Correspondence.

A Carolina Ostrich Farm.

To the Editor of the SCIENTIFIC AMERICAN:

I notice in SCIENTIFIC AMERICAN, issue of April 2, page 275, an article by Day Allen Willey on raising ostriches and mentioning only two farms. From the California farm there is a branch ostrich farm in Asheville, N. C., where for three years they have been quite successful in raising the birds and manufacturing and selling plumes. J. M. STONER.

Asheville, N. C., April 6.

Why Does Popcorn Pop?

To the Editor of the SCIENTIFIC AMERICAN:

1. Why does popcorn "pop"?
2. Why does not ordinary corn pop like popcorn?
3. What is the composition of popcorn, and how does it differ from ordinary corn?
4. Why does popcorn pop better when thoroughly dry? R. BAILY CARSON.

Knoxville, Ill.

1. The popping of popcorn is due to the volatilization of the oil content in the kernel.

2. Field corn does not pop as readily as popcorn, because the outer portion of the kernel is more porous, permitting the escape of the oil as it volatilizes; while in the case of popcorn a great pressure is developed in the kernel by the confined oil, and the kernel is suddenly exploded and turned wrong side out.

3. In composition popcorn differs from ordinary corn in having a larger proportion of the corneous element and a greater per cent of oil.

4. Popcorn pops more readily when dry because when moistened the kernels are swollen, more porous, toughened, and do not explode so suddenly and completely as when dry and hard. C. P. HARTLEY.

Assistant in Physiology, Bureau of Plant Industry, Department of Agriculture, Washington, D. C.

Dr. Draper's Speculum Test.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to articles and letters on the above subject in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1306 (1901) and 1450 (1903), and in SCIENTIFIC AMERICAN, November 13, 1903, and March 26, 1904, I wish to say that Mr. James A. Smith is correct and that Dr. Draper and myself are wrong.

I beg Mr. Smith to accept my regrets for the error, and my humble apology for my contradiction, and also thank him for his valuable correction.

Longitudinal aberration in most mirrors being but small, and all practical opticians finishing their work by actual trial on a star is, I presume, the reason that the error has escaped notice so long. I find that the outstanding aberration in Dr. Draper's 15-inch specula would amount to less than 1-20 of an inch; and as he admits that most of his reflectors were over-corrected (by his test), of course the actual error would be less still; so that it is hardly surprising that it escaped his notice, the more so as other considerations—as the obliqueness of the pencil, the difficulty of determining the *exact* focus of a narrow zone near the margin, the disturbance due to heat waves in a close cellar, as well as diffraction troubles—make it undesirable to rely upon the test *exclusively*, though it is invaluable in determining if a surface is uniform, and for detecting irregularities and other imperfections.

I never found any advantage in using so small a hole as Mr. Smith recommends.

EDMUND M. TYDEMAN.

Camden, N. J., April 4, 1904.

Commercial Japan.

"Commercial Japan in 1904" is the title of a monograph just issued by the Department of Commerce and Labor through its Bureau of Statistics. It shows that the trade relations between the United States and Japan in recent years have grown with greater rapidity than between Japan and any other nation.

In 1881 the imports from the United States formed less than 6 per cent of the total importations into Japan, while in 1902 they formed nearly 18 per cent of the total importations. Meantime Great Britain's share in the imports of Japan fell from 52 per cent to 18 per cent in 1902. The United States is also Japan's largest customer, by reason of the fact that the chief export products of Japan are articles required by the manufacturers of the United States, and which can not be produced in this country. The total exports from Japan in 1900 amounted to 204,429,994 yen (yen is equal to 51 cents, United States currency) in value, and of this amount 52,566,395 yen went to the United States, 39,171,455 to Hongkong, 31,871,576 to China, 19,150,423 to France, and 11,262,997 to the United Kingdom; the total exports of 1902 amounted to 258,303,065 yen, of which 80,232,805 yen in value went to the United States, 25,876,059 to Hongkong, 46,838,545 to China, 27,283,458 to France, and 17,346,149 to the United Kingdom.

