CENTER OF POPULATION AND MEDIAN LINES, CONTINENTAL UNITED STATES

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CENTER OF POPULATION.

On the basis of the Thirteenth Census returns the center of population and the median lines for continental United States have been determined for April 15, 1910. In these calculations no account is taken of the territory and population of Alaska and of other noncontiguous territory. The location of the center at the dates of the several censuses, 1790 to 1910, and the movement of the point from decade to decade, are indicated in the tables and maps of the present bulletin, which includes, also, a map on which are drawn the median parallel of latitude and the median meridian of longitude, 1910.

A somewhat technical significance, different from that frequently given to it, attaches to the term "center of population" as used in census publications. The center is often understood to be the point of intersection of a north and south line which divides the population equally, with an east and west line which likewise divides it equally. This point of intersection is, in a certain sense, a center of population; it is here, however, designated the median point to distinguish it from the point technically defined as the center.
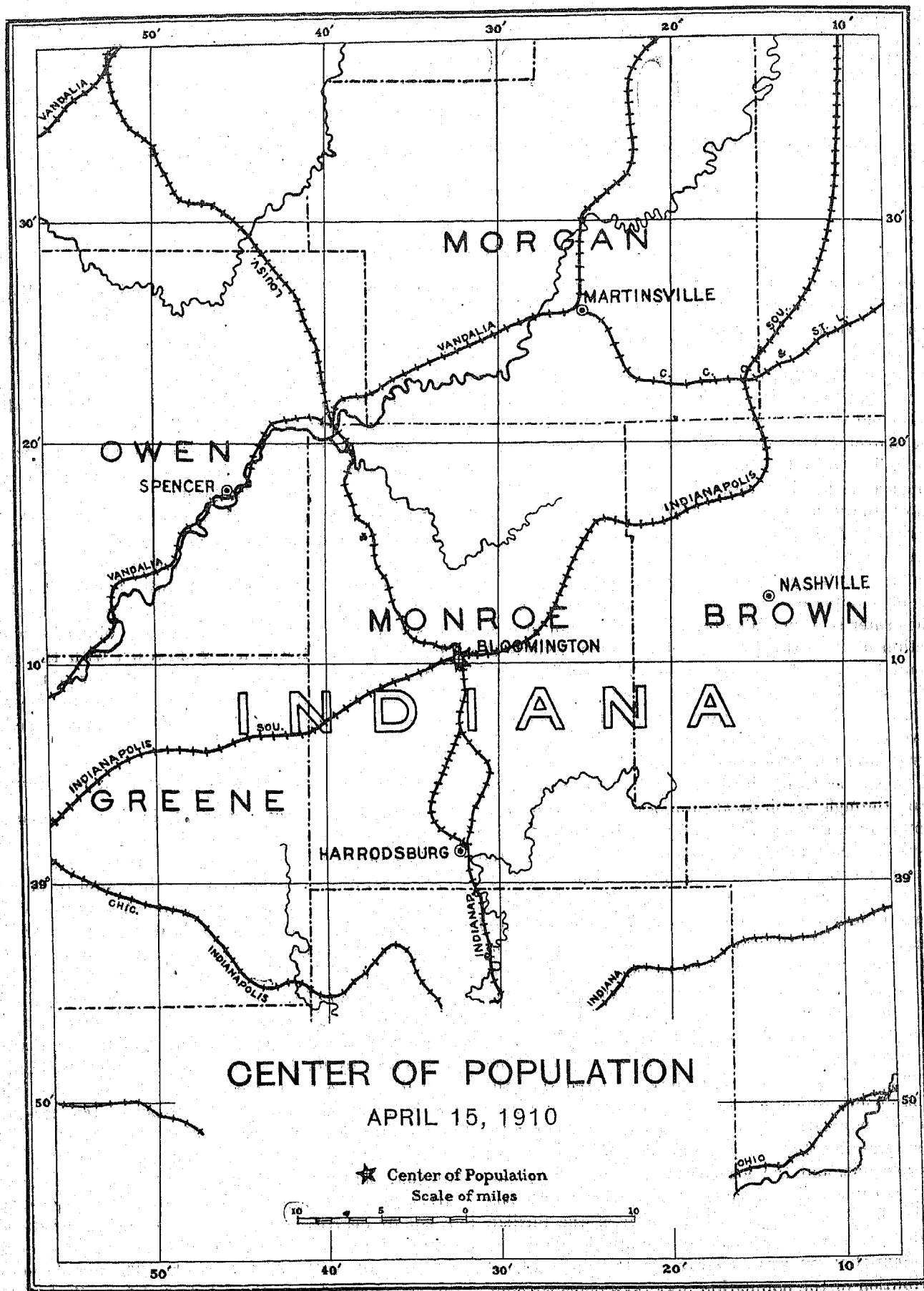
The character of these two points may be made clear through a physical analogy. The center of population may be said to represent the center of gravity of the population. If the surface of the United States be considered as a rigid plane without weight, capable of sustaining the population distributed thereon, individuals being assumed to be of equal weight, and each, therefore, to exert a pressure on any supporting pivotal point directly proportional to his distance from the point, the pivotal point on which the plane balances would, of course, be its center of gravity; and this is the point referred to by the term "center of population," as used in this bulletin. Continuing the above analogy, it may be noted that the median point, which may be described as the numerical center of population, is in no sense a center of gravity. In determining the median point distance is not taken into account, and the location of the units of population is considered only in relation to the intersecting median lines—as being north or south of the median parallel and east or west of the median meridian. It is evident that extensive changes in the geographical distribution of the population may take place without affecting the position of the median point. In this respect the median point differs essentially from the

