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them to have been, from intimate personal acquaintance, both with the men and with the country to which they were applied on precisely the same evidence as is to be found in Canada, are at least entitled to be regarded as something more than 'fancy sketches.'

"I am, my dear Professor Dana,
Very truly yours,
"(signed) ALFRED R. C. SELWYN."

Inquiry Regarding Fresh-water Pearl Fisheries.

I ENCLOSE herewith a circular of queries that I am very desirous of having answered to assist in carrying out an investigation in regard to the locations, yield and proper protection of fresh-water pearl fisheries in the United States. All correspondence on this subject should be addressed to me as follows: G. F. K., care of United States Commission of Fish and Fisheries, Washington, D. C.

GEORGE F. KUNZ.

LIST OF QUESTIONS.

The pearl-bearing mussels: 1. Nature of stream in which found, kind of bottom, character of water; 2. Geological character of the district as to rock, soil, etc.; 3. General abundance of mussels; 4. Size, shape, and position of the mussel beds; 5. Local names of mussels; 6. Habits of mussels; 7. Enemies and fatalities to which mussels are exposed, nature and extent of destruction by muskrats, hogs, freshets, etc.; 8. Size, shape, and color of mussels; 9. Species of mussels in which pearls are most common; 10. Proportion of mussels in which pearls occur; 11. Sizes, or other peculiarities, of shells in which pearls are found. The pearls: 12. Nature and origin of pearls; 13. Position in mussel; 14. Size, shape, and color of pearls; 15. Relative value of pearls of different sizes, shapes, and colors; 16. Markets for pearls; 17. Prices for pearls. The fishery: 18. Method of taking the mussels; 19. Description of apparatus used in taking mussels and in opening the shells; 20. Methods of extracting the pearls; 21. Treatment of pearls when found; 22. Utilization of mussels after extraction of pearls or after opening; 23. Principal occupations of mussel fishermen; 24. Statistics of fishery in 1893: Fishermen, number; Boats, number, value; Apparatus, number, value; Pearls, number, value; 25. Statistics, complete or partial, for previous years; 26. Period when pearl fishing was of greatest importance in district; 27. History of origin and growth of fishery; 28. Exhaustion of mussel beds, causes, rapidity; 29. Do exhausted beds become replenished, and in what time? 30. Is State protection of beds desirable or necessary?

Pseudo-aurora.

THIS phenomenon has again, this winter, been of unusual beauty and brilliancy over lights in this city. The following is an explanation of the occurrence: The phenomenon is not a shadow effect, as explained by Mr. Hazen in a number of last year's *Science*; neither has it any electrical significance, as has been indicated by several writers. It has a true light effect and consists of an apparent bright shaft of light extending upwards to the zenith over bright lights. If the lights are swung high it may also be seen extending from the light to the earth. It only occurs under certain atmospheric conditions, which are about as follows: Cold, cloudless nights, with but slight wind, if any, following upon an atmospheric humidity approaching saturation. Under these conditions, small, almost solid, flat, hexagonal ice crystals fall in a constant mist, glistening in a strong light, like particles of diamond dust. It is in the peculiar flat, light form of

these crystals, associated with the manner in which they fall, that explanation of the phenomenon rests.

Leaves falling from trees, during a calm, preserve, during the chief part of the descent, the horizontal position. This is found by careful observation to be alike true of the fall of the flat, hexagonal ice particles at the times when pseudo-aurora occur. The rays of light from the lamp or other brilliant light, striking the under flat surfaces of the crystals, are simply reflected to the eye of the observer; and the eye receives rays reflected from all particles of ice within the vertical plane through the eye and through the lamp or source of light, referring the grand final light effect to the vertical.

That it is not of an electrical nature is evident in that some of the most brilliant shafts occur over bonfires, and when the moon is low in the horizon, on nights showing the aurora, it is seen to cause the same phenomenon.

H. L. BOLLEY.

Fargo, North Dakota.

Notes and Queries.

Rubus strigosus is rather common in Waterbury, Conn., but I have never found it bearing perfect fruit (except as noted below). The canes are quite as strong and thrifty as any found in northern New England, and plenty of flowers are produced, but rarely more than two or three drupelets in a berry ever mature.

My observations extend over a period of more than thirty years. At present the plant is much more abundant than formerly, but the failure of the fruit to mature is the same as at first. Asking Dr. Asa Gray, at a meeting of the Botanical Section of the A.A.A.S., several years ago the cause of this, he remarked that "he should like to see the flowers" before answering.

Of course it is because they are not *fertilized*, but why are they not? Honey bees here, as further north, find the raspberry blossoms a rich source of honey, and any part they may take in the fertilizing process ought to be as effective here as in other sections. The exception to this sterility makes the sterility still more singular. Along the ditches through some of our shallow peat bogs this red raspberry grows, sometimes, very rank and tall, and it is not rare to find, in September and October, the terminal portion of the year's growth full of blossoms and perfect but unripe fruit. I have seen these berries fully grown, very large, but none quite ripe, though they probably do ripen in warm seasons. There is a cause for this failure of the summer crop, but what is it? I believe the cultivated species and varieties of the raspberry do as well here as anywhere. It is well understood that the failure of the first crop of red clover to produce many seeds is because the bumble-bees, the only insects that frequent its flowers for honey, are too few to transfer the pollen.

This cannot be the case with the raspberry. It may be found that the honey-bee, wholly intent on gathering honey, neglects the pollen altogether and that the pollen gatherers prefer that of some other flowers found here. The interrelations between plants and insects are not all yet found out, but the suggestion made above may have no foundation in fact.

Thirty years ago the farm yards and road sides in western Connecticut were white in the summer from the abundance of the flowers of the May weed (*Maruta Cotula*). A few years later—but just when no one can tell, for it passed without observation—this plant disappeared entirely. For years not a single specimen could be found. It is now slowly reappearing, but not yet abundant. Over how large a part of the country this disappearance took place I cannot say, for my observations did not extend far beyond Waterbury and the adjacent towns.

Here, as in numberless other cases, the ever-recurring *why* appears. Certainly no *apparent* cause banished this