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CONSANGUINEOUS MARRIAGES: THEIR
EFFECT UPON OFFSPRING.

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CONSANGUINEOUS MARRIAGES: THEIR EFFECT UPON OFFSPRING.

THE subject of this paper is of interest alike to the physiologist and to the practitioner of medicine, who is constantly liable to be called upon for his opinion as to the desirability, or more often as to the safety, of prospective marriages between relations. The great practical importance of correct views upon this matter has seemed to me, therefore, to justify still further investigation of a topic on which, although much has been said, little has been settled.

The traditional belief, held still by a large majority of the laity and by very many of the medical profession, has been given physiological expression by no one with greater clearness than by Dr. Devay. He says¹:

"The objection to consanguineous marriages in not * * * the perpetuation in families by means of inter-marriages of maladies susceptible of hereditary transmission, as certain forms of temperament, certain organic predispositions, like narrowness of the chest or other vices of formation. *It is evident that the condition of consanguinity in itself adds nothing to the chances of morbid inheritance* which, depending upon the health of those marrying and of their respective ancestors, have the same source in every sort of marriage. We charge upon unions between relatives of the same stock, the production, by the *sole fact of non-renewal of the blood (non renouvellement de sang)*, of a specific

¹ Hygiène de Famille, 2d ed., p. 246.

cause of organic degeneration fatal to the propagation of the species."

Now this statement is very explicit, to the effect that besides the ordinary laws of inheritance which may affect offspring for good or for bad, there is in marriages of relations a specific degenerative influence, due to the mere fact of "non-renewal of the blood." If this be true, it follows that the operation of this influence will be equally potent and baneful when the persons united are healthy as when they are diseased. And there should be discoverable among the offspring of such unions a conspicuous deterioration, out of all proportion to those other hereditary influences whose potency is so well established. Indeed it is difficult to see why, if this supposition be true, we should not find some evidence of degeneration present as the rule in all the persons born from marriages of relations, inasmuch as in all these cases by the hypothesis this specific cause of degeneration is present. Whether this is the fact, has been made the subject of inquiry by many investigators, but with results so utterly diverse as to leave the student more bewildered than ever, and to suggest that in no field of investigation has the statistical method more pronounced limitations than in this. In a paper like the present we can only allude in the briefest manner to some of the most important collection of cases illustrating the opposite views on this question.

Dr. Bemiss¹ collected thirty-four cases of consanguineous marriages. Seven, or 20.5 per cent. were barren. One hundred and ninety-one children were born; an average of 5.6 children per marriage, barren and fertile. Of the one hundred and ninety-one children, fifty-eight died young; fifteen of them from consumption. Of the surviving one hundred and thirty-four, thirty-two are said to be "deteriorated, but without absolute indications of disease." A large number of diseases and defects are ascribed to forty-seven

¹ N. A. Med. Chirurgical Review, January, 1857.

of the remainder, and only forty-six are described as healthy.

Dr. Bemiss also made a report to the American Medical Association¹ the following year, in which he collected eight hundred and thirty-three consanguineous marriages, producing three thousand nine hundred and forty-two children, being 4.6 children per marriage. 28.7 per cent. are put down as defective, 3.6 per cent. as deaf mutes, 2.1 per cent. as blind, 7 per cent. as idiots, 2.04 per cent. as insane, 1.5 per cent. as epileptic, 7.6 per cent. as scrofulous, and 2.4 per cent. as deformed; 22.4 per cent. are recorded as having "died young."

Dr. Howe² collected in the same year, from statistical tables in Massachusetts, seventeen cases of marriage of kindred. "Most of the parents were intemperate or scrofulous; some were both one and the other." These unions produced ninety-five children, of which forty-four (nearly 50 per cent.) were idiots, twelve were scrofulous or puny, one deaf and one a dwarf.

Dr. Arthur Mitchell,³ Deputy Commissioner in Lunacy for Scotland, found among one hundred and forty-six children born from forty-five consanguineous marriages (thirty-seven of them being fertile), 5.5 per cent. idiots, 3.4 per cent. imbecile, 7.5 per cent. insane, 1.4 per cent. epileptic, 3.0 per cent. paralytic, 1.4 per cent. deaf mutes, 2 per cent. blind, 15 per cent. "consumptive, scrofulous or manifestly of weak constitution." A total, as he says, of 64 per cent. of the marriages producing children in some way injuriously affected.

MM. Cadiot,⁴ Devay⁵ and Boudin⁶ have also published

¹ Transactions American Med. Association, 1858, vol. xi. p. 323.

² Journal Psych. Med. and Mental Pathology, July, 1858, p. 393-4.

³ Mem. to the Anthropological Society of London, vol. ii. 1866. See also *Edinburgh Med. Journal*, vol. vii. p. 872.

⁴ Comptes Rendus, tome lvii. p. 978.

