

The best are those taken by the governmental survey and that are on exhibition in the National Museum.

Our upward journey from the Cottonwood Cabin was begun under the scorching blaze of noonday. We proceeded at a leisurely pace, often pausing to admire some gay bank of tropical flowers, to inspect some rare plant, or to examine some attractive glen or cave. How grateful were the groves of junipers, with their cool shade! We are in no hurry. We listen to the marvelous stories the chasms around us have to tell as to their creation. The task of erosion began ages ago, when the general surface was near the sea level. The shallow channels were deepened as successive upheavals made faults in the strata, and gradually lifted the plateaus to their present height of from 6,000 to 9,000 feet, without destroying their geological horizons. Nature is now resting. There are no rending earthquakes here, and the volcanic fires are extinct. The forces at work are the perennial streams, aided by the winds and the sun's heat, the melting snows, and occasional cloud bursts and electrical storms.

Slowly we pursued our tortuous path amid scenery perpetually changed by the shadows cast from the remote pinnacles and nearer crags. The ruffled escarpment far above us glowed as if in some conflagration; but as the afternoon wore away, its scalloped edges lost that fierce glare and were graciously tinged by the ruddy sky. Are those masses of royal purple, rose color, lemon color, olive green, and vermilion simply hard rocks? They are more like sunset clouds. We are climbing through an enchanted realm. As evening approaches, the colors die into sober gray. The long ravines seem to fold their wings about the gorgeous temples to await the dawning of a new day. Darkness settles over the vast abyss. We hasten lest we, too, should be enwrapped in the black mantle. And when we finally gain the rim, and turn to take our last look at the Grand Canyon, its glories are hidden amid the nocturnal gloom.

The accompanying map of the Grand Canyon region was drawn by me on a much reduced scale from the most recent atlas sheets prepared by the U. S. Geological Survey.

The Coming Bee.

J. EDWARD GILES.

An article on "The Desirability of Producing a Larger Race of Bees," which was published in the *Apiculturist* for March, suggested the possibility of securing a cross between our common races of bees and the recently discovered "giant bees" of India, in such a way as to produce a new race which should combine the desirable points of both parent races.

The particular advantage hoped for from such a cross would be to secure a race which would be able to gather honey from red clover and perhaps from other flowers which now go to waste, so far as the honey crop is concerned, because the bees which we now have are unable to reach the honey. An experiment of the United States Fish Commission on the breeding of fish suggests to me still another possibility in the breeding of bees. According to a recently reported interview, Mr. D. E. Crawford, of the United States Fish Commission, stated: "We have little doubt now that before two more years we shall have evolved what the seaboard public has been clamoring for for so many years—the boneless shad. Of course I don't mean a shad that is actually boneless, but one that will be to all intents and purposes as boneless as the flounder of this country or the sole of England. This will have been accomplished by the cross breeding of the shad, the flounder and a peculiar edible jelly fish which is a staple food among the seacoast natives of Japan. . . . Our experiments, while at first rather discouraging, now leave but little doubt of turning out successful. At first the crossing resulted in the production of a lot of jelly fishes with an elaborate outfit of bones, which was just what we did not want, but time and study showed us our mistakes, and now we have a few hundred half-grown shad with less than 18 per cent as many bones as the ordinary sort.

A few years ago, when the belief in the unalterability of species both of animals and plants was generally accepted, the attempt to alter the bony structure of the shad would have been regarded as a hopeless undertaking, but now that so much has been accomplished, no one can say what the limit of possibility is. Professor Goodale, of Harvard University, predicts the time when fruits of all kinds will be produced without seeds. There is ground for hoping that this result may be attained in the fact that the banana regularly grows without seeds, or rather with only rudimentary seeds which appear as dark specks in the fruit, and so do not interfere in the least with our enjoyment of eating the fruit, and if these rudimentary seeds are planted in the ground, they refuse to germinate. Occasionally also an orange is found without seeds, and there are many other facts which give good reason to believe that before many years we may enjoy the pleasure of eating seedless fruits of several kinds.