center of population, which responds to the slightest population change in any section of the country. To illustrate: since the median point lies east of Minnesota, a million persons could move from Minnesota to Oregon without affecting the median point, while the movement of 500 persons from one town in Indiana to another, across the north and south line passing through the median point, would change the location of the point. On the other hand, a movement of a million persons from Minnesota to Oregon would have a very considerable effect on the center of population, since, in terms of the above analogy, the pressure exerted by each individual would increase in proportion to the distance traveled away from the center. If all the people in the United States were to be assembled at one place, the center of population would be the point which they could reach with the minimum aggregate travel, assuming that they all traveled in direct lines from their residence to the meeting place. No such statement holds true of the median point.

METHOD OF DETERMINING THE CENTER OF POPULATION.

In locating the center of population it is first assumed to be approximately at a certain point. Through this point a parallel and a meridian are drawn, crossing the entire country. In determining the center of population in 1910 it was assumed to be at the intersection of the parallel of 39° north latitude with the meridian of 86° west longitude, which lines were taken as the axes of moments.

The product of the population of a given area by its distance from the assumed parallel is called a north or south moment, and the product of the population of the area by its distance from the assumed meridian is called an east or west moment. In calculating north and south moments the distances are measured in minutes of arc; in calculating east and west moments it is necessary to use miles on account of the unequal length of the degrees and minutes in different latitudes. The population of the country is grouped by square degrees—that is, by areas included between consecutive parallels and meridians—as they are convenient units with which to work. The population of the principal cities is then deducted from that of the respective square degrees in which they lie and treated separately. The center of population of each square

MORGAN

MARTINSVILLE

VANDALIA

OWEN

SPENCER

VANDALIA

MONROE

NASHVILLE

BROWN

BLOOMINGTON

INDIANA

SOU.

GREENE

INDIANAPOLIS

HARRODSBURG

CHIC.

