

CHARLES F. HERRMANN



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THESIS
INFLUENCE OF FORESTS
ON THE CLIMATE

BY

CHAS. F. HERRMANN.

THESIS

First impression

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-: I N F L U E N C E O F F O R E S T S
O N T H E C L I M A T E . :-

Thesis written by

C. F. Herrmann,
1897.

THESIS

Table of Temperatures.

1892

	Tree Temperatures		Open air Temperatures	
	Trees in open field.	Trees in forest	Temperature at 2 p. m.	Mean Temperature
June	66.71	63.86	72.	67.7
July	66.99	62.57	73.35	70.29
August	68.73	62.51	75.35	68.3
September	61.39	59.87	69.03	60.80
October	51.02	52.08	57.41	48.3

1897

	Temperatures in the Forest		Temperatures in open air	
	In Trees	On Trees	2 p. m.	Mean
February	29.04	30.32	32.45	26.01
March	31.21	37.13	38.42	32.82
April	47.09	50.44	52.15	42.58
May	59.95	66.46	66.93	57.59

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If we listen to the many complaints man makes against his surroundings in nature we must stop and question, why this lack of completeness and harmony? At first we are almost lead to believe that man is an entirely helpless creature, subject to the seeming defects in creation. But careful investigation shows that this is not true, and that man is dissatisfied only when he is out of harmony with the laws of nature. The lack of obedience to nature's laws has exposed the yield of our land to destructive influences by the sudden changes and extremes of temperature. Through that ever predominant factor, human selfishness, and the greed of immediate gain the forests of our country have been destroyed, and unless a timely means for their restoration is adopted the evils that we shall yet experience will be of even a more severe character than those we have experienced in the past.

Of the many influences of forests for the good of mankind it will be our special aim to try to show its influence upon the climate; leaving entirely out of consideration its influence in acting as a regulator of hydrological conditions, its mechanical influence in preventing floods, and its effect of purifying the air by taking up carbonic acid and giving off oxygen.

Although the woods about the College farm are of insufficient extent to afford all the conditions found in large areas of woodland, yet the investigations carried on in them indicate that they have an influence upon the surrounding atmosphere, and that in such localities where forests are abundant they have a marked influence upon climate.

During the year 1892 from the month of June to October inclusive observations of the temperatures of trees in the open field and forest were made at 1 p. m. daily. For this purpose three trees were selected in the open field, a maple, pine, and spruce whose diameters were sixteen, twenty-one and seventeen inches respectively; in the forest two oaks were chosen with diameters of thirty inches and thirty-six inches respectively. The temperatures of the trees were obtained by boring holes about one foot in depth from the north side.

During the month of June the temperatures of the maple, pine, and spruce trees were 66.4, 68.64, 65.11 degrees F., respectively making an average temperature of 66.71 degrees F. for the trees in the open field; the temperatures of the two oaks averaged 64.12, 63.8 respectively making an average temperature of 63.86 degrees F., for the trees in the forest. During the month of July the above named trees in the open field averaged 66.44, 68.06, 66.46 respectively, making a total average of 66.99 degrees F.; The temperatures of the above named trees in the forest averaged 62.6, 62.54 respectively, making a total average of 62.57 degrees F., for the forest trees. In August the above named trees in the open field averaged 69.77, 70.61, 65.83 respectively, making a total average of 68.73 degrees F.; The temperatures of the above named trees in the forest averaged 63.66, 61.37 respectively, making a total average of 62.51 degrees F., for the forest trees. In September the above named trees in the open field averaged 62.65, 62.76, 58.78 respectively, making a total average of 61.39 degrees F.; the temperatures of the above named trees in

the forest averaged 59.71, 60.03 respectively, making a total average of 59.87 degrees F., for the forest trees. In October the above named trees in the open field averaged 55.53, 52.14, 46.4 respectively, making a total average of 51.02 degrees F.; the temperatures of the above named trees in the forest averaged 52.3, 51.87, respectively, making a total average of 52.08 degrees F., for the forest trees. During these months the averages of the daily mean temperatures of the open air were as follows: June 67.7, July 70.29, August 68.3, September 60.80, October 48.3; and the averages of the maximum temperatures of the day taken at 2 p. m., were June 72, July 78.35, August 75.35, September 69.03, October 57.41.

