

middle of the north part of the passage between Java and Sumatra, a passage which has formed an important commercial route. The strait is about seventy miles long and sixty broad at the south-west end, narrowing to thirteen miles at the north-east end. The island, seven miles long by five broad, lay about thirty miles from the coast of Java; and northwards the strait contracts like a funnel, the two coasts in that direction approaching very near to each other. A few weeks ago, as we intimated at the time, the volcano on the island began to manifest renewed activity. The whole region is volcanic; Java itself having at least sixteen active volcanoes, while many others can only be regarded as quiescent, not extinct. Various parts of the island have been frequently devastated by volcanic outbursts, one of the most disastrous of these having proceeded from a volcano which was regarded as having been long extinct. The present outburst in Krakatoa seems to have reached a crisis on the night of Aug. 26. The detonations were heard as far as Soerakarta; and ashes fell at Cheribon, about 250 miles eastwards on the north coast of Java. The whole sky over western Java was darkened with ashes; and, when investigation became possible, it was found that the most wide-spread disaster had occurred. The greater part of the district of North Bantam has been destroyed, partly by the ashes which fell, and partly by an enormous wave generated by the wide-spread volcanic disturbance in the bed of the strait. The town of Anjer, and other towns on the coast, have been overwhelmed and swept away; and the loss of life is estimated at 100,000. The island of Krakatoa itself, estimated to contain 8,000,000,000 cubic yards of material, seems to have been shattered, and sunk beneath the waters; while sixteen volcanic craters have appeared above the sea between the site of that island and Sibisi Island, where the sea is comparatively shallow. The Soengepan volcano has split into five; and it is stated that an extensive plain of 'volcanic stone' has been formed in the sea, near Lampong, Sumatra, probably at a part of the coast dotted with small islands. A vessel near the site of the eruption had its deck covered with ashes eighteen inches deep, and passed masses of pumice-stone seven feet in depth. The wave reached the coast of Java on the morning of the 27th, and, thirty metres high, swept the coast between Merak and Tjiringin, totally destroying Anjer, Merak, and Tjiringin. Five miles of the coast of Sumatra seem to have been swept by the wave, and many lives lost. At Tadjong Priok, fifty-eight miles distant from Krakatoa, a sea seven feet and a half higher than the ordinary highest level suddenly rushed in, and overwhelmed the place. Immediately afterwards it as suddenly sank ten feet and a half below the high-water mark, the effect being most destructive. We shall probably hear more of this wave, as doubtless it was a branch of it which made its way across the Pacific, and that with such rapidity that on the 27th it reached San Francisco harbor, and continued to come in at intervals of twenty minutes, rising to a height of one foot for several days. The great wave generated on May 10, 1877, by the earthquake at

Iquique, on the coast of Peru, spread over the Pacific as far north as the Sandwich Islands, and south to New Zealand and Australia; while that at Arica, on Aug. 13 and 14, 1869, extended right across the Pacific to Yokohama (*Nature*, vol. i. p. 54). It is misleading to speak of such waves as tidal: they are evidently due to powerful, extensive, and sudden disturbances of the ocean-bed, and are frequently felt in the Pacific when no earthquake has been experienced anywhere, though doubtless due to commotions somewhere in the depths of ocean. So far, these are all the facts that are known in connection with this last stupendous outburst of volcanic energy. It has altered the entire physical geography of the region, and the condition of the ocean-bed. The existing charts of the strait, with their careful soundings, are useless for purposes of navigation; and, when quiescence is restored, a new series of soundings will be necessary. Doubtless the results of the outbreak will receive minute attention at the hands of the Dutch government; and, when all the data are collected, they will form valuable material for the study of the physical geographer.

LETTERS TO THE EDITOR.

Humblebees vs. field-mice.

IN SCIENCE of Sept. 7 the vice-president of section F (biology), in his address of Aug. 15, referring to the aid given by humblebees in fertilizing *Trifolium pratense*, is reported as saying, "Humblebees prefer to raise their colonies in old nests of meadow-mice. I mentioned in my last report, that it had been suggested that we should not keep many cats, nor allow hawks, foxes, or dogs to catch these mice; for they make nests which are quite necessary for the humblebees, which help fertilize our red clover, and thereby largely increase the yield of seed."

I would beg leave to differ from the author of the suggestion referred to, on the ground, that, if carried out, the effect produced would be apt to be quite the contrary of that intended. As field-mice prey upon the nests and combs of the humblebees, acting as a great check to their increase in numbers, the greater the precautions taken to prevent the killing of the mice, the greater would be the tendency towards the extermination of the humblebee, and therefore the less would be the yield of seed, resulting from the lack of aid rendered by these insects in fertilizing the red clover.

In support of my objection, I would refer to Darwin's *Origin of species*, sixth edition, third chapter, where, under the head of "Complex relations of all animals and plants to each other in the struggle for existence," he says, "The number of humblebees in any district depends in a great measure on the number of field-mice, which destroy their combs and nests; and Col. Newman, who has long attended to the habits of humblebees, believes that 'more than two-thirds of them are thus destroyed all over England.'" E. NUGENT.

Pottstown, Penn., Sept. 15, 1883.

The influence of winds upon tree-growth.

I observe that in the vicinity of Cambridge and Boston, wherever the common New-England elms stand in a moderately isolated site, and one exposed to the wind, they lean, in a large majority of cases, trunk and all, to the south-east. This is true, also,

to a less extent, of maples; but the oak, ash, poplar, and pine stand sturdily erect. I believe the leaning of the elastic-fibred elms is due to the prevailing winds, which are from the west and north-west, these winds being also the strongest and coldest. At the office of the U. S. signal-service in Boston, observations are taken three times a day. In 1882, out of 1,095 observations taken, 298 showed the wind to be in the west, and 225 showed it to be in the north-west: in other words, about half (or forty-seven per cent) of the observations showed the wind to be somewhere between west and north-west. For the other five years the record is as follows:—

1877.	1878.	1879.	1880.	1881.
247 W.	229 W.	273 W.	301 W.	278 W.
169 N.W.	231 N.W.	257 N.W.	153 N.W.	175 N.W.