INDIANAPOLIS

CENTER OF POPULATION
APRIL 15, 1910

★ Center of Population
Scale of miles

degree is assumed to be at its geographical center, except where such an assumption is manifestly incorrect; in these cases the position of the center of population of the square degree is estimated as nearly as possible. The population of each square degree north and south of the assumed parallel is multiplied by the distance of its center from that parallel; a similar calculation is made for the principal cities; and the sum of the north moments and the sum of the south moments are ascertained. The difference between these two sums, divided by the total population of the country, gives a correction to the latitude. In a similar manner the sums of the east and of the west moments are ascertained and from them the correction in longitude is made.

THE CENTER OF POPULATION: 1910.

At the Thirteenth Census the center of population was in the following position:

Latitude..................... 39° 10′ 12″ N.
Longitude................... 86° 32′ 20″ W.

This point is in southern Indiana in the western part of Bloomington city, Monroe County, as shown on the map on page 2.

During the last decade, 1900 to 1910, the center of population moved west 43′ 26″, approximately 39 miles, while its northward movement was only 36″, or approximately seven-tenths of a mile. The great increase in the population of New York, Pennsylvania, and certain other states north of the thirty-ninth parallel has balanced the increase in Texas, Oklahoma, and southern California. The advance toward the west is, to a large extent, due to the increase in the population of the Pacific coast states, their distance from the center giving any increase of population in those states much greater weight than an equal increase in the populous states east, which are nearer the center. For instance, San Francisco, Seattle, Portland, and Sacramento combined, with a population of 906,016, have as great an influence on the center as Philadelphia, Boston, and Baltimore combined, with a population of 2,778,078. The westward movement from 1900 to 1910 was nearly three times as great as from 1890 to 1900, but was less than that for any decade between 1840 and 1890.

LOCATION OF THE CENTER AT PRIOR CENSUSES.

In 1790 the center of population was at 39° 16′ 30″ north latitude and 76° 11′ 12″ west longitude, which, according to the best maps, is a point about 23 miles east of Baltimore. During the decade from 1790 to 1800 it moved almost due west to a point about 18 miles west of the same city, latitude 39° 16′ 6″, longitude 76° 56′ 30″.

From 1800 to 1810 it moved west and slightly south to a point in the state of Maryland about 40 miles northwest by west of Washington, latitude 39° 11′ 30″, longitude 77° 37′ 12″. The southward movement during this decade was due to the annexation of the territory of Louisiana, which contained quite extensive settlements.

From 1810 to 1820 the center of population moved west and again slightly south to a point about 16 miles north of Woodstock, Va., latitude 39° 5′ 42″, longitude 78° 33′. This second southward movement was due principally to the extension of settlements in Mississippi, Alabama, and eastern Georgia.

From 1820 to 1830 it again moved west and south to a point about 19 miles west-southwest of Moorefield, in the area now comprising the state of West Virginia, latitude 38° 57′ 54″, longitude 79° 16′ 54″. This is the most decided actual southward movement that it has made during any decade, owing to the annexation of Florida and the great extension of settlements in Alabama, Louisiana, Mississippi, and Arkansas, or generally, it may be said, in the Southwest. The movement from 1870 to 1880 was apparently greater, but this was due chiefly to a defective enumeration in 1870, and can not be considered as an actual change in the distribution of population.

From 1830 to 1840 it continued west, but slightly changed its course to the north, reaching a point 16 miles south of Clarksburg, in the area now comprising the state of West Virginia, latitude 39° 2′, longitude 80° 18′. During this decade population had increased rapidly in the prairie states, and in the southern portions of Michigan and Wisconsin.

