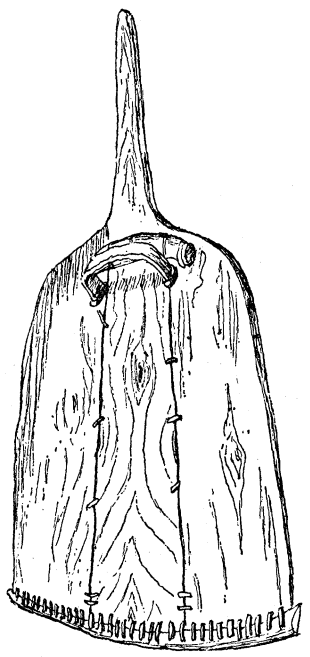
as perfectly air-tight as the body of the snow-block itself. An active Innuit will go completely around the igloo on a single joint in about a minute, and it seldom takes over ten to do all the chinking in a large hut. This part is generally assigned to the boys and women, especially the former, who are much lighter, as it is necessary to go on top to complete their work. A well-built igloo, however, will readily bear the weight of two large men on their hands and knees; and yet I have seen a small boy fall through one made of friable snow.

Meanwhile the boys and women have been busy throwing the loose snow from the trenches, and piling it on the house, often following closely upon the work of block-laying, covering the whole to a depth of from six inches to half as many feet. The depth to which this is carried depends on the length of time they expect to use the hut, and on the temperature.



THE SNOW-SHOVEL.

The common pictures of the huts, showing the block-work so conspicuously, are largely the work of the imagination of the artists, all that is seen being rounded heaps of rough granular snow. Such artistic license may, however, be allowable to show the essential features; and, so far as my criticism is concerned, I do not wish to be understood as saying that such uncovered igloos never occur.

I have spoken of the snow-walls, when chinked, as being perfectly air-tight. This is not strictly correct; the snow being more or less porous, and allowing a slow but ample current of air to pass through. In fact, at night the door is sealed, and the only means of ventilation is through the body of the snow.

In 1879, during a heavy north-east gale, I was in an igloo on the west bank of Back's River. The walls were of a granular snow, but were covered to a depth of three or four feet. Yet, with all this thickness, a candle-flame held near the wall on the windward side was deflected constantly at an angle of from thirty to thirty-five degrees from the vertical.

The banking is done with a snow-shovel made of half-inch boards, tapering off to a short handle for one hand: a bent piece of musk-ox horn fastened in at the centre furnishes a hold for the other. The cutting edge is protected by a sharpened shoe of reindeer-horn, neatly bound on with reindeer sinew, which is also used to sew the boards together. The Netschilluks use shovels of cedar, walnut, and mahogany from Franklin's ships.

*(To be continued.)*

## *MINNESOTA WEATHER.*

MUCH has been said about the sanitary properties of the climate of Minnesota as a healing-place for the consumptive; and in this connection a great deal of erroneous information has been published, often to the serious injury of the invalid, who is misled by it. As might be expected, the newspaper is the principal agent in the dissemination of such literature. Here is an extract from the editorial page of the St. Paul and Minneapolis *Pioneer press*, the leading journal between Chicago and San Francisco: —

"Of the aid that may be given by a pure, rarefied, and dry atmosphere, thousands of people now living in Minnesota, who have been rescued from impending death, can bear substantial and grateful testimony."

Written in the haste of a newspaper office, by one who is practically pledged to the laudation of his state, as the western editor is, such a paragraph would scarcely deserve notice, were it not a summation in brief of some of the most popular errors afloat on this subject, and which one meets with everywhere in that land, from the drawing-room gossip to the medical journal. As such, it may profitably serve as text for analysis.