So much for the prevailing direction of the wind. There seems to be no other cause than this, to which we can assign the phenomenon of growth in question. All the many exceptions to the rule are to be explained, doubtless, by local causes, — shelter, neighborhood of other trees, and other more occult conditions of fibre. The works on forestry and botany seem not to notice the fact of asymmetry in tree-growth. It is only a repetition, on a larger scale, of the graceful deviation from monotonous symmetry which characterizes all leaf and branch structure.

W. S. KENNEDY.

Importance of lime-juice in the pemmican for arctic expeditions.

The recent failure to relieve the party under Lieut. A. W. Greeley at Lady Franklin Bay leads us to recur to the repeated difficulties which have marked the history of former arctic expeditions. We have re-examined the accounts of the English expedition of the Alert and the Discovery, under Nares and Stephenson, which left England, May 29, 1875. It was the first English arctic expedition which had orders to endeavor to reach the North Pole. It had the advantage of the advice of experienced arctic navigators, its commander Nares having been a member of several such expeditions.

Thus it surprises the reader, that more thorough precautions were not made against the scurvy. The *London quarterly review* for January, 1877, has the fullest account of the ravages committed by that disease with the sledge-parties sent out by Nares. Of the sledge-party under Commander Parr it says,—

"Of seventeen of the finest men of the navy, who composed the original party, but five were (on return) able to walk along-side. One was dead, and the remainder in the last extremity of illness."

It gives a minute account of the prostration by scurvy of the two other sledge-parties, — one under Commander Beaumont, and one under Commander Aldrich. Concerning the latter, the *Review* says, —

"To quote from the journal of Commander Aldrich, who led the western division, would be to repeat the same dreadful details. The party broke down, and were supported by the same pluck, and brought back alive — that is all one can say — by the help of God and the same determined courage. Surely, nothing finer was ever recorded than this advance of three sledges, — one to the north, another to the east, a third to the west, — laden down with sick and dying men, in obedience to an order to do their best, each in their separate direction. It is the old story, — too common in English annals, — the organization broke down, and individual heroism stepped in to save the honor of the day. But at what a cost!"

All this was because the parties had no lime-juice. And Capt. Nares, "with a chivalry and candor which do him honor, whether he has failed in judgment or not, declared that such was the fact, and that the omission was made by his orders and on his responsibility." He said, —

"Acting on my lights and experience at the time, I followed the example of such men as M'Clintock, Richards, Michan, and McClure, of the Investigator, and started off our sledges with as nearly as possible the same rations as had proved fairly successful on all previous occasions; that is, without lime-juice for issue as a ration, a small quantity for use as a medicine being carried by the sledges, which were not expected to be able to obtain game. . . . Up to the middle of May the lime-juice remains as solid as a rock. No sledge-party employed in the arctic regions in the cold month of April has ever been able to issue a regular ration of lime-juice. In addition to the extra weight to be dragged, that its carriage would entail, there is the even more serious consideration of the time necessary in order to melt sufficient snow."

He added, —

"Of course, hereafter, lime-juice in some shape or other must be carried in all sledging journeys; and we earnestly trust that some means will be found to make it in a lozenge, for, as a fluid, there is, and will always be, extreme difficulty in using it in cold weather, unless arctic travelling is considerably curtailed."

The *Quarterly review*, in quoting these manly remarks of Capt. Nares at Guildhall, says, —

"Even if it should be found that Sir George failed in judgment in this matter, he has in our opinion shown the finer form of fitness for command, in his readiness to assume the responsibility of his acts."

His frankness and manliness in assuming the whole blame to himself have evidently, in great measure, disarmed criticism.

But this brings us to the main object in this letter; and that is, to recur to the remedies which this story has suggested. If lozenges of lime-juice in a shape for arctic exploration have not been manufactured, they certainly can at least now be found at the druggists in a shape to be used as troches for colds.

But the efficient remedy is to have pemmican made which is permeated with lime-juice, as recommended in the 'Report of the surgeon-general of the navy for 1880' (see p. 356). Gen. P. S. Wales said, —

"The indispensable necessity of lime-juice in the sledging-parties, and the difficulties of carrying it, and preparing it for use, induced me to suggest the propriety of combining the juice and pemmican in the proportion of one ounce to the pound of the latter. The pemmican is greatly improved in taste and flavor, and will, I believe, be more assimilable. This is an important modification, as there are persons who cannot eat the ordinary article."

The article was prepared as proposed, and tried in Washington, and pronounced to be very palatable.

Gen. George H. Thomas, in preparing for one of his battles, issued a general order, enjoining upon his whole army strict attention to minutiae, saying that "the loss of a battle might be due to one missing linchpin."

In recurring to this recommendation from the office of the surgeon-general of the navy, we have thought that it may be considered opportune, when the minds of many are now turned upon the arctic expeditions. We think that recommendation was followed, so far as the preparations of the Jeannette and the Rodgers were concerned; but, alas! they never got so far as to turn their attention to fitting out explorations with sledge-parties.

BENJAMIN ALVORD.

Rensselaeria from the Hamilton group of Pennsylvania.

Will you kindly afford me a small space to correct an error in your report of the discussion which followed the reading of my paper at Minneapolis? On p. 327 of your issue for Sept. 7 occur the following sentences: —