⁵ Gazette Hebdomadaire, quoted in *Edin. Med. Journ.*, vol. vii. p. 680.

⁶ *Annales d'Hygiène Publique*, tome xviii.

statistics showing the evil effects of marriages of kin among their own countrymen.

If we now turn to the other side of the account we find equally positive results. In the first place M. Bourgeois¹ gives us the history of his own family, descended from a consanguineous union in the latter part of the 17th century. Eight of the marriages are those of cousins and the remainder, some sixty in number, all feel the influence of consanguinity. Yet only one union in the entire number has been infertile, and here the fault was undoubtedly in the wife, a woman of alien stock, while the husband was three generations removed from the nearest marriage of kin. In one branch there are four marriages of cousins in five successive generations, one of them being of double first cousins. Yet the children of this last union, being four times of kin, are six in number and are all well and bright save one, the victim of a traumatic accidental injury. The health of all the two hundred descendants is excellent, except in one family of grandchildren and great-grandchildren from the double cousin marriage, where a scrofulous taint has crept in.

Seguin² gives the particulars of ten marriages of kin in his own family, two of the number being of uncle with niece and the rest of first cousins, from which sixty-one children were born, most of whom lived to grow up, not a single one showing deaf-mutism, hydrocephalus, stammering or polydactylism.

Dally³ gives a case of continued intermarriages between two families, all being of first cousins save two which were of second cousins. This has continued for five generations with an average of three or four children per marriage. The total number of branches direct and collateral is one hundred and twenty to one hundred and forty, though quite a number of the family have been celibates. There has been

¹ Comptes Rendus, tome lvi. p. 178.

² Comptes Rendus, vol. lvii. p. 254.

³ Anthropological Review, May, 1864.

no case of idiocy or deaf-mutism, and but one of insanity, and that in an old woman.

M. Voisin¹ found in the isolated commune of Batz forty-six consanguineous marriages. Five were between first cousins, producing twenty-three children; thirty-one were between second cousins and produced one hundred and twenty children; and the ten remaining unions gave birth to twenty-nine children. All were healthy and free from deformities of every kind. The community consists of some 3,300 souls, and has always been very much isolated. They are simple, intelligent and moral, and not a single case of mental disease, deaf-mutism, albinism, retinitis pigmentosa or any malformation could be found, though the inhabitants had closely intermarried from time immemorial.

These two classes of observations, so diametrically opposite in their conclusions, cannot both be accepted as fairly representing the facts. If, now, we look for a moment at the testimony with regard to specific constitutional defects, given in most parts by men agreed as to the generally unfavorable effect of consanguineous marriages, we find equally unreconcilable discrepancies. Take the point of idiocy, for instance. Dr. Howe's figures show that 44 per cent. of the children of persons related to each other were idiots, while Bemiss, in one set of his cases, found the idiots to compose 7 per cent. of all the children born, and in another set to amount to only 2 per cent.

In the matter of deaf-mutism, we have the statement of Dr. C. A. Cameron,² based upon the Irish census of 1881, that of the 5136 deaf mutes enumerated in that country, 135 (being 2.6 per cent. of the whole) were the children of first cousins. Yet Dr. Fitzpatrick, in the very discussion which followed the reading of Cameron's paper, asserted that in his experience almost every case of deaf-mutism occurred in persons born from parents who were related.

¹ Mémoires de la Société d'Anthropologie de Paris, vol. ii. 1865, p. 433.

² Med. Press and Circular, May 16, 1883.

Huth, in his interesting work, to which I am indebted for one or two of the foregoing references, has collected the results published by some fifteen investigators as to the proportion of deaf mutes consanguineously descended,¹ and finds the percentages given to vary from a maximum of 30.4 to a minimum of 3.9,—a range so great as seriously to invalidate the figures.

One or two discrepancies in the results of individual observers deserve to be noted. In this same matter of deaf-mutism, Boudin says,² that estimating the danger of a deaf mute being born from an ordinary marriage as one, in a union of cousins it is eighteen, in one of uncle with niece it is thirty-seven, and in one of aunt with nephew seventy. If this defect is due to the mere fact of consanguinity in the parents, its danger should vary directly as the nearness of the relation. But an aunt and nephew are no nearer than an uncle and niece. Why then should there be twice as much danger of deaf-mutism in the one case as in the other?

Again, it appears from the tables of Bemiss,³ that the percentage of the "defective" in the children of third cousins is actually greater than in the offspring of second or even of first cousins. But it is manifestly absurd that effects due to the mere fact of consanguinity should be more disastrous where the degree of relationship is the eighth than where it is the fourth,—in persons having only 6 per cent. of the blood of a common ancestor than in those having 25 per cent.

Impressed by the unreliability of many of the statistics published upon this subject, I have gathered what cases I could hear of as a contribution to the study of an important subject. Before laying the results before you, I may be allowed a word regarding some of the difficulties of the problem. In the first place, all cases collected in this way are almost of necessity selected ones, and I cannot flatter

¹ *The Marriage of Near Kin*, London, 1875, p. 239.

