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THE FALL LINE

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ONE of the chief geographical determinants of the position and success of many cities in the Middle Atlantic States is the so-called Fall-line which marks the boundary between the Piedmont region and the Atlantic coastal-plain. This line extends from the mouth of the Raritan River in northern New Jersey clear to the Gulf States, where it gradually fades out.¹ At every point where the eastward-flowing Appalachian streams pass from the hard and highly-tilted crystalline rocks of the Piedmont belt to the soft, unconsolidated sands and clays of the emerged portions of the continental shelf, *i. e.*, the Atlantic coastal plain, falls and rapids of varying height occur. Hence the line which joins the points where falls occur on successive large rivers is called the Fall-line.² In the northern part of the plain, the Fall-line occurs just at tide-level, sometimes within the Piedmont. On the Delaware it is two miles above the margin of gneiss rocks, at Trenton; on the Schuylkill it is three miles above the easternmost outcrop of granites and schists.

The history of the development of the fall-line, or fall-zone as it ought really be called, as it is often several miles in width,³ has been briefly this: Before the elevation of the present coastal plain, while its strata of Mesozoic and Cenozoic formation were being laid down on the submarine outwash of the Appalachian Old Land, the rivers had their mouths far above where they are now situated, and near the inner margin of the present plain, so there was practically no fall-line. Now that the plain has been elevated the rivers have deepened their channels in it more than in the crystalline rock of the Piedmont, making the transition from one to the other distinctly visible. As long as 75 years ago a state geologist attributed this line of falls to the hardness of the foundation rock of the Piedmont.⁴

On one side of the fall-line lies the coastal plain with its rich soils, muds and alluvial deposits, cut to a limited depth by the great rivers which cross it, its low relief, determined entirely by its hydrography,⁵ its smooth, sluggish yet navigable rivers often mere tidal canals and estuaries.⁶ On the

¹ U. S. Geological Survey 1885-6, pp. 548-549.

² Davis, *Physical Geography*, p. 1-34.

³ Report Maryland Weather Service, Vol. 1, p. 116.

⁴ U. S. Geological Survey 1885-6, pp. 548-549.

⁵ U. S. Geological Survey 1885-6, p. 549.

⁶ Maryland Weather Service, Vol. I, p. 112.

other, the more or less rough or rolling Piedmont upland distinguished by its geological formation and its topography. It is composed of hard rocks of uneven surface, due to long-continued erosion and gradually rising, it merges imperceptibly into the Appalachian ridges. Its streams, running over rock bottoms, are far swifter and clearer and more diversified by rapids and reaches.¹

Starting, as I mentioned before, at the northern end of New Jersey, the fall-line is crossed by many rivers; of these the largest and most important are the Delaware, the Schuylkill, the James, the Potomac, the Roanoke, the Rappahannock and the Savannah. Situated where these rivers cross the series of slight faults with eastward downthrows, which cause the fall-line,² are such cities as Trenton, Philadelphia, Port Deposit, Baltimore, Richmond, Raleigh, Columbia, Augusta and Macon. Practically every city south of New York which is of great commercial importance, except Charleston and Savannah, which are seaboard towns, is situated along this line. Thus the boundary of the Atlantic coastal plain is marked on nearly every large river by an important city.³

There are a number of conditions which, combined with the splendid water-power furnished by these rivers which cross the fall-line, have functioned in the development of the above-mentioned cities. Almost first in importance is the association of the up-stream limit of navigation. In the case of the Delaware, Susquehanna, Potomac and James Rivers, navigation is possible to ocean-going vessels up to the fall-line.⁴ Further south this combination is less prevalent, largely because of the greater width of the coastal plain, which is over 100 miles wide at Raleigh, North Carolina; partly because the smaller volume of the rivers, which, south, drain only the plain and eastern slope of the Appalachian highland, while in the north they cross the mountain-barrier. Obviously manufacturers who have direct connection with the sea, especially those whose products are bulky in comparison to their weight, like the producers of pig-iron, have a great advantage over those who must transport by rail to the coast. It is estimated that the opening of the canal between Birmingham, Ala., and Mobile Bay will reduce freight charges 80 per cent. to manufacturers of iron and steel in that region.⁴ Again, the general character of the two areas which adjoin the fall-line contribute largely to its importance.⁵ The Piedmont furnishes

¹ Report Maryland Weather Service, Vol. I, p. 175.

² *Ibid.*, Vol. I, p. 116.

³ Davis, *Physical Geography*, p. 156.

⁴ Census Bulletin 1901, section of Alabama Manufactures.

⁵ Davis, *Physical Geography*, p. 134.

minerals, iron, building-stone, slate, which are rendered accessible in some places by the cutting which the entrenched streams have done along the fall-line.¹ At Port Deposit and Jones Falls, Md., are extensive quarries of granite and gneiss. In both places, the streams not only help to uncover the rock and drain the quarries, but also to transport it to the coast.² The level coastal plain with its rich deep soils offers quick profits to the raiser of fruits and vegetables in the northern part, of cotton and tobacco in the southern, while the even topography permits of numerous railway lines. Throughout the section, but more especially in the south, there are the added advantages of nearness of raw materials and cheap labor to the centers of manufacture. It is against these two factors that the New England cotton mills are fighting what is in some cases a losing battle. Within the last few months the stockholders of the Booth mills, of Lowell, Mass., one of the oldest concerns in the country, voted to liquidate. Their failure was ascribed in great measure to the growing competition of southern mills. Southern merchants formerly went north for the goods which are now manufactured more cheaply at home, and the raw cotton which was once shipped north to be made up for foreign trade is now being sold from the south direct to Japan and China.³ In the last decade the Southern States have trebled the capacity of their mills. At present there are over 300 mills situated near or in cotton fields along the fall-line from Virginia to Alabama, and the increase in the amount of capital invested in southern cotton mills from 1890 to 1900 was 131.4 per cent.⁴ The southern mills have had the added advantage of being established in recent years, with corresponding improvements, some of which have not yet been introduced in the north. The first factory operated wholly by electricity, without belts or shafting is located in the south.⁵ This method permits of the factory being placed on high ground away from the stream, thus securing accessibility and healthfulness. This operation of textile plants by electric currents derived from water power at a distance accounts largely for the apparent decrease in use of water, from one-half the total motive power used in the United States to about one-sixth, which was noted in the last census.⁶ In North Carolina the increase in use of water was 20,050 horsepower, or 79.2 per cent.; in Georgia and New Jersey it was respectively 43.8 per cent. and 41.5 per cent.⁷