From 1840 to 1850 the center moved west and slightly south again, reaching a point about 23 miles southeast of Parkersburg, in the area now comprising the state of West Virginia, latitude 38° 59′, longitude 81° 19′, the change of direction to the south being largely due to the annexation of Texas.
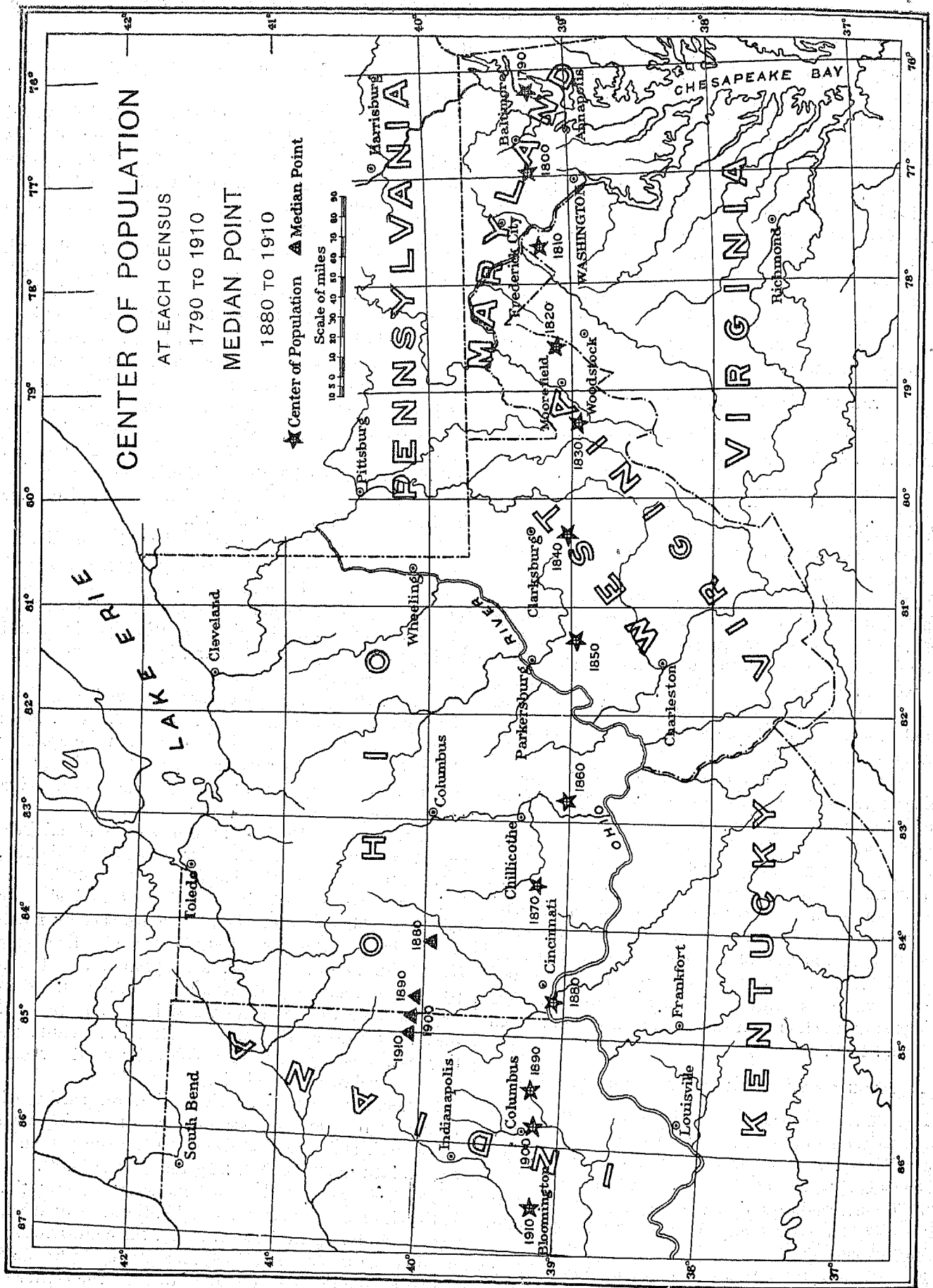
From 1850 to 1860 it moved west and slightly north, reaching a point 20 miles south of Chillicothe, Ohio, latitude 39° 0′ 24″, longitude 82° 48′ 48″.