If we are to have boneless shad and seedless fruits, it

does not seem too much to hope that we may also have a race of stingless bees. It is said that there are at least two distinct races of stingless bees in South America, but these races have not much value as honey gatherers, and moreover they build combs with very thick-walled cells, and probably they would not be worth cultivating as compared with the European, Asiatic, and African races; but there is apparently a good reason to hope that these races may be used to give their one good quality of stinglessness to our common races as there was that the flounder and Japanese jelly fish could be used for the improvement of the shad. If we can cross our present races of bees with the giant bees of India and obtain a race with long proboscis and perhaps increased size (if that should prove to be of any advantage), and cross this improved race with the South American stingless bees, and by these crosses secure a race with all the good points of the Italian bee, with the additional feature of a lengthened proboscis and with the sting taken away, we shall then have a race of bees which it will be difficult to improve. It might be desirable to improve still farther by breeding out the swarming instinct, and there appears to be no reason why the swarming instinct cannot be bred out of bees as thoroughly as the sitting instinct has been bred out of certain races of domestic fowls, but now that swarming can be so thoroughly controlled by the use of queen traps and automatic hivers, this point is not as important as it would otherwise be.

Of course no one knows as yet whether it will be possible to secure a cross between our common races and those of India or South America, and no one knew whether a cross could be secured between the shad and the flounder until the experiment was tried, but now that the experiment has succeeded, the process seems so simple that we wonder why it was not done before.

It seems to me that this matter is of sufficient importance, and the prospect of success sufficiently great, to justify the agricultural department of the United States in undertaking the cost of the experiments. The cost to the government would be trifling in comparison with the benefits which would be gained if the experiment should be successful; but very few individuals who are competent to do the work would have the means to carry out the experiments at their own expense, because a residence of a few years in South America would perhaps be necessary in order to study the habits of the stingless races in their native country, and to do this it might be necessary to domesticate the bees if this has not already been done.

I have not seen the statistics of the last census; but according to the census of 1880 the honey crop for 1879 amounted to twenty-five million pounds, or about half a pound for the year to each inhabitant of the United States. At an average price of ten cents per pound, the value of the honey crop for that year would be about two and one-half million dollars. If we had a race of stingless bees, the value of the crop would soon be doubled, for many would be induced to go into the business of bee keeping who are now deterred by fear of the stings or who live in thickly settled villages, and hesitate to keep bees for fear that their neighbors will consider their pets a nuisance. Even in the oldest and most thickly settled States the number of bees could easily be doubled without exhausting the honey supply, and in suitable places by planting special crops there is no limit to the amount of honey which could be produced. Some may argue that an increased supply of honey would mean lower prices, and that since it is not easy to find a market for the present supply, it would not be possible to dispose of a larger quantity; but experience shows that as the supply of any article of food increases, the demand always keeps pace with the supply. In the memory of men who are not yet very old, it was formerly very difficult to find a market for tomatoes, but I remember a few years ago talking with a farmer who was then preparing a load of tomatoes for market, and he remarked that it was at that time easier to sell a wagon load of tomatoes than when he first began to raise them to sell a peck. The reason why it is difficult to sell honey is that people generally have not learned to use it. Eight ounces per year for each person in the United States seems a very small quantity, but I presume that a large percentage even of that quantity is sold through the drug houses for medicinal purposes.

I have described what I believe is "the coming bee," and it seems to me that there is nothing impossible or unreasonable in the ideas advanced. If a proper amount of enterprise is shown, I see no reason why we should have to wait many years before the ideal is realized, because breeders are now beginning to understand the science of breeding and are giving up the old haphazard methods, and, therefore, progress is certain to be much more rapid than it has been in the past.—*American Apiculturist*.

THE total colored population, as returned under the census of 1890, is 7,638,360. Of this number, 7,470,040 are persons of African descent, 107,475 are Chinese, 2,039 are Japanese, and 58,806 are civilized Indians.