The exports of Japan to the United States, as already indicated, are chiefly articles which are not produced in this country, and in a majority of cases are those required by our manufacturers. Of the 80,232,805 yen in value exported to the United States in 1902, the value of 46,784,720 yen consisted of raw silk, 8,921,995 yen manufactures of silk, 9,124,085 yen of tea, 6,381,733 yen matting for floors, 577,888 yen rice, 1,516,401 yen chemicals, drugs, etc., while manufactures of bamboo, lacquered ware, and other products peculiar to the Japanese have also figured largely in the list. Exports of raw silk from Japan to the United States have steadily grown, especially since the development of the silk-manufacturing industry in this country. In 1893 the value of her raw silk exports to the United States was 11,078,748 yen; in 1894, 22,457,348 yen; in 1895, 27,826,245 yen; in 1896, 14,080,981 yen; in 1897, 32,262,900 yen; in 1900, 26,710,050 yen; and in 1902, 46,784,720 yen.

Of raw silk from Japan, the total exportations exceed 50,000,000 yen annually, of which the United States is the largest purchaser. France is the next largest customer in this line, her purchases of raw silk from Japan in 1902 amounting to 14,682,816 yen in value, against 46,784,720 yen by the United States, while Italy took raw silk to the value of 12,261,383 yen, England, 564,948 yen, and Russia, 776,759 yen. The total exports from Japan to the United States in 1881 were 11,056,464 yen in value, being 36.5 per cent of the total exports of that year, and in 1902 were 80,232,805 yen, or 31.06 per cent of the total exports.

Japan's imports from the United States have grown with even greater rapidity than her exports to the United States. In 1881 they amounted to but 1,781,108 yen, and in 1900 had reached 62,761,196 yen in value. Proportionately they have grown with much greater rapidity than the total importations of Japan, our share of her import trade having increased from 5.72 per cent in 1881 to 17.91 per cent in 1902, while the United Kingdom, our principal competitor in that market, which furnished, in 1881, 52.57 per cent of the total imports of Japan, supplied, in 1902, 18.53 per cent. A detailed examination of the supplies furnished by the United States to Japan can perhaps be better made from our own standpoint measured in dollars. In the fiscal year 1892 our total exports of domestic merchandise to Japan amounted to $3,288,282, and in 1902 to $21,139,726. Of this total, the largest item of export was raw cotton, which aggregated $9,058,290, the next largest item being illuminating oil, with a total of $5,195,665.

Third in rank is manufactures of iron and steel, with a total of $1,923,607, other important items being breadstuffs, $1,296,615; provisions, $196,337; scientific instruments, $314,734; leather and manufactures, $322,729; tobacco and manufactures, $509,921; clocks and watches, $115,386; paper and manufactures thereof, $187,860; lubricating oil, $187,138, and paraffin, $311,920; while many other articles of less importance have found a place in the markets of Japan. Taking up the great class of iron and steel and examining its details, it is found that the exports of locomotive engines in 1902 amounted to $129,352 in value; builders' hardware, $106,651; sewing machines, $15,980; firearms, $9,513; car wheels, $11,955; other machinery, $734,696; and miscellaneous manufactures of iron and steel, $915,460.

The exports of raw cotton have grown from but $85,211 in 1890 to $9,058,290 in 1902. Illuminating oil, the exports of which amounted in 1890 to $3,559,395 in value, showed in 1902 a total of $5,195,665, despite the active competition of Russian and Sumatran petroleum, and the further fact that Japan is now herself supplying a part of her consumption of illuminating oil. Exports of flour increased from $127,120 in 1890 to $1,279,880 in 1902. This increase is evidently due to a growing disposition among the Japanese to consume more of this class of food rather than to rely upon rice, as in former years, since the number of foreigners in Japan other than Chinese and Koreans amounts to less than 4,000, and has not materially increased during the period in which our exports of flour to that country have increased sevenfold.

In paper and manufactures thereof our export trade with Japan has grown very rapidly, the total exports in this class being, in 1890, $1,606; in 1896, $10,126; and in 1902, $187,860. Instruments for scientific purposes increased from $9,441 in 1890 to $34,600 in 1894, and $314,734 in 1902. In 1890 the value of the canned beef exported from this country to Japan was $11,212; in 1902 the total was $8,399; while exports of pickled beef advanced from $638 in 1890 to $3,536 in 1902. Leather and manufactures of leather find a steady demand in Japan, owing to the fact that the number of cattle and other animals whose skins are used for tanning is comparatively small; the total number of cattle in Japan, according to the last census, being but 1,282,341, or 28.62 for each 1,000 inhabitants.

