knowledge of the flow of time. This he can, with slight additional trouble, communicate to the external world, although wanting the means of promulgation to any great extent. Telegraphs, on the other hand, exactly supply this want, and can spread abroad in all directions the astronomer's information. Before the transfer of the telegraphs to the State, the successful working of the Greenwich system was due entirely to the existence of amicable arrangements entered into by both parties. But now that the time-signal system is, as it were, consolidated, it might well receive greater development. The principal clocks, and those of public institutions, in our large cities and towns, London included, should be more directly regulated than is at present the case by the automatic signals which can be so readily supplied by telegraph, and which might usually be received (as at Westminster) in the clock tower or chamber, for direct comparison with each particular clock. In large towns one wire could be made to serve for many buildings, and the cost for each thus greatly reduced.

The efficient regulation of public clocks in the way mentioned is however a thing entirely for the consideration of the municipal bodies in the various cities and towns concerned. But it is otherwise with the question of the establishment of signals on our coasts for the giving of Greenwich time to outward-bound or passing vessels. This is a matter not merely of local, but of national interest; and, since the whole subject of the safety of our ships at sea is now under the consideration of the Imperial Legislature, it seems a proper time to direct attention to the usefulness of such coast-signals, as tending directly to the improvement of navigation, and thereby contributing in an important degree to the further protection of shipping.

MIGRATION AND HABITS OF THE NORTHERN LEMMING

WITH all our recent knowledge of the Northern Fauna, and the ample opportunities of the Scandinavian naturalists, the animal in question still seems to have evaded a thorough scrutiny and complete solution of the why and wherefore of its remarkable migrations. Ten consecutive summers spent in Norway have led Mr. W. Duppé Crotch,¹ in studying the creature, to propound a novel view as to the impetus of its recurrent irruptions. Passing by the traditional lore respecting its sudden appearance in myriads, he discounts the later informed writers' explanation of hunger, or of the approach of severe weather, being the cause. Even "survival of the fittest," with its cogent subsidiary clauses, according to our author, fails to serve as a substantial reason, for, as he observes, none of the travellers survive. His own theory is a very simple one. The bands of migrants always head westward, and at last, in diminished numbers, perish in the sea. In one well authenticated instance (Collet), a ship sailed for fifteen minutes through a swarm, the water being literally alive with them far as the eye could reach. This migratory instinct, Mr. Crotch assumes, is hereditary, their progenitors in the good old times of geological age having sojourned in a land of plenty, now submerged beneath the Atlantic. According to him the migration is not all completed in one year, as formerly supposed, nor do they, as stated, form processions and cut their way through obstacles; but breeding several times in the season, they gather in batches, and at intervals make a move westward. Their pugnacity, he states, is astonishing, and the approach of any animal, or even the shadow of a cloud, arouses the anger of this small creature like a guinea-pig, and they back against a stone or rock uttering shrill defiance. Our author found, in most examples, a bare patch on the rump, due to their rubbing against the said buttress of

support when at bay. He wonders why a bare patch, and not a callosity, should not result from this innate, apparently hereditary habit. They cross wide lakes by swimming, but when in the water they are easily frightened, and lose all idea of direction, and are inevitably drowned by a slight ruffling of the surface. It seems the reindeer trample them under foot whenever the chance may occur, and other enemies in the shape of hovering rapacious birds and small carnivora thin the numbers considerably as the Lemmings in force drive westward. The writer also called attention to the fact that fossil remains of the Lemming exist in England, as an evidence that the animal had penetrated hither before this island was severed from the continent. The subject altogether is a most interesting and suggestive one, well worthy of the investigation and observation of northern sojourners. Even the recent views of Mr. Crotch, it seems, does not set the whole question at rest. There possibly may be some physical or physiological reason underneath; at all events it is certainly remarkable how a settled westward course is that chosen, calling to mind the similar direction which races of men are assumed to follow.

THE SEYCHELLES ISLANDS¹

THE Report mentioned below is dated 20th May, 1875, and refers to two visits made to the Islands of the Seychelles group in 1871 and 1874. The islands visited by Mr. Horne were Mahé, Praslin, Silhouette, La Digue, Félicité, Curieuse, Aux Frégates, St. Anne, and Aux Cerfs. The soil, climate and products of the islands are very similar, so that the remarks made are equally applicable to all of them. The climate is healthy, although the islands are situated almost under the equator, and the Cascade Valley in Mahé which is at an elevation of 1,500 feet above the sea, is pointed out as being especially delightful. The seasons are two, the warm and wet, during the north-west monsoon, from October to April; and the comparatively cool and dry season from April to October. The rainfall during the year is about 96 inches, most of which falls during the wet season.