From 1860 to 1870 it moved west and sharply north, reaching a point about 48 miles east by north of Cincinnati, Ohio, in latitude 39° 12′, longitude 83° 35′ 42″. This northward movement was due in part to the waste and destruction in the South consequent upon the Civil War, and in part to the fact that the census of 1870 was defective in its enumeration of the southern people, especially of the newly enfranchised negro population.

In 1880 the center of population had returned south to nearly the latitude occupied in 1860, being near Cincinnati, Ohio, just south of the Kentucky boundary, in latitude 39° 4′ 8″, longitude 84° 39′ 40″.

In 1890, owing to the great increase of population in the cities of the Northwest and in the state of Washington, and also in New England, the center moved north to latitude 39° 11′ 56″, longitude 85° 32′ 53″.

During the decade from 1890 to 1900 the center of population moved west 16′ 1″, a little over 14 miles, to longitude 85° 48′ 54″, and south 2′ 20″, a little less

CENTER OF POPULATION

AT EACH CENSUS

1790 TO 1910

MEDIAN POINT

1880 TO 1910

✸ Center of Population   ▲ Median Point

Scale of miles

10 5 0   10   20   30   40   50   60   70   80   90

LAKE ERIE

PENNSYLVANIA

MARYLAND

CHESAPEAKE BAY

○ Harrisburg

○ Pittsburg

○ Baltimore   ✸1790

Annapolis

✸1800

WASHINGTON ✸

Frederick City ○   ✸1810

✸1820   Moorefield ○

○ Woodstock   ✸1830

VIRGINIA

WEST VIRGINIA

Richmond ○

○ Wheeling

Clarksburg ○   ✸1840

Parkersburg ○   ✸1850

Charleston ○

OHIO

○ Cleveland

○ Columbus

Chillicothe ○   ✸1860

✸1870   Cincinnati ○

○ Frankfort

○ Louisville

KENTUCKY

Toledo ○

○ South Bend

INDIANA

1880 ▲

1890 ▲

1910 ▲ ▲ 1900

Indianapolis ○

Columbus ○   ✸1890

✸1900

✸1910   Bloomington ○

OHIO RIVER

○ Charleston

(4)

than 3 miles, to latitude 39° 9′ 36″. This is the smallest movement it has ever shown in a decade, the great ·increase in the population of Indian Territory, Oklahoma, and Texas being largely offset by an increase in the population of the North Atlantic states.

The movement from 1900 to 1910 has already been described.

The closeness with which the center of population throughout its westward movement has clung to the thirty-ninth parallel of latitude is remarkable. The most northern point was reached in 1790 and the most southern point in 1830, but the difference was only about 21 miles. In each decade there has been a westward movement. The greatest movement west was during the decade from 1850 to 1860, when the center advanced 81 miles; the least from 1890 to 1900, when it advanced 14 miles. The total westward movement since 1790 is 557 miles.

The following table and the map on page 4 show the location of the center of population and its westward advance during each decade since 1790.

POSITION OF THE CENTER OF POPULATION: 1790 TO 1910.

CENSUS YEAR.	North latitude.			West longitude.			APPROXIMATE LOCATION BY IMPORTANT TOWNS.	MOVEMENT IN MILES DURING PRECEDING DECADE.			
								From point to point in direct line.	Westward.	Northward.	Southward.
	°	′	″	°	′	″					
1790.........	39	16	30	76	11	12	23 miles east of Baltimore, Md......................	....	....	....	....
1800.........	39	16	6	76	56	30	18 miles west of Baltimore, Md.....................	40.6	40.6	....	0.5
1810.........	39	11	30	77	37	12	40 miles northwest by west of Washington, D. C..	36.9	36.5	....	5.3
1820.........	39	5	42	78	33	0	16 miles north of Woodstock, Va....................	50.5	50.1	....	6.7
1830.........	38	57	54	79	16	54	19 miles west-southwest of Moorefield, W. Va.[1]....	40.4	39.4	....	9.0
1840.........	39	2	0	80	18	0	16 miles south of Clarksburg, W. Va.[1].............	55.0	54.8	4.7	....
1850.........	38	59	0	81	19	0	23 miles southeast of Parkersburg, W. Va.[1].......	54.8	54.7	....	3.5
1860.........	39	0	24	82	48	48	20 miles south of Chillicothe, Ohio................	80.6	80.6	1.6	....
1870.........	39	12	0	83	35 ·	42	48 miles east by north of Cincinnati, Ohio........	44.1	42.1	13.3	....
1880.........	39	4	·8	84	39	40	8 miles west by south of Cincinnati, Ohio.........	58.1	57.4	....	9.1
1890.........	39	11	56	85	32	53	20 miles east of Columbus, Ind....................	48.6	47.7	9.0	....
1900.........	39	9	36	85	48	54	6 miles southeast of Columbus, Ind................	14.6	14.4	....	2.8
1910.........	39	10	12	86	32	20	In the city of Bloomington, Ind...................	39.0	38.9	0.8	....