Comparing the temperatures of the trees in the field and in the forest with the averages of the maximum and mean temperature of the day we find that while the temperatures of the trees were nearly constant the daily fluctuations of the open air temperatures were very marked. The trees in the forest as compared with those in the field and with the open air temperatures show that during the months of June, July, August, while the latter two temperatures were comparatively high the temperatures of the forest trees on the contrary were considerably lower. In September the temperatures of the open air and of the trees in the field fall considerably while those of the forest trees fall but little. In October this change is still more marked, and we have the temperatures of the forest trees above that of the trees in the field while the difference between the temperatures of the forest trees

and that of the open air is not as great as in previous months.

Beginning with February in the year 1897 and continuing through May the observation of the temperatures on the inside and the outside of four beech trees were made at 1 p. m. The trees selected for this purpose had a diameter of nineteen, sixteen, twenty-three, twenty-six inches respectively.

During the month of February the average temperature in the trees was 29.04 degrees F., while the temperature on the outside of the trees averaged 30.32 degrees F. In March the temperature in the trees averaged 31.21 while the outside temperatures of the trees averaged 37.13 degrees F. In April the temperatures in the trees averaged 47.09 while the temperatures on the outside of the trees, averaged 50.44 degrees F. In May the temperatures in the trees averaged 59.95 while the temperatures on the outside of the trees averaged 66.48 degrees F. During these months the averages of the mean temperature of the open air were as follows: February 26.01, March 32.82, April 42.58, May 57.59; while the averages of the maximum temperatures taken at 2 p. m., were February 32.45, March 38.42, April 52.15, May 66.98.

Comparing the temperatures in the trees with those on the outside of the trees show that during February they are more nearly equal than during the remainder of the months, and that the temperatures in the trees are slow to respond to the variations of temperature in the forest. The temperatures on the outside of the trees and those of the open air are also more nearly equal during February than for the remainder of the months, and the forest temperature is less subject to

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the fluctuations of the atmosphere than that of the open air.

The observations made in the year 1892 and those made in 1897 both indicate that the forests have a marked influence upon the climate in the three following ways:

1st Owing to the constancy of the temperature of the trees the atmosphere is less variable;

2nd The retention of heat by the trees tends to warm the surrounding atmosphere during the colder months;

3rd During the summer months the trees have a tendency to take up the heat and thereby cool the air which comes in contact with them.

The indication of these results is that the forests exert an ameliorating influence upon the climate together with their other beneficent effects.

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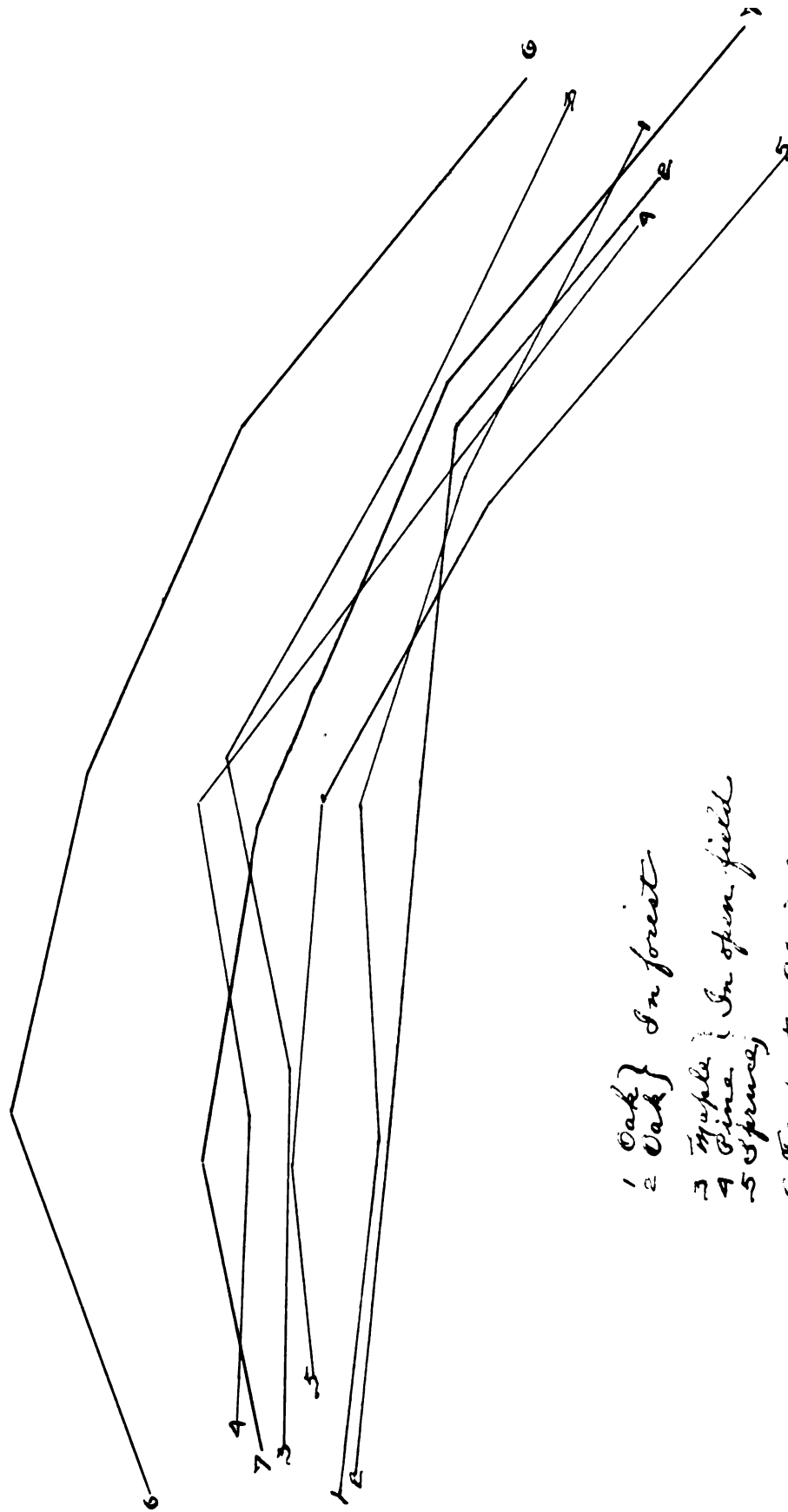
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OCTOBER