Correspondence.

The Deflections of a Tornado.

To the Editor of the *Scientific American*:

Some of your readers may recall an article by the writer in the *SCIENTIFIC AMERICAN* of August 15, 1891, in which was presented some peculiarities of a tornado that passed this region on May 20 of that year. It was characterized by a direct eastward route along a township line for a distance of thirty miles and deflections right and left within small limits to nearly every tall object near its path. After each struggle with a detached object offering much resistance, it was nearly always deflected.

On July 2, 1892, the township line, 6 miles south, was swept again almost due east for a distance of about ten miles by a storm in many respects similar. It manifested less force, but was only less fatal, perhaps, because fewer homes lay in its path. After its first descent its direction was to the northeast for perhaps a mile, but after destroying a house it proceeded the remainder of its route, at no time a dozen rods away from the midsection line, one-half mile north of the township line, swinging a little transversely toward bunches of trees, houses, etc. It seemed guided away from its first house by a line of wire fence (tearing up the posts). In fact, it seemed to get its first impetus due east by this. I recall that the former storm also followed directly up a long line of this fence till deflected by an obstruction. Much further on, some tall locust trees and an orchard seemed to deflect it from a low house which it missed only a few feet, but a tall house half a mile further on received the full force. After wrecking this it was again deflected northeast to some timber in a small "draw" half a mile further on. Down this it ran to a denser wood in a southeast direction, whence again it traveled eastward with the trees along a little stream. Coming into this a little further on was another timbered "draw," and a portion of the whirl split off and ran up this about sixty rods, although its direction was backward—a little west of north. Here this portion of the storm found itself in the center of a meadow. It went directly eastward again to a detached clump of trees, and was thence deflected southeasterly. The other portion of the storm had gone on directly east, but much less forcibly, emerging on to a lake. Now the portions began to approach each other, and passing one on either side of an ice house, they joined their fury on a tall wooden derrick. The roof of the water works engine room beneath was lifted and hurled northeast, but a low chimney was left unhurt. A frame house near by was moved only on its foundation. Again the storm split, the north portion spreading over a wide sweep and doing small damage; but the south branch was now still so furious as to utterly demolish a house one-fourth mile further on. From thence it too was scattered and for the next half mile only a wide path of broken trees marks the march of both, after which they lifted.

The signs of twisting were not marked, all debris being blown onward, but on all standing trees examined by the writer, the limbs on the south side are brought back west, carried around north and left streaming out eastward. This, I believe, is the reverse of the usual order north of the equator.

Now, since a string of fence posts and a narrow strip of timber seem capable, within certain limits, of guiding and deflecting these terrible clouds, may it not be just possible that, on our prairies, wind-breaks might be so planted, of some tall trees on either side of the buildings, as to guide these great forces around the homes or at least break them up into less destructive portions? Or might not a series of tall posts be similarly placed, or other tall objects erected for the same purpose? These two storms have certainly shown strong attraction for tall objects. May it not possibly prove something more than a theory that tall towers, like wooden derricks, might be so arranged as to guide tornadoes around towns and cities or other densely settled districts?

I should be glad if you could spare the space to invite brief statements of facts concerning the deflections of other storms, whether any such phenomena as I have noted have been observed to prevail generally. In heavily timbered regions there is small hope of anything practical being done, but there is just a hint that in level, open regions (and here the tornado is usually at its worst) we may yet contrive, when we know the laws of their progress better, to conduct these great forces as we do others. There is much to convince us that the great lambent cloud is highly electrified, and, like a silken wisp under the same conditions, it swings to objects near its path.

The smell of ozone in the atmosphere after the passage of this storm was very noticeable.

JAMES NEWTON BASKETT.

Mexico, Mo., July 5, 1892.

THE best form of bismuth to use in the treatment of infantile diarrhoeas is the salicylate, it being the most actively antiseptic.—*Medical World*.