Some of the islands have high mountain peaks, as Mahé, with an elevation of 3,000 feet, and Silhouette with an elevation of 2,500 feet; the highest land in the other islands is less than 1,500 feet. Lagoons often exist between the base of the mountain and the flat sandy beaches which exist in all the islands. In former times crocodiles were abundant in the lagoons, but they have now been extirpated.

The islands are granitic with veins of trap. Coral reefs are abundant but of small size, the largest being on the north-east of Mahé, and the north-east and south-west of Praslin. The surface of the islands is mountainous and undulating. Granitic boulders are common, and are most numerous near the mountain tops and in the bottom of ravines. The soil is rich and capable of producing any kind of crop peculiar to the tropics. In many places, however, the soil has been washed away, and some of the islands are almost bare rock. There is much uncultivated land, the greater proportion of which is good, but according to Mr. Horne, the people are either too lazy or too poor to cultivate it.

The chief produce of the islands is cocoa-nut oil and fibre. The plantations of cocoa-nut palms are increasing, and many of the young plants are now bearing, which they do when ten or twelve years old. The value of a plantation in full bearing is about three shillings per tree per annum. The oil is extracted by the old primitive mill which has been used in Ceylon and elsewhere for hundreds of years. The fibre is extracted by machinery and will soon

¹ Report on the Seychelles Islands. Addressed to the Honourable the Colonial Secretary, by J. Horne, Sub-Director Royal Botanical Gardens, Mauritius.

¹ In a paper read before the Linnean Society, May 4.

form an important item in the exports from the country. The cocoa-nut thrives very well in the Seychelles, and plantations exist from the sandy beaches up the slopes of the mountains to elevations of from 1,000 to 1,500 feet. Tobacco was formerly much cultivated, and was of very fine quality, but the imposition of a tax on tobacco seems to have stopped the cultivation, and Mr. Horne says "the value of the tobacco grown would scarcely suffice to pay the tax, independently of the return which might be expected for their labour." Sugar-cane is cultivated to a small extent to make rum, but although the canes are magnificent, the yield of sugar is small and unremunerative. Cotton also grows remarkably well, but the cultivation has died out since the abolition of slavery, owing to the want of labour during the picking season. The chocolate plant grows freely on waste lands, and its culture is progressing. Vanilla has been planted in several places, and these plantations will shortly be bearing.

Maize and rice are but little cultivated, although in some places two crops of the latter might be obtained each year.

Spices, as cloves, cinnamon, nutmegs, allspice, and pepper thrive well. Clove trees are abundant and attain a height of 40 to 50 feet. The islanders gather the cloves in a reckless and extravagant manner, often felling the trees when the cloves might be reached by a bamboo ladder. The cinnamon is the bitter cinnamon, and is comparatively worthless. The nutmeg and allspice trees were introduced in 1871, and here thrive well. Pepper (*Piper nigrum*) is abundant, climbing over the granite boulders like ivy, and much might be made of it if a few Chinamen or Malays were introduced. Vegetables are very scarce, chiefly from the indolence or indifference of the inhabitants. Manioc and sweet potato are abundant, but yams are very little cultivated. The inhabitants obtain most of their food from the *Colocasia esculenta*. Arrowroot has been planted, and ginger, turmeric, and cardamoms might be easily cultivated. Mr. Horne recommends the rearing of silkworms and the cultivation of coffee. Mulberry-trees grow very readily, and coffee seems formerly to have been cultivated. The only drawback seems to be the want of labour. Pine-apples are abundant but of inferior quality, while oranges are common and excellent. Limes and bigarades are not uncommon, and lime-juice was formerly manufactured to some extent. Other tropical fruits, as ananas, bread-fruit, &c., are common.