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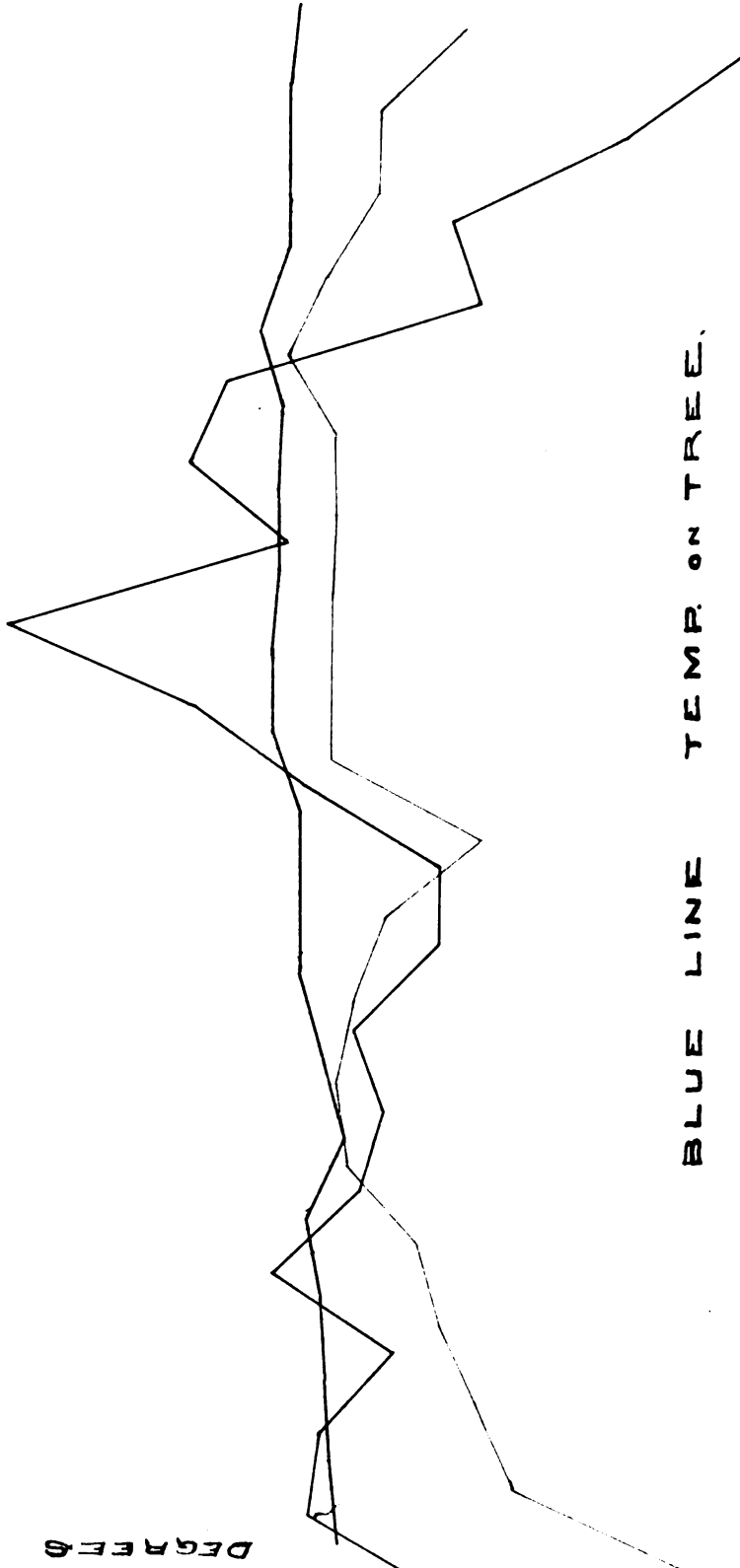
1 Oak } In forest
2 Oak }

