HUMAN TWINNING IN THE UNITED STATES: RACIAL FREQUENCIES, SEX RATIOS, AND GEOGRAPHICAL VARIATIONS

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INTRODUCTION

In reviewing recently the publications on human multiple twinning, I was struck by the scantiness of quantitative data bearing on the subject. Most writers quote VEIT's statistics on twinning in Prussia, collected seventy-five years ago, or give approximate frequencies of twinning without any citation of sources or authorities. Fortunately, however, there has been accumulating since 1915 a significantly large and constantly increasing mass of data on the subject of multiple births in the United States. These figures are to be found in the yearly reports on birth statistics issued by the Census Bureau. I have attempted in this paper to compile and analyze the data so as to make them readily available for use. There are certain obvious conclusions that may be drawn from the figures, but for the most part I have not tried to dilate upon possible theoretical deductions. In addition to the data for the United States, I have included for comparison a few statistics from other countries; the sources for these are listed in the bibliography.

The first annual report on birth statistics in the United States was issued in 1915, but the first seven reports did not include single still-births, nor multiple still-births where none of the children were alive at birth. I have accordingly begun with the report for 1922, in which complete data are given by sex, color, and state of registration for all births and still-births, and for both single and multiple births. Figures from thirty states were available that year, and by 1930 (the date of the current report) forty-six states and the District of Columbia were reporting. Slightly over eighteen million births were reported in the nine years.

There is an unfortunate defect in the reports on the colored births. The single births are listed for white, negro, Indian, Chinese, and Japanese separately, but the multiple births since 1922 have not been classified in this way but have been recorded merely as white or "colored." There is not much question as to the bearing of these figures on twinning in the negro race, for 94 percent of the "colored" births are negro, and only 6 percent Indian or Asiatic. I have checked the 1923–1930 figures on "colored" births against: (1) the figures for twinning in the negro alone, as

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given in the 1915–1922 reports; and (2) the figures for "colored" twins in some of the southern states where the negro births form more than 99 percent of all "colored" births; and I feel no hesitation in saying that the figures for multiple births in the "colored" population may be taken to represent the negro race. On the other hand, it is impossible to draw any conclusions from these data as to the relative frequency of twinning in Amerinds or Asiatics.

THE FREQUENCY OF TWINNING IN AMERICAN WHITES

The statistics on multiple births in the white population in this country are given in table 1. It will be seen that the frequency of multiple births is about the same as was found by VEIT in Prussia (1/89). Twins, of course, are vastly more common than cases of triplet or quadruplet birth. We may point out from this table a popular fallacy that has gone unquestioned for years as to the proportional relations between the num-

TABLE 1

Mutiple births in the registration area of the United States between 1922 and 1930, in members of the white race. Includes both live- and still-births.

	ALL PREGNANCIES	ALL MULTIPLE BIRTHS	TWINS	TRIPLETS	QUADRUPLETS
Number	16,538,001	189,358	187,499	1,829	30
Percent of all pregnancies		01.145	01.133	00.011	00.00018
Fractional frequency		$\frac{1}{87.3}$	$\frac{1}{88.2}$	$\frac{1}{9042}$	$\frac{1}{551,266}$

bers of twins and of triplets. It has been said that if $\frac{1}{n}$ equals the frequency of twin births, then $\frac{1}{n^2}$ will be the frequency of triplet births, and $\frac{1}{n^3}$ that of quadruplets. From the above table, we see that $\frac{1}{n}$ is $\frac{1}{88.2}$. $\frac{1}{n^2}$ then, should be $\frac{1}{7779}$, and $\frac{1}{n^3}$ should be $\frac{1}{682807}$. Comparing these with the actual values in the table, it is seen that triplet births are 14 percent less frequent, and quadruplets 19 percent more common than the alleged formula would lead us to expect. We must conclude that the $\frac{1}{n}:\frac{1}{n^2}$ ratio between twin and triplet births is only an approximation, and not a very close one at that.

It must not be concluded that the frequency of twinning as found in this country will apply to all other nations. It has always been pointed out that there are variations in this respect from one country to another.

TABLE 2

Frequency of multiple births in American whites and in certain other nations.