Exportations of cotton cloths to Japan have fallen by reason of the rapid increase of the manufacture of cotton cloth in that country, the total for 1902 being but $48,803 against $141,264 in 1897. Meantime, however, exportations of raw cotton to Japan have rapidly increased, being, as already indicated, $9,058,290 in 1902 against $85,211 in 1890. This is largely due to the increase in the manufacture of cotton goods in Japan, though American cotton has grown in popularity with the manufacturers there within the past few years. Experience has shown them that cotton from the United States is more satisfactory for use in manufacturing than that which Japan had been accustomed to obtain from India and China, the staple in American cotton being longer, thus giving better results. The cotton of India, however, sells at a lower price than that of the United States, and therefore still finds a large market in Japan in years of plentiful supply. Japan also produces a considerable amount of cotton, though it can scarcely be expected that this will increase in a manner to at all keep pace with the growth of her cotton manufacturing industry. The entire area of Japan is but 161,159 square miles, or less than the State of California, while but about 12 per cent of the land is under cultivation, and but a comparatively small proportion cultivable, since mountain ranges and rocky islets and shores occupy a large proportion of its area. It must be remembered that Japan, with her small cultivable area, has a population of 44,805,937, and must therefore devote most of her arable land to the production of food stuffs, while her natural products of silk and tea are so much in demand the world over that they are not likely to be displaced for cotton, which can be so readily brought from other and comparatively adjacent countries. Cotton manufacturing in Japan has, however, grown very rapidly, the total number of spindles in 1899 being 1,170,327 against 5,456 in 1863. It is thus apparent that Japan will continue to purchase from other parts of the world a large proportion of the raw cotton which her rapidly-growing cotton mills will consume, and as the cotton from the United States has already made headway against that from the nearer countries of China and India, it is reasonable to assume that the market for American cotton will continue to grow, especially if an Isthmian canal gives opportunity for direct water shipments from the cotton-growing section of the United States to the ports of Japan without breaking bulk.

Dry Bananas.

BY S. E. WORRELL.

Ripe peeled bananas only weigh about forty-five per cent of the full bunches, while the dried product, retaining all its flavor and nutrition, only weighs approximately one-ninth as much as the bunches, and has nearly the same reduction in space. These features alone will save a large amount in the cost of transportation and cold storage of the fresh fruit. It is impossible to grind dried bananas into flour, as they are about as tough as evaporated apples, but they may be prepared in two styles; either to press them into barrels or boxes, just as they leave the drier, or chop them up fine with a large sausage-meat cutter, and pack them in attractive one-pound paper packages. In the latter shape they will make an excellent breakfast food, and can be used for cakes, puddings, ice creams, and numerous other purposes. Also, if heavily compressed in a small space, they will make an ideal ration for soldiers or travelers on long inland tours. Unquestionably bananas embody more nutritious matter than any other fruit, not excepting dates, which, while they are rich in sugar, contain little starch or gluten, and also have large seeds. It is said that an Arab can cross a desert on a pocketful of dried dates for food. We must take this statement with considerable allowance, or else believe their barren lands are very small or their pockets are of unusual dimensions. I would take a pocketful of dried bananas in preference.

I see no reason, if this evaporated fruit is put up in insect-proof packages, why it will not keep for years in any climate, so it can be safely and cheaply transported to any part of the earth. As is well known, the fresh fruit is the most expensive to ship. Owing to the long voyages and its delicate nature, it must be very carefully handled to prevent bruising, and requires cold storage, so as not to ripen too soon. The saccharine and gluten contents of bananas naturally cause a little more difficulty in their evaporation than common fruit, but I believe this can be overcome by some changes in our best driers. I would advise the adoption of mechanically-forced hot-air currents, which will nearly double their capacity and shorten the operation, thus furnishing a brighter colored product, which increases its value. I also believe it will be necessary to substitute perforated sheets of non-corrosive metal for the bottom of the drying trays instead of the usual cheap galvanized-iron wire cloth.

The best evaporated fruit retails here at from ten to fifteen cents per pound, but dried bananas ought to bring higher prices, owing to their fine flavor and the fact that they require no sweetening.

From these reasonable conclusions it would appear if this business, gone into on a large scale with ample capital, some of which must of course be expended in judicious advertising and careful management, promises permanent and profitable returns.