3 Maple } In open field
4 Pine }
5 Spruce }

6 Temp at 2 P.M. } In open air
7 Mean Temp. }

DEGREES FAHRENHEIT

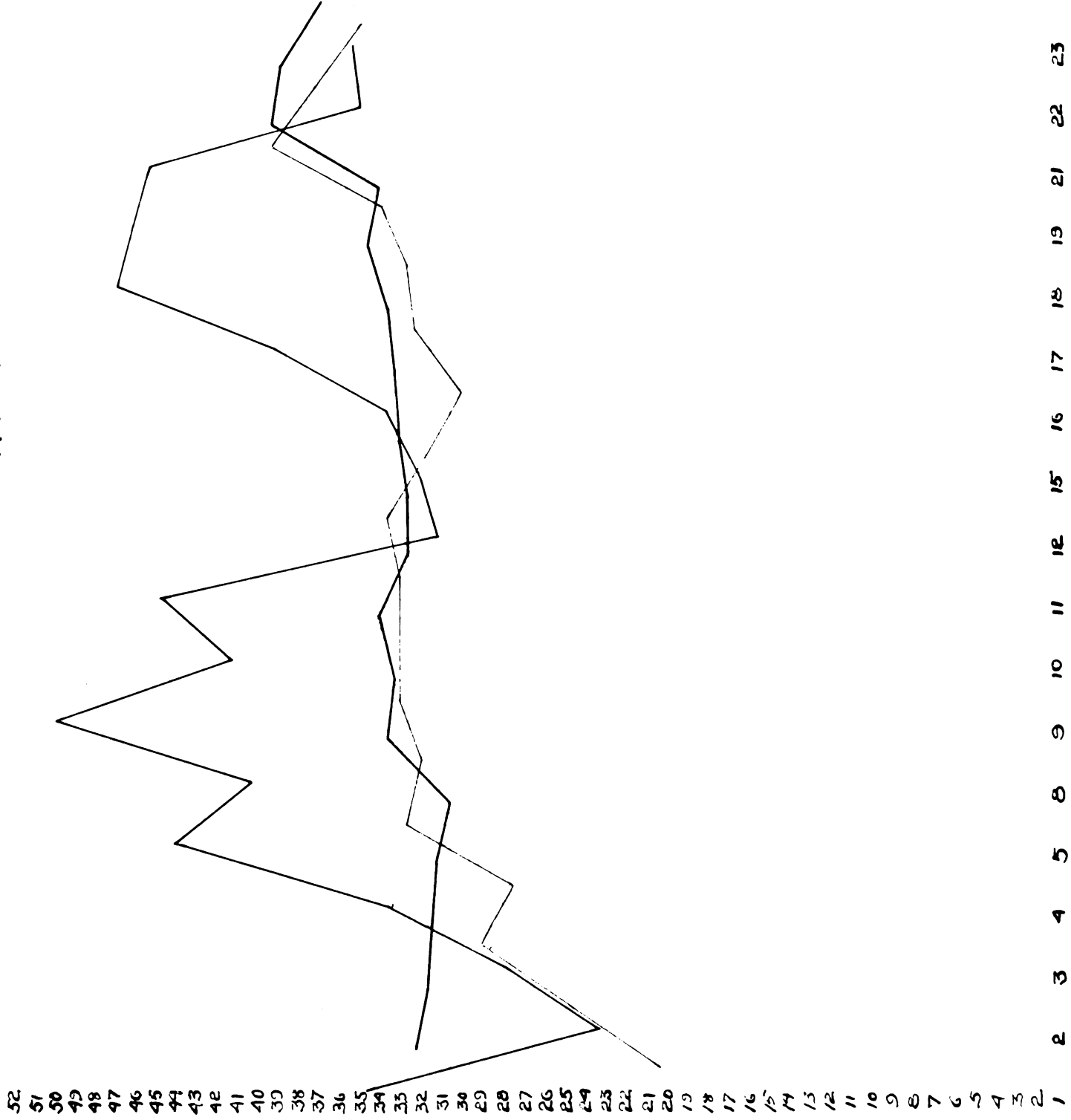
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BLUE LINE TEMP. ON TREE.
BLACK LINE TEMP. IN GROUND.
RED LINE TEMP. IN TREE.