In the matter of pure air, Minnesota is not different from other northern states in which the face of nature has been moiled by the

hand and habitation of man. On the prairies and in the pine-woods the atmosphere yet retains a large share of its pristine purity: in the cities it is the reverse. Especially is it vitiated in the large and rapidly growing cities of St. Paul and Minneapolis, whose systems of water-supply, drainage, garbage-removal, and sanitary inspection, cannot keep pace with their increase of population. This fault will be remedied in time, however, when the authorities shall have learned that the doubling or trebling of a city's people in a decade brings with it new responsibilities as well as new prosperity. It is an easy and pleasant thing to boast that one's town is gaining population at the rate of a thousand a month, and that the values of real estate are rising accordingly; but the real-estate owner is slow to appreciate the necessity of advancing the salaries of city officials, and the appropriations for city improvements, with corresponding alacrity. Minneapolis, although built upon the flat surface of the prairie, has admirable opportunities for drainage into the adjoining gorge of the Mississippi River; but its dilatoriness in this and other works of sanitary improvement has been severely punished by the scourge of typhoid-fever. The prevalence of this disease has caused Minneapolis at times to stand at the head of the column of death-rates of the cities of the United States. While there may be malaria in Minnesota, — and, indeed, the term is sometimes found in the reports of the physicians, — it is by no means the popular disease that it is in the south and east, where it is almost the fashion. A person may spend a year there without hearing the word mentioned; and that immunity alone should be enough to stimulate emigration in that direction.

Dryness of atmosphere is claimed for Minnesota; and if we consult only the amount of rainfall, whose annual value ranges from twenty to forty inches, there is apparent justice in this claim. But the manner as well as the amount of the pluvial precipitation must be considered. They have in that state a good deal of the lachrymose English weather, in which a drizzling dampness takes the place of the short, sharp, and decisive showers of equatorial lands. At the close of a rainy day the observer will go to his rain-gauge, and find its bottom scarcely covered. The effect of effort without accomplishment is always a depression of spirits in the looker-on; and this rule is never truer than when applied to a rainy day. Those who spent the month of October, 1881, in Minnesota, will remember it as a season of almost continual storm, during which, even when there was no absolute rainfall, there was an unwholesome mist floating in the air. Occasionally the sun shone, but not with sufficient power to make an impression. Farm-labor was almost suspended. The potatoes rotted in the ground, and the wheat grew in the stack. The streets of Venice were scarcely more liquid than the streets of St. Paul. Danger-signals were erected in the fashionable avenues to warn teamsters away from fathomless depths of mud. Hackney-coaches were stalled there, and their horses were detached, leaving the vehicles to be extracted by the processes of engineering. So impassable were the roads, that the fuel-supply was unequal to the demand, and invalids were obliged to go to bed to keep warm, and public schools were closed because their pupils were frozen out.

Still the rainfall of this month was less than four inches and a half. Many a single shower in the warm latitudes precipitates an equal amount of water. Indeed, there are records of rains in which as much water has fallen in one day as falls in Minnesota during the year; but, as a light rainfall does not necessarily mean a dry atmosphere, neither does an excessive precipitation invariably make a wet one. The water may flow away quickly, leaving no sign; and the next day the sun may shine as brightly as ever. Better, therefore, for the lungs, is an occasional drenching than a perpetual drizzle. While it must be admitted that the weather of the October just quoted, although not so bad as that of the September preceding, was yet exceptional in the extreme, still such exceptions could hardly occur in a very dry climate.

The student of physical geography would scarcely expect to find the climate of Minnesota a dry one. An average of such statistics as the writer has at hand indicates that rain or snow falls at least every third day in St. Paul. The state is almost directly under the influence of the Great Lakes, and is itself threaded with rivers, and dotted with lakes. Of the latter there are eight thousand worthy of the name, besides innumerable ponds. Two large river-systems receive their waters from the drainage of this region. The swamp-lands of the state play an important part in its area, as the maps of the land-office show. A large share of its forests are afloat upon ancient marshes. Cranberries and rheumatism abound. The Red River region is celebrated for its floods. At one time that stream was popularly said to be thirty miles wide; and

the traveller down its valley was obliged to proceed by alternate stages of land and water, the steamboat being utilized when the railway-cars began to swim. Then it was that the facetious pilgrim from St. Paul to Winnipeg was, according to his habitual description of the journey, three days out of sight of land. It was a joke, to be sure; but such jokes are not heard in a dry climate.

The moisture of the atmosphere of Minnesota is the salvation of the state: it makes agriculture a possibility and a success. Given the same amount of rainfall in another latitude, and under more arid climatic conditions, and her wheat-fields would be blighted. As it is, her scanty rains, with the exception of a few showers in summer, fall slowly and gently; in times of drought the thirsty air freights itself with moisture from the abundant water-surface of the state; and these sources of humidity are re-enforced by the prolonged irrigation resulting from the melting of the winter snows and the thawing of the frozen ground in spring.