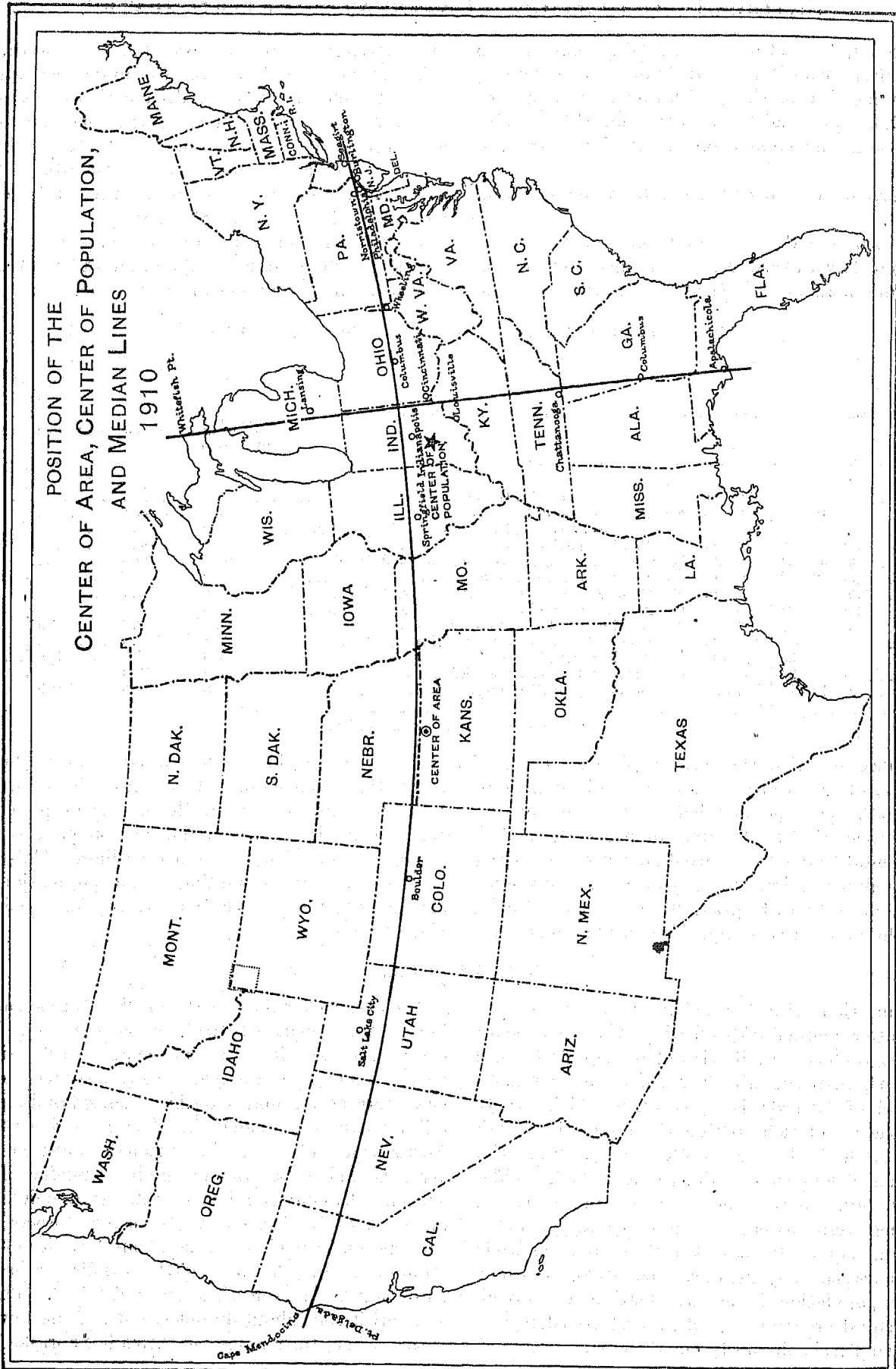[1] West Virginia formed part of Virginia until 1860.