NATION	NUMBER OF BIRTHS	MULTIPLE BIRTHS	FREQUENCY
U. S. White	16,538,001	189,358	$\frac{1}{87.3}$
Ontario	69,209	793	$\frac{1}{87.3}$
Australia	117,258	1,271	$\frac{1}{92.3}$
New Zealand	27,316	343	$\frac{1}{79.6}$
South Africa (Europeans)	46,423	545	$\frac{1}{85.2}$
Belgium	665,355	11,959	$\frac{1}{55.6}$
Uruguay	33,709	389	$\frac{1}{86.7}$
Norway	1,693,202	24,493	$\frac{1}{69.2}$
Sweden	Percent of multiple births, 1851–1920 varied between 01.425 and 01.499		$\frac{1}{68\pm2}$

A few illustrative figures are given in table 2. There is seen to be a high frequency of twinning in Scandinavia, a fact which has been noted many times previously, and an even higher percentage in Belgium. It is interesting to note that twinning seems to be of ordinary frequency in Uruguay, as some writers have claimed that multiple births are usually rare in Mediterranean racial stocks.

FREQUENCY OF TWINNING IN "COLORED" (=NEGRO) RACES

The data given in table 3 are the Census Bureau's figures for colored births; as was pointed out previously, these are composed of approximately

TABLE 3

Multiple births in the registration area of the United States between 1922 and 1930, in members of the "colored" races. Includes both live- and still-births.

	ALL PREGNANCIES	ALL MULTIPLE BIRTHS	TWINS	TRIPLETS	QUADRUPLETS
Number	1,829,077	26,336	25,977	352	7
Percent of all pregnancies		01.44	01.42	00.19	00.00038
Fractional frequency		$\frac{1}{69.5}$	$\frac{1}{70.4}$	$\frac{1}{5196}$	$\frac{1}{261,297}$

94 percent negro, 2 percent Indian, and 4 percent Asiatic births. Multiple births are seen to be 25 percent more frequent than in United States

whites, and the excess of triplet and quadruplet births alone is even greater. As in the white births, the alleged rule of $\frac{1}{n}:\frac{1}{n^2}$ is seen to give a false idea of the proportion of twin to triplet births.

As stated previously, I feel that the above results should be taken as applying to the negro, and not to the "colored" races in general. I have at hand two definite statements as to twinning in these groups. ABERLE found 4 sets of twins in 644 pregnancies among the Pueblo Indians, an incidence of $\frac{1}{161}$; and LAUFFER quotes a French physician, Dr. A.-T. MONDIÈRE, as having records of 153,174 births among the Annamese with only 15 multiple births. If multiple births are really so infrequent among Amerinds and Asiatics, then the values of table 3 are somewhat lower than they would be if the table included only negro births. In any case, the values in the table may be looked upon as representing a minimum, and twinning in the negro is definitely more common than in the white.

It has been objected that the figures for the negro may be inaccurate because of incomplete reports from the southern states. It is quite probable that the reports are not always complete, although I doubt that the southern states as a whole are any worse in this respect than other parts of the country. Even where the reports are incomplete, we might expect that they would be near enough to a random sample to yield valid percentages. However, in order to check this point, I examined the returns on colored births from several of the states separately. There seems to be some variation in the percentage of multiple births from one state to another, but this variability is not nearly as great as the similar fluctuations in the white births, nor does it seem to bear any relation to sectional lines, for in most of the northern states with a large negro population the percentage of multiple births is as high as it is in the south. It seems certain that the differences shown between whites and negroes in tables 1 and 3 represent real differences of a racial character.

SEX RATIOS IN MULTIPLE BIRTHS, AND THEIR SIGNIFICANCE

In table 4 I give the distribution of the sexes in all cases of multiple births and still-births reported since 1915. This table enables us to establish two points. The first of these concerns the sex ratios in multiple births as compared with that of births in general. Considering first the sets of twins, we find their sex ratio to be 103.5 for the whites, and 100.6 for the colored. For all births between 1922 and 1930 the ratios were: white, just under 106; colored, slightly over 103. There is thus a definite excess of females in twins as compared to the ratio in single births. In the triplet births, there is an absolute as well as a relative preponderance of females;

TABLE 4

Sex ratios in multiple births in the registration area of the United States, 1915–1930. For the years 1915–1921 the figures include only cases where at least one member was alive at birth.

	TWINS		
	♂♂	♂♀	♀♀
White	95,685	92,670	90,892
Colored	10,847	11,916	10,745

	TRIPLETS			
	♂♂♂	♂♂♀	♂♀♀	♀♀♀
White	711	649	697	726
Colored	103	100	103	155

	QUADRUPLETS				
	♂♂♂♂	♂♂♂♀	♂♂♀♀	♂♀♀♀	♀♀♀♀
White	13	6	8	6	7
Colored	0	0	4	1	3

the ratio falling to 97.7 for white and 79.4 for colored. The numbers of quadruplets are hardly large enough to be reliable. In them there is a decided preponderance of males among the whites and of females among the colored.