The beneficial effects of an unclouded sun in the treatment of consumption may, perhaps, be overrated. The dweller in a rainless atmosphere, dazzled by the perpetual brightness, and with lungs parched by the heat and dust and dryness of the air, might come at last to long for an occasional rainy day, as the traveller in the desert longs for the shadow of the palm. But, at any rate, our weather bureau could scarcely do better work than to give us a 'sunshine map,' upon which the statistics of hourly observations the year round, upon the state of the sky, should be graphically portrayed. Such frequent observations could be taken without inconvenience, as it would not be necessary for the observer to remain at a fixed station for that purpose. Such a map would show by depths of shading the relative amounts of sunshine and cloud at any place; and the invalid could select at a glance a residence which would have the desired proportion of these conditions. The complexion of Minnesota upon such a map would probably not vary widely from the average.

As has been seen, there is also a popular belief that the air of Minnesota is in a very rarefied condition. In the interests of meteorology, that superstition must be met and combated. The only cause of rarefaction of atmosphere worth considering here is elevation above the sea. Minnesota, as one might guess from its position in the Mississippi valley, is a low country. The mean elevation of the United States above sea-level is about twenty-five hundred feet. The average elevation of Minnesota is considerably less than half that number. Indeed, its 'height of land' falls much below twenty-five hundred feet. Therefore a large proportion of visitors to that state move into a heavier atmosphere than that which they have left; but unfortunately they do not know that fact, and, under the influence of their imaginations, they find their breath wonderfully shortened. The elevation of St. Paul above the sea is seven hundred or eight hundred feet; that of the plateau region of New York is from a thousand to two thousand feet. I once knew a lady to remove from the latter to the former place, thus going down hill and into a denser atmosphere. Arriving in St. Paul, she could with difficulty climb a flight of stairs, owing to the lightness of the air, as she expressed it. When informed of her mistake, she was indignant, and resented the information. People do not like to give up their errors, even if they are uncomfortable ones. Having come a thousand miles in search of novelty, it was strange and cruel if she could not be allowed to enjoy that novelty which is supposed to be characteristic of the west, — a rarefied atmosphere. With all its benefits, science works mankind an occasional mischief. The mountaineers of old suffered no inconvenience from their exalted position until the meteorologist came along, and explained to them that the air grew constantly thinner as they approached the clouds. Even to-day the unlearned inhabitants of our Rocky Mountain region make no complaints of a difficult respiration. It is only the scientific tourists who pant by the aneroid, and cough up a little blood when they cross the timber-line. Whether appreciated or not, however, it is certain that the air of the uplands is less substantial food for the lungs than that of the low countries; and it is the density of the atmosphere, and not the reverse, which is to the advantage of Minnesota as a home for the consumptive. There are many people who advise this unfortunate to seek out some elevated region in which to live, but there are very few who can give any reason for this counsel. A learned doctor tells us in one of the late magazines, that the harmful substance known as carbonic-acid gas is more abundant near the level of the sea. Certainly; since there is more air to the cubic measure at a low elevation, there is naturally more carbonic acid, which exists in the atmosphere, whether high or low, in a certain percentage of the whole; but there is at the same time more of the saving grace of oxygen, which

the invalid is after. It is true that carbonic acid has a way of accumulating in low and unventilated recesses; but there are cellars, crevices, and deep and narrow valleys in the highlands as well as on the lower levels. As well recommend thin soup to the hungry man as to advise the sick man, whose one lung must do the duty of two, to breathe thin air. Should he climb the mountains to Leadville, he will be warned away by the inhabitants of that city, who will inform him, in the rude poetry of the mines, that a healthy man has to fan the air up into a corner in order to get enough for a breath.

The atmosphere is not necessarily dry at a great altitude, as some suppose, nor damp in the lowlands. There are lofty swamps and low deserts. The mountain peaks, according to the poet, milk the clouds; and in some parts of the world the mountaineer is more sure of his daily rain than of his daily bread. Mount Taylor, in New Mexico, is called the 'Mother of rain' by the imaginative Indians. On the other hand, the deserts of California, which are below the level of the sea, are so dry, that, in the language of the plains, the jack-rabbit has to pack his water with him when he goes upon a journey.