¹ Gilbert and Brigham, *Introduction to Physical Geography*, p. 69.

² Maryland Weather Service, Vol. I, p. 147.

³ Adams, *Commercial Geography*, p. 87.

⁴ Census Bulletin 1902, *Manufactures*, p. 14.

⁵ *Ibid.*, p. 13.

⁶ U. S. Census 1900, Vol. VIII, p. 133.

⁷ *Ibid.*

Of the fifty millions invested in cotton manufacturing in seventeen Georgia towns, Augusta controls ten millions and Macon six millions. The increase in the value of cotton goods produced by South Carolina from 1890 to 1900 was \$20,123,120, while the increase in North Carolina during the same period was \$18,809,355. Of the seven advantages named in the census as causes for the successful localization of industries, the Southern States possess as regards cotton, five, *i. e.*, nearness to raw materials, accessibility to markets, waterpower, favorable climate and supply of cheap labor. Of the Virginia fall-line towns, Richmond is the most favorably located for it has an abundant supply of tobacco at its doors, a climate well suited to the handling of the leaf,¹ cheap labor, and the James River, which is navigable by large vessels and also furnishes abundant water power, for it falls nearly fifty feet at Richmond.² So favorable are all conditions to tobacco manufacture that large quantities of Connecticut, Pennsylvania and Havana leaf are brought into the state to be made into cigars. In 1890 there were 296 establishments capitalized at \$10,536,198.³

From the time of the early settlements in Maryland the abundant water power furnished by the streams of the Piedmont has been applied first to grist and saw mills and later to the manufacture of textiles, cotton, wool and knit goods, and wood pulp.⁴ Of these, cotton manufactures, especially that of cotton duck in Baltimore is most important. Another factor besides location on the fall-line, which has aided in the success of Baltimore is its position near a region famous for its fruits and vegetables as well as its oysters. All these products are canned extensively, in fact Maryland leads in the canning of oysters, tomatoes and peaches.⁵

Pennsylvania, on account of its abundant supply of fuel, coal, natural gas, timber, has used waterpower less extensively than almost any other state; at present waterpower represents only 4.6 per cent. of the total power used and is confined largely to grist and lumber mills, paper and wood pulp manufacture,⁶ which are not Pennsylvania's chief products. The importance of its fall-line cities is due mostly to their position at the head of navigation on large streams and on north and south railway lines.⁷ The state ranks first in the manufacture of carpets, with 48 per cent. of the total product of the United States, second in wool manufacture with 21.4 per

¹ Census Bulletin 1902, Virginia Manufactures, p. 5.

² U. S. Geological Survey 1885-6, p. 549.

³ Census Bulletin 1902, Virginia Manufactures, p. 5.

⁴ Maryland Weather Service, Vol. 1, p. 146.

⁵ Census Bulletin 1902, Maryland Manufactures, p. 22.

⁶ *Ibid.*, Pennsylvania Manufactures, p. 4.

⁷ *Ibid.*, p. 2.

cent. of the total for the United States, and second in hosiery, worsted and knit goods with 22.9 per cent. of the total product for the United States. Philadelphia is first in all of these manufactures, in fact carpets and woolen goods are restricted almost entirely to that city, and their establishment there antedates the Revolution.¹

Philadelphia's importance in shipbuilding is due to its proximity to the great iron manufacturing establishments of the state, to the depth of the river close to the shipyards and to mild winters which allow outside work on vessels.² Next to the River Clyde in Scotland, the Delaware is now the greatest shipbuilding stream in the world. More of our government vessels are constructed at Philadelphia than at any other point. However, the commercial importance of Pennsylvania is largely due to its iron and steel manufactures located in the central and western parts of the state on the Allegheny plateau.

One important factor in the progress of Trenton, New Jersey, beside its position on the fall-line, and at the head of navigation on the Delaware is the presence of fine pottery clays in the vicinity. Almost the first attempts to produce in this country anything except the coarsest granite ware were made at Trenton.³ From the establishment of the industry there in 1857 experiments were made with finer glazes. The success of exhibits of ivory porcelain and Parian vases made in Trenton factories at the centennial of 1876 greatly stimulated this industry. Higher grades of China of more artistic shape and finer glaze were soon made in many other factories and the success of Trenton pottery was established.

Although it is true that waterpower as a factor in manufacturing is generally decreasing in importance, and therefore mere location on the fall-line would not secure or maintain commercial importance for a city, it is obvious that in most cases, location on that line is connected with many advantages not found together elsewhere, and that the fall-line cities of the Atlantic slope will continue to maintain their present commercial importance.

¹ Pennsylvania Manufactures, p. 9.

² Census Bulletin 1902, Pennsylvania Manufactures, p. 15.

³ Census Bulletin 1902, New Jersey Manufactures, p. 8.