From the sex ratios and the distribution of the sexes in the twin pairs, we can now calculate the relative frequencies of fraternal and identical twinning. If the sex ratio in the white twins is 103.5, then the distribution of pairs of fraternal twins will be $(103.5)^2$♂♂, 2(103.5) (100)♂♀, and $(100)^2$♀♀. Since all the ♂♀ pairs are fraternal twins, the actual number (92,670) of these being known enables us to calculate the numbers of ♂♂ and ♀♀ pairs which are fraternals, and by subtraction to obtain the numbers of like sexed pairs which are identicals. Solving in this way, we find that out of a total of 279,247 sets of twins about 93,827 pairs, or slightly over 33 percent, must have been identical. Similar calculations indicate a little less than 29 percent of identicals in the colored twins.

	♂♂	♂♀	♀♀
twin pairs	95,685	92,670	90,892
fraternal pairs	48,000	92,670	44,750
identical pairs	47,685		46,142

The above figures differ from those of NICHOLS, who found only 26 percent of twin pairs to be identicals. NICHOLS also found a reduction in the

sex ratio in multiple births, but not to such a marked degree in the twin and triplet births as is shown in this paper. On the other hand, he found a sex ratio of only 54.8 in quadruplet births, while in the cases listed here there is actually a preponderance of males in white quadruplets. These differences are possibly due in large measure to the fact that NICHOLS' data were compiled from all the available records of various nations in both Europe and the Americas, and hence was of different racial composition, and of even less homogeneity, than the data presented here. As a possible bit of evidence that the tendency to the occurrence of multiple births differs in our series, I may point out that quadruplets occurred three times as often in my records as in NICHOLS'.

REGIONAL DIFFERENCES IN THE INCIDENCE OF TWINNING

The regional variations in the frequency of multiple births in the white race are shown in table 5 and figure 1. The negro has not been considered in this connection because of the impossibility of separating records of Indian and Asiatic births from those of the negro. In as far as they can

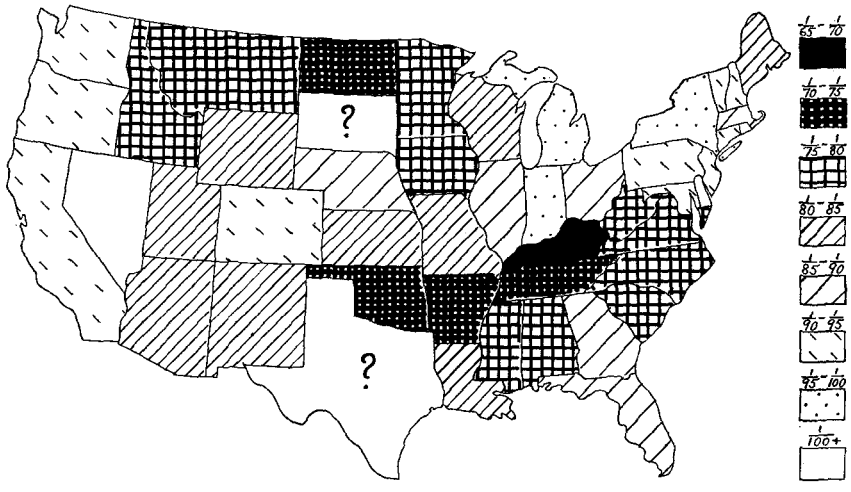

FIGURE 1.—Map to show the incidence of multiple births in whites by states, compiled from the data given in table 5. The basis used is the fractional frequency, that is, one multiple birth in so many pregnancies.

be interpreted, however, the data indicate that the negro is less variable than the white in the frequency of twinning, although some states do differ in this respect.

It is evident from the map in figure 1 that there are two regions in which twinning is exceptionally frequent, one in the south and one in the northern plains region, but the reasons for these differences are obscure. I feel that these variations in the frequency of multiple births are probably due

TABLE 5

Frequency of multiple births in whites, by State of registration. Includes all data available from 1922 to 1930.