In connection with the location of the center of population of the United States it is of interest to note also the position of what may be termed the center of area—that is, the point on which the surface of continental United States would balance if it were a plane of uniform weight per unit of area. This point is located in northern Kansas, 10 miles north of Smith Center, the county seat of Smith County, approximate latitude 39° 55′, longitude 98° 50′, and is therefore about three-fourths of a degree (51 miles) north and 12¼° (657 miles) west of the center of population. Its location is shown on the map on page 6 designating the position of the median lines. This would be the center of population if the population were distributed evenly over the territory of continental United States.

MEDIAN LINES.

In connection with the definition of the median point another method of presenting facts with regard to the geographical distribution of the population has been noted, involving the location of median lines. A parallel of latitude is determined which evenly divides the population so that the population north of that parallel is the same as that south. Similarly, a meridian of longitude is determined which divides the population evenly as between east and west. In calculating these median lines it is necessary, in the case of the square degrees of latitude and longitude which are traversed by the lines themselves, to assume that the population is evenly distributed through these square degrees or to make an estimated adjustment where this is obviously not the case.

The eastern terminus of the median parallel, according to the census of 1910, is on the New Jersey coast near Seagirt. In its course west this line passes through central New Jersey, leaving the state near Burlington and entering Pennsylvania a few miles north of Philadelphia, thence passing through Norristown and continuing through southern Pennsylvania and across the northern extremity of West Virginia, leaving the latter state at a point a few miles north of Wheeling. It nearly bisects Ohio, Indiana, and Illinois, crossing about 10 miles north of Columbus, Ohio, 25 miles north of Indianapolis, Ind., and about 20 miles north of Springfield, Ill. Through Missouri it runs about 30 miles south of the Iowa and Missouri line, thence passing through Nebraska about

POSITION OF THE
CENTER OF AREA, CENTER OF POPULATION,
AND MEDIAN LINES
1910

MAINE

VT. N.H. MASS. CONN. R.I.

N.Y.

PA.

Morristown Burlington
N.J.
Phila. DEL.
MD.
D.C.
Wheeling
W. VA.
VA.

Whitefish Pt.

MICH.
Lansing

Columbus
O.Cincinnati

KY.
Louisville

N.C.

S.C.

GA.
Columbus

FLA.
Apalachicola

ILL.
Springfield O Indianapolis
CENTER OF
POPULATION

IND.

OHIO

TENN.
Chattanooga

ALA.

MISS.

WIS.

MINN.

IOWA

MO.

ARK.

LA.

N. DAK.

S. DAK.

NEBR.

CENTER OF AREA

KANS.

OKLA.

TEXAS

MONT.

WYO.

Boulder
COLO.

N. MEX.

IDAHO

Salt Lake City

UTAH

ARIZ.

WASH.

OREG.

NEV.

CAL.