During Mr. Horne's two visits he collected about 400 species of plants. About half that number are plants inhabiting all tropical countries, the greater portion of the other half will find congeners in Madagascar, Eastern Tropical Africa, Southern India, the Malay, Polynesian, or Oceanic Islands. The Flora of the Seychelles has no affinity to that of the Mauritius, and Mr. Horne considers that the relations to the Flora of Madagascar will be important from the similarity of geological formation and climate. He also thinks that the Seychelles Flora will have much in common with that of Eastern Tropical Africa. Mr. Horne's specimens have been sent to Kew, and will doubtless be described in the forthcoming Flora of Mauritius and the Seychelles. The Flora seems small, but vegetation is in many places scarce, owing to the occurrence of fires and from the ravages caused by the reckless felling of trees. Much of the ground is covered with dry Palm and Pandanus leaves, which easily take fire. The fire-tracks are readily distinguished by the age of the trees and shrubs now found growing on them.

The palms of the Seychelles are very interesting. The first is the Coco-de-Mer or Double Cocoa-nut. It abounds at Praslin, in a ravine, the highest trees measuring from 80 to 90 feet. The tree growing near the Government House at Port Victoria has flowered for the first time at about its thirty-fourth year. The other native palms of

the Seychelles are all *spiny*, viz., a species of *Areca*, *Stevensonia grandifolia*, *Verschaffeltia splendida*, the "Lataniér Haubbaum," and another undescribed species. *Areca rubra* (?), *Hyphane* sp., and *Latania rubra* or *Borbonica*, have probably been introduced.

Articles, as hats, &c., of almost infinite variety are made from the young leaves of the Coco-de-Mer. The leaves of *Stevensonia* are used for thatch, and the split stems of *Verschaffeltia splendida* make excellent palisades. Ropes are made from the leaves of *Curculigo Sechellarum*, and fibre for cordage is got from *Paritum tiliaceum*. The fibre of *Fourcroya gigantea* (recently introduced) is made into fishing lines. The gum copal of Madagascar is got from *Hymenaea verrucosa*, a rare tree in the Seychelles.

Many useful timber trees are met with. The chief are the following:—

- "Capucin," a species of *Sideroxylon*.
- "Takamaka" (*Calophyllum inophyllum*).
- "Bois de Fer," a species of *Dipterocarpea*.
- "Gayac" (*Azalia bijuga*).
- "Badamier" (*Terminalia badamier*).
- "Bois de Natte" (*Imbricaria petiolaris*).
- "Bois Marée," a species of *Gomphandra*.
- "Bois Rouge" (*Wormia ferruginea*).
- "Bois de Table" (*Heritiera littoralis*).
- "Sandal," a species of *Rubiaceae*.
- "Bois Montagne" (*Campnospermum Zeylauncum*).
- "Cèdre" (*Casuarina equisetifolia*).

Mr. Horne carefully describes the uses of these timber trees.

The ordeal nut of Madagascar (*Tanghinia venenifera*) is met with in the Seychelles. It is a small tree about twenty feet in height, with large clusters of pretty white flowers having a pink centre.

Pigs are fed on the boiled roots of the *Colocasia macrorrhiza*; all parts of the plant are poisonous if unboiled.

Pitcher plants, *Pandani*, and species of *Loranthus* are common; Ferns are tolerably numerous, and include the *Cyathea Sechellarum*, *Angiopteris evecta*, &c.

Mr. Horne recommends the Government to purchase the Coco-de-Mer ravine, to prevent the destruction of the trees, and he very properly adds, that "the destruction of the trees would be an outrage on science and a disgrace to civilisation."

Trees seem to be felled quite indiscriminately—a portion of the tree selected, the rest left to rot—so that now good trees are only to be found in the most inaccessible parts of the mountains. We trust that Mr. Horne's report will not be overlooked by the authorities; otherwise we may soon expect to hear that the Seychelles are merely barren rocks and every trace of vegetation gone.

W. R. M'NAB

THE LOAN COLLECTION CONFERENCES

SECTION—PHYSICAL GEOGRAPHY, &c.

Opening Address by the President, John Evans, F.R.S.

IN opening the Conferences in connection with this Section of the Loan Exhibition of Scientific Apparatus, it will probably be expected that I should say a few words, if only by way of explanation, of the class of subjects that come within our range, which indeed are neither few nor unimportant. Let me first take the general list of subjects which have on the present occasion been grouped together, and which may be said to constitute our domain. These are Meteorology, Geography, Geology and Mining, Mineralogy, Crystallography, &c. Some of these subjects might no doubt with almost equal propriety have been assigned to other sections. Meteorology might for instance have been classed under the head of Physics and Mineralogy would not have been altogether alien to