STATE	TOTAL BIRTHS	MULTIPLE BIRTHS	FREQUENCY (1 IN:)
Alabama	170,490	2,175	78.2
Arizona	38,553	462	83.4
Arkansas	124,187	1,769	70.3
California	701,498	7,449	94.4
Colorado	56,262	603	93.3
Connecticut	264,508	2,898	91.3
District of Columbia	50,007	524	95.4
Delaware	34,778	326	106.6
Florida	149,026	1,691	88.1
Georgia	113,003	1,324	85.4
Idaho	45,352	568	79.8
Illinois	1,166,547	13,040	89.4
Indiana	557,865	5,701	97.8
Iowa	319,024	4,019	79.4
Kansas	317,476	3,748	84.7
Kentucky	468,365	7,006	66.8
Louisiana	109,254	1,346	81.2
Maine	147,153	1,785	82.4
Maryland	246,488	2,634	93.5
Massachusetts	728,548	8,301	87.7
Michigan	872,533	9,003	96.9
Minnesota	473,639	6,184	76.5
Mississippi	208,012	2,654	78.3
Missouri	244,973	2,941	83.2
Montana	88,432	1,156	76.5
Nebraska	259,451	3,007	86.5
Nevada	2,474	20	123.7
New Hampshire	83,253	910	91.4
New Jersey	629,260	6,725	93.6
New Mexico	22,793	280	81.3
New York	2,019,614	20,820	97.0
North Carolina	518,646	6,730	77.0
North Dakota	102,577	1,382	74.2
Ohio	1,085,930	12,644	85.9
Oklahoma	119,050	1,610	74.0
Oregon	130,568	1,430	91.3
Pennsylvania	1,830,665	19,870	92.2
Rhode Island	137,867	1,212	113.8
South Carolina	134,353	1,715	78.4
Tennessee	179,208	2,430	73.7
Utah	118,974	1,459	81.6
Vermont	65,817	720	91.4
Virginia	381,930	4,828	79.1
Washington	210,175	2,331	90.2
West Virginia	250,327	3,180	78.7
Wisconsin	521,371	6,226	83.8
Wyoming	41,625	515	80.8

in large part to racial differences; and such differences are known to exist among European populations; but our knowledge of the racial stocks involved in the present case is too indefinite to allow us to do more than guess at the possibilities. The high percentage of twinning in Minnesota and North Dakota might be due to a large Scandinavian element in these states (see Norway and Sweden, in table 2), but I doubt that this explanation could be extended to Montana and Idaho. Similarly, if we try to explain the frequent multiple births in the southern states as being a racial character of the predominant "old American" stock, why then does not Georgia, with a similar population, agree with them in this respect? It is known that the frequency of twinning increases with the size of the family and the age of the parents (this is pointed out in the Census reports), and it is possible that these factors may be concerned in some way. I feel, however, that our present knowledge is too inadequate to allow us to draw any valid conclusions as to the causes of this remarkable regional fluctuation in twin production; and I prefer to avoid adding any more unverifiable speculations to the vast store with which the whole subject of human twinning is already encumbered.

APPENDIX

An important paper dealing with this same subject came to my attention after this manuscript was already in the editor's hands. This reference is: Sir K. DAS, 1934, Twin pregnancy (a demographic and ethnic study), J. Obst. Gyn. Brit. Emp. **41:** 227–255. DAS'S statistics are from varied sources and are of uneven value. He includes the figures for the United States from 1915 to 1929, giving frequencies of 1/88 for whites and 1/67 for colored. His figures for Germany, Italy, Scotland and Japan are significantly large, the frequency of twinning being between 1/82 and 1/85 for the first three and 1/301 for Japan. The Japanese rate, based on 17 million births, is important as establishing the low twinning rate in Asiatics. Another interesting group of DAS'S figures deals with a series of 48 thousand births in Calcutta hospitals. Europeans and Eurasians show a twinning frequency of 1/95; full blooded Indians of 1/59. DAS naïvely brackets these figures for the Indians with those for United States negroes to prove a higher twinning for colored races against whites, a procedure which implies a total misconception of the idea of racial differences.

LITERATURE CITED

ABERLE, S. B. D., 1932 Child mortality among Pueblo Indians. Amer. J. Phys. Anthr. **16:** 339–349.

AUSTRALIA, Official year-book for 1932.

BELGIUM, Annuaire statistique de la Belgique, 1929–1930.

MONDIÈRE, A.-T., 1875 Monographie de la femme Annamite. Mem. de la Soc. d'anthrop., t. 2, pp. 474– (cited in "Multiple births among the Chinese," B. Laufer, Amer. J. Phys Anthr. **3:** 83–96).

NEW ZEALAND, Official year-book for 1932.

NICHOLS, J. B., 1907 The numerical proportions of the sexes at birth. Mem. Am. Anthrop. Ass **1:** 249–300.

NORWAY, Statistisk Ärbok for Kongeriket Norge, 1929.

ONTARIO, Report relating to the registration of births, marriages, and deaths in the Province of, 1931.

SOUTH AFRICA, Official year-book, for 1931–1932.

SWEDEN, Statistist Ärsbok for Sverige. 1929.

UNITED STATES, Birth, still-birth, and infant mortality statistics. Annual reports, 1915–1930. U. S. Dept. Commerce, Bureau of the Census.

URUGUAY, Anuario Estadistico de la Rep. Orient. del, 1904–1906.

VEIT, G., 1855 Beiträge zur geburtshülflichen Statistik. Monats. f. Geb. u. Frauenk., **6:** 126–132.