Cape Mendocino

Pt. Delgada

10 miles north of its southern boundary, and across the northern part of Colorado, passing about 5 miles north of Boulder city. Its location in Utah is about 45 miles south of Salt Lake City near Spanish Fork towns. There are no large towns near its course across the northern part of Nevada and California. The western terminus of the median parallel is on the Pacific coast, in Humboldt County, Cal., about 5 miles north of Point Delgada and 20 miles south of Cape Mendocino, the point of continental United States extending farthest west.

· The median meridian starts at Whitefish Point, on the northern peninsula of Michigan, near the eastern end of Lake Superior, thence passing south through the southern peninsula of Michigan about 25 miles west of Lansing and through Indiana about 10 miles west of the Indiana-Ohio boundary, and 25 miles west of Cincinnati. South of the Ohio River it bisects Kentucky about 40 miles east of Louisville, crosses eastern Tennessee, and leaves the state 20 miles east of Chattanooga. Through Georgia it passes close to the Georgia-Alabama line, about 2 miles west of Columbus, Ga., leaving the state near the intersection of the Alabama, Georgia, and Florida boundary lines. It then crosses the northwestern portion of Florida and terminates in the Gulf of Mexico at the city of Apalachicola.

During the last three decades, from 1880 to 1910, there has been little change in the location of these lines—so slight in fact that the changes can not be accurately shown on a small map. For this reason the median lines are not drawn on the accompanying map for any years prior to 1910. The median parallel has moved north a distance of 11.3 miles since 1880. In the same period the median meridian has moved west 45.3 miles. Each of the three decades has shown a slight movement of the parallel north and of the meridian west. Between 1900 and 1910, however, the northern movement was only 2.3 miles, and the westward only 7.5 miles. The greatest change took place in the decade from 1880 to 1890, during which period the median parallel moved north 6.6 miles, and the median meridian west 27 miles. The location of these lines at the several censuses, from 1880 to 1910, is shown in the following table. The location of these lines in 1910 is shown on the map on page 6.

MEDIAN LINES: 1880 TO 1910.

CENSUS YEAR.	Median parallel, north latitude.			Median meridian, west longitude.			MOVEMENT IN MILES DURING PRECEDING DECADE.	
							Median parallel, northward.	Median meridian, westward.
	°	′	″	°	′	″		
1880	39	57	00	84	7	12		
1890	40	2	51	84	40	1	6.6	27.0
1900	40	4	22	84	51	29	2.4	10.8
1910	40	6	24	84	59	59	2.3	7.5

It may be observed that while each median line exactly bisects the population as a whole it does not at any given point or through any given section of its course necessarily bisect the population even approximately. The median parallel does not bisect even approximately the population living either west or east of the Mississippi River. Similarly, the median meridian does not bisect the population either of the northern or southern section of the country. Nor does any one of the four sections into which the intersecting median lines divide the country contain one-quarter of the total population. It is obvious, however, that the diagonally opposite sections are necessarily exactly equal in population.[1] The population of the north-eastern section exactly equals the population of the southwestern; and, similarly, the population of the southeastern exactly equals that of the northwestern. The northeastern and southwestern each contain, in fact, a population of about 27,500,000, while the southeastern and northwestern sections each contain about 18,500,000.

MEDIAN POINT.

What is termed by the Census Bureau the "median point" of the population corresponds, as already stated, to a common conception of the center of population; that is, it is the junction of the median line dividing the population equally north and south with the median line dividing it equally east and west, distance of the population from the center not being considered. As already indicated, the changes in the median point reflect only the difference between the growth of population east of the point and the growth west of it and the difference between the growth north and south of the point. Other differences in relative growth do not affect its location.

[1] The mathematical demonstration of this is simple. If A, B, C, and D represent, respectively, the population of the north-western, northeastern, southeastern, and southwestern sections, then:

A+B=½ population of U. S.
B+C=½ population of U. S.
A+B=B+C.
Therefore A=C.
Similarly it may be proven that B=D.