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XXXI.—*The Geography of Bread-Plants.*

By Ph. Dr. MICHELSEN.

THE geography of these plants shows us clearly the great changes that have been produced upon the globe through the industry and enterprise of man. What a different physiognomy would not indeed all the countries of the civilized world present to us were it possible to eradicate from their soil all the exotic plants, and to grant life to the indigenous ones alone!

The boundaries within which the bread-plants thrive are usually called the *bread-lines*. The northern bread-line extends farthest in Scandinavia, where, in the 70° N. lat., in a few districts of Finland, barley and potatoes are successfully cultivated. Thence the line declines considerably towards the east and west; and the Faroe Islands, between the $61\frac{1}{2}^{\circ}$ and $62\frac{1}{2}^{\circ}$ N. lat., produce but little barley. Neither in Iceland nor in Greenland, in the 63° , are cultivated the proper bread-plants: nay, on the northern coast of America, the 50° may be considered the farthest point where such plants are cultivated; while Newfoundland, whose southern point lies about parallel with the Bodman Lake, in the $47\frac{1}{2}^{\circ}$, produces even there not any sort of the bread-plant. The line then rises again a little more to the north, and, in pursuing it to the west, we arrive at the western coast of America, at the 57° and 58° . We find it again on the eastern coast of Asia, in the 50° . It is only in the southern part of Kamtschatka that a small quantity of corn is cultivated. Thence the bread-line rises again in the region of the river Lena (Siberia), as far as the 57° ; on the Jenissey River, as far as the 58° ; on the Ob River, as far as the 60° . Thence it reaches Archangel at the 67° , and finally terminates at our starting-point in Scandinavia. These curves of the line exactly correspond with the situation of the countries through which the line passes. On the eastern coast of the two continents the line lies in the 50° N. lat., and rises towards the west in a northerly direction, 20° in the Old World and only 8° in the New. This phenomenon is owing to the colder climate of the American continent, the result, it is supposed, of the position of the magnetic pole. Indeed the aurora borealis is there seen more splendidly, as far south as Philadelphia, than at the southern coast of the North or German Sea. This fact might somewhat strengthen the opinion, that the magnetic pole has a more southerly direction in the western hemisphere than in the eastern.

With regard to the southern line, it is almost impossible to define its course. A glance at the map shows how little land there is in the southern latitudes, and how little even of that small portion is devoted to agriculture. We may, therefore, conclude that the curves of the line are not so large by far as those of the northern line, owing chiefly to the different division of the land in the southern hemisphere. The continents form large triangles, the basis of which is in the north, while the southern points are surrounded by seas, and contain a more equal temperature.

In considering the principal bread-plants, such as they are distributed in the various regions in the different parts of the globe, we find on the northern hemisphere—

Rye, Oats, Barley, and Potatoes.—In Asia, as far as the 48° N. lat.; in Europe, 50° ; in America, 40° .

Wheat is in Asia almost entirely wanting, and it is only cultivated in Asia Minor between the 40° and 30° N. lat.; in Europe, between 50° and 40° ; in America, between 40° and 30° .

Rice (Oryza sativa).—In Eastern Asia between 40° and the equator; in Europe, south of the 40° N. lat.; in Africa, between 20° and the equator; in Eastern America, between 40° and 30° .

Maize.—In Europe, south of the 40° ; in Africa, between the 20° and 10° ; in America, south of the 30° .

Dates.—In Africa, between 30° and 15° .

Sago-Palms upon the islands of the Malaya and Philippine Islands, between 10° and the equator.

Yam (*Dioscorea sativa and aculeata*).—In Asia, Africa, and America, in the tropical climates.

Breadfruit.—Upon the islands of the Pacific Ocean.

Upon the southern hemisphere we meet with yams, cacao, pisang, manioca, breadfruit, potatoes, &c., in the tropical regions.

Rice begins in America on the eastern coast between the 10° and 20° s. lat.

Wheat.—In New Holland, Africa, and America, between the 20° and 40°.

Farro-plants (of the *Cryptogam* division), potatoes, &c., at New Zealand, between the 30° and 50°.

It is not, however, the latitudes, with their various climates, alone that influence the growth of one or the other species of the bread-plants; the cultivation is to a certain extent also the result of the elevation of a country above the level of the sea.

In the midst of the girdle where wheat is chiefly cultivated, in Central and Southern Europe, are also cultivated, upon certain elevations, rye, oats, barley, &c.; while beyond those elevations even the northern products vanish before the increasing coldness of the temperature.

In Asia the cultivation of rice extends at the Himalaya to the elevation of 3000 feet; wheat to that of 10,000 feet; rye, barley, oats to that of 12,000 feet; while on the northern side of the mountain, in Thibet, wheat is grown even at an elevation of 13,000 feet. Humboldt tells us that an elevation of 10,000 on the south side is the extreme boundary for the growth of wheat; while in the high plains of Thibet it is partially grown even at an elevation of 18,000. This vast difference in the boundaries of the girdle or belt is chiefly the result of the snow frontier, which, according to the recent investigations of the brothers Gerard, slopes in the south to 13,000 feet, and in the north to 16,000 or 17,000 feet above the level of the sea. These advantages of the Thibet highlands travellers ascribe to the sun's rays, which strongly reflect upon the mountains from the high plains.

Upon the Andes, especially upon the heights of Peru, maize is grown at an elevation of 12,000 and 13,000 feet. There, as also in Mexico, potatoes thrive at an elevation of 10,000 feet; wheat and other grain at 9000 feet; and pisang, manioca, &c., at 3000 feet.

These two vast mountains of the globe afford thus the principal kinds of breadstuffs known to us. Of subordinate importance are buckwheat, beans, peas, lentils, millet, dhurra (black millet), chesnuts, &c., which are successfully cultivated in various climates; nor are the principal breadstuffs exclusively confined to their respective boundaries.

In the northern belt of rye, oats, barley, and potatoes, we find also buckwheat, beans, and peas. In the belt of wheat, we find beans, peas, millet, dhurra, chesnuts, maize, and rice. In that of dates we find wheat and several other species of grain. In the tropical belt are successfully grown maize, rice, wheat, besides the plants peculiar to the climate.

The bread-plants of the Northern Polar boundaries, which form the standard specimen for whole groups, extend, according to Humboldt, Stroun, and others, west of Asia in the following manner:—

Barley—60° in Kamtschatka, 58° on Jenissey, 60° on the Ob, 57° to 67° on the Dwina, 70° in Lapland, 60° on the Faroe Islands, 45° in Newfoundland, 50° in British America, 41° in Missouri, and 48° on the Columbia River.

Wheat—50° on the Kurilian Islands (between Kamtschatka and Japan), on the Altai 55°, on the Ural 58°, on the northern inland seas of Russia 62° to 65°, in Scandinavia 65°, in the Highlands of Scotland 56° to 57°, in Newfoundland 47°, on the Red River 48° to 50°, on the Columbia 45°, and 44° on the western coast of America.