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MARCH



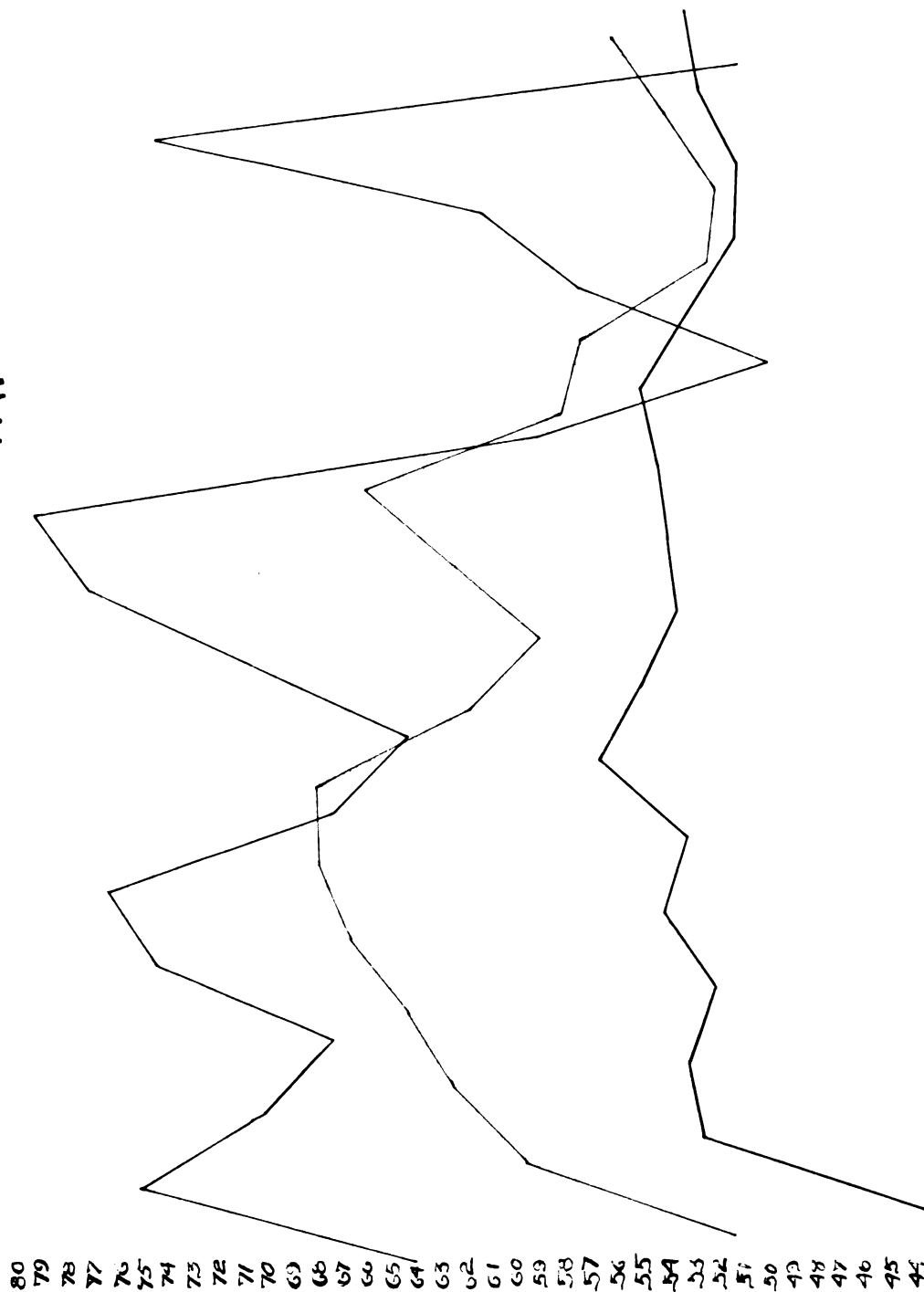
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