purpose put in requisition, to moor them as immovable as the circumstance of the case will admit. The next proceeding in course is to flood the camels, and bring the foundation on the bottom, when the former may be drawn by the steam-tugs from beneath the latter. A full and well-instructed force, already occupying the work, will then commence sinking the structure by the application of the steam air-pump, by excavating the sand under the piles through the cones forming their feet, and continue vigorously to prosecute the operation until it descends to the required depth. Twenty-four hours of favourable weather, would, it is confidently believed, suffice for the complete and satisfactory accomplishment of this most novel proceeding; and even half that time to place the work in safety on the shoal against any ordinary contingency of weather, in case the state of it at the time should prevent the sinking of the cylinders. The great breadth of the structure compared with its height, and the absolute regularity of its figure, combined with its enormous weight, and the smallness of its surface exposed to the blow of the sea, all go to warrant a confidence in this belief.

Although the range for an elevation of 137 feet (the least height by the design of the focal plane above the level of the sea,) and the deck of an ordinary size vessel, is quite within the powers of the second order of lenticular lights, it is deemed advisable, in view of the importance of apprising navigators of the position of the shoal at the earliest moment, to provide in the estimate for one of the first order, which by the increased volume of light may not only be seen under a less favourable condition of the atmosphere, but also be distinguished aloft from ships of the largest class when actually below the horizon. The difference in the first cost of the two orders is about $3000, the difference in the maintenance about $350, annually—confined in the present instance, from the character and isolated position of the light, requiring no larger force, to the greater consumption of oil—say 250 gallons—and the slightly increased cost of the smaller accessaries.

On the Cause of the Aurora Borealis;

By Prof. A. de la Rive.*

When in June 1836, I published in the Bibliothèque Universelle a note on the origin of hail and atmospheric electricity, I already foresaw that the same cause would explain the aurora borealis, and the irregular and diurnal variations of the magnetic needle. As I had not then seen an aurora, I withheld at that time this application of the principles. Since then I have witnessed two fine auroras, and the appearances observed, especially during that of November 17, 1848, have confirmed my view of the nature of the phenomena, while they also accord with the observations of others, especially with those of Hansteen, Bravais and Lottin, and also with the many interesting details in Humboldt's Cosmos. My subsequent electrical experiments throw additional light on the origin of the aurora.

* Mem. Soc. de Phys. et Hist. Nat. de Genève, xiii, and Bib. Univ., xxiv, 337. Dec. 1852.