As to the thousands who have been rescued from death by the 'pure, rarefied, and dry atmosphere' of Minnesota, this is a matter of town talk, which impartial observation does not confirm, and which there is no census to deny. In this connection I would challenge the champion of the most celebrated sanitarium for consumptives to produce a list of the patients who have 'got better' under his notice, and I will match against him an equally honest observer from some undistinguished and unpretentious and confessedly unhealthy locality, whose proportional record of improvements will be equally favorable. Why, then, should the sick man become a wanderer, as he certainly will if he once starts in chase of the *ignis fatuus* of a climate cure?

FRANK D. Y. CARPENTER.

## *LETTERS TO THE EDITOR.*

### Prehensile feet of the crows.

IN nos. 16, 18, and 20 of SCIENCE are communications by different writers on the intelligence of crows, suggested by one of mine in no. 13. I beg to add one more, concluding what I have to say on this subject.

All seem agreed as to the intelligence of these birds; but few, I find on inquiry, have seen them seize or carry objects in their claws. Yet no amount of negative testimony should invalidate my observation on the Italian bird, when taken in connection with the further evidence to be given. We all look at nature piecemeal; and it is certainly unreasonable to assume that one is in error because he claims to have seen through his pin-hole something which another has not observed through his.

I agree with the doubters, that crows ordinarily use their bills, and not their claws, in seizing and carrying their food. In confirmation of what I claim to have seen, I will adduce similar instances, noticed by others as well as myself, in the Corvidae. I cannot positively assert that the bird I saw was C. corone: it might have been C. cornix, possibly C. frugilegus, but, at any rate, a *crow*, for it had the flight, the proportions, the color, the voice, and the boldness of these birds.

As to crows not nesting among rocks, this is generally true of the American crow (C. Americanus); but the European C. corone, a larger and more solitary species, prefers the sides of steep rocks, as also does the hooded C. cornix. Both the American and European ravens often nest in inaccessible cliffs, and so do the rooks.

To begin with the largest. I have seen C. corax in Iceland holding and carrying in its claws fish-heads from the beaches, and, when disturbed, from one barren crag to another, — an object too large and too heavy to be conveniently carried in the bill, and too precious to be left behind where food is so scarce. I have seen C. carnivorus, in the winter wilderness of Lake Superior, carrying in the same way what looked like a squirrel or rabbit. It is well known that both these birds, when wounded, will strike savagely with their claws, like a bird of prey; which, being perching birds, according to our classifications they had no scientific right to do.

Of the fish-crow (C. ossifragus), Wilson (*Amer. ornith.*, v. 27) writes, "their favorite haunts being about the banks of the river, along which they usually sailed, dextrously snatching up *with their claws* [the italics are mine] dead fish or other garbage that floated on the surface;" and, on p. 28 (*op. cit.*), "These (a singular kind of lizard) the crow would frequently seize *with his claws*, as he flew along the surface, and retire to the summit of a dead tree to enjoy his repast." Audubon (*Orn. biog.*, ii. 269) says the same. Clark's Columbian crow is said to do the same thing, and its claws are sharp and raptorial. I have seen this species, along the shallows of the coast of North Carolina, seize and carry off in its *claws* living fish from the shoals over which it flew.

Buffon, Chenu, Wilson, and Nuttall allude to the custom of capturing crows by fastening one on its back, feet upward, on the ground: its cries bring its companions to the rescue, one of whom is sure to be seized and held by the *claws* of the prisoner.

For several summers I lived in the next house to a tame and speaking crow, which often came in front of the kitchen in quest of food. One day a half-eaten ear of boiled corn was thrown to him. While engaged in picking it, holding it by the claws, as is the habit with the crows, he was disturbed by the attacks of a barking terrier. Keeping him at bay for a time by vigorous pecks, he finally tried to carry the ear in his *bill* to a favorite perch in a low cedar. As he seized it, first at one end and then at another, the leverage of the free end was such that it gave his head and neck very uncomfortable twists. He finally perched upon the ear in defence of his food, and, clinching it tightly in his *claws*, flew with it, in my sight, to his perch a few feet distant.

Mr. E. A. Samuels (author of the 'Birds of New England') writes to me (Aug. 2, 1883), "I have known of its seizing with one foot — and hopping