² *Annales d'Hygiène Publique*, tome xviii.

³ *Trans. American Med. Assoc.*, vol. xi.

myself that my own form an exception to the rule. In recalling instances of consanguineous marriage, persons are apt to remember only those which have been made conspicuous; and nothing is more conspicuous than defectiveness among the offspring. The opposite kind of selection, viz., the suppression of unfavorable cases, is much less common, for if an individual should keep back an unfortunate page of his family history, his neighbors will know and report the facts, even while they become oblivious of the uneventful commonplace cases. It is the ill news that travels fast and far. At least three of the unfavorable cases in my list I heard of from multiple sources.

In judging of the results, moral factors have to be allowed their just value. Intemperance, which was present for instance in most of Dr. Howe's cases, the depraved morality attendant on incestuous unions, the luxury and dissipation prevalent in many royal and noble families, the sloth and shiftlessness of many isolated communities, should often bear some at least of the responsibility that is put upon consanguineous marriages. Testimony is sometimes colored by religious prejudices in those who hold allegiance to the canon law. When one reads over the forty or more abnormalities ascribed to the intermarriage of kin, as in the cases published by Huth, and finds among them such diseases as psoriasis and whooping cough, he is forced to believe that the narrator was run away with by his hypothesis.

The great difficulty, after all, is in cases where the children of relations display any taint or defect, to exclude the influence of morbid inheritance. The influence of this factor is very evident in some of my own cases, and is abundantly sufficient to account for the evil results had there been no relationship between the parents.

In regard to inheritable diseases in the parents, I have often been unable to gain information. But no one I think can deny that simple heredity may have borne an important

part in most of the cases. Whether it will account for all the facts is a question which we must reserve till later. Now one very important conclusion follows, namely, that a case where no evil result follows a consanguineous marriage is of more value as evidence against the intrinsic harmfulness of such a union than an unfavorable case is for its harmfulness. For in the former instance at least we know that consanguinity was harmless; in the latter we know that *something* was harmful; it may have been consanguinity or it may not. In other words, the effect being removed there can have been no efficient cause, not even consanguinity; the effect being present, the cause must be look for among *all* the antecedents, not consanguinity alone. If then there were an equal number of good and bad results from such unions, the evidence would preponderate in favor of the harmlessness of the element of consanguinity. I have tabulated one hundred and eight cases of consanguineous marriage, collected from various sources, professional and non-professional. None of the cases, so far as I am aware, have been published before. In eighty-six instances the relationship was that of first cousin; in four, first cousins once removed; in thirteen, second cousins; in one, third cousins; in one, cousins, degree not specified; in one, uncle and niece; in two cases the parents bore the relation to each other of brother and sister.

I have classed as healthy only those individuals who appeared to be free from any congenital defect or disease, and who had an average degree of intelligence and bodily well-being. On this principle among the non-healthy are included all who suffered even from such slight defects as stammering and strabismus; all who were "under par" in intelligence or "not strong"; all who had phthisis, even though that disease developed late, and the individual was for thirty or forty years considered well; all who died in infancy, unless there was evidence that the death was from

some acute disease and independent of any possible inherited taint.

With this somewhat stringent interpretation of the word, I find three hundred and twelve "healthy" children out of a total of four hundred and thirteen, the direct offspring of consanguineous marriages,—the per cent. being about $75\frac{1}{2}$.

The non-healthy individuals comprised :

Deaf Mutes,	12
Insane,	7
Idiots,	13
Blind,	3
Died of Consumption,	15
Nervous,	5
Of less than average intelligence,	8
Died in infancy,	16
Not robust,	6
Hermaphrodite,	1
Died of Meningitis,	2
Cross-eyed,	2
Still-born,	2
Deaf (not congen.),	2
Stammerers,	2
Myopic,	2
Deformed,	2
Epileptic,	1
	<hr/>
Total,	101

Among these one hundred and one persons were also duplicate defects, as follows :

- 2 cases of talipes varus.
- 1 case " somnambulism.
- 1 " " myopia.
- 1 " " polydactylism.
- 1 " " epilepsy.
- 2 dwarfs.

TABLE OF 108 CASES OF CONSANGUINEOUS MARRIAGE.

Cases marked * are of Consecutive Consanguinity.

No. of Case.	Relationship.	Husband's Occupation, etc.	Years Married.	No. of Children.	Healthy Children.	Deaf Mutes.	Insane.	Idiots.	Blind.	Died in Infancy.	Children's Children.	REMARKS.
1	1st cousin		25+	9	8							8 dissolute; 1 nervous, bordering on insanity.
2	1st cousin		25+	8	3	5						"All smart."
*3	1st cousin	son of No. 2	25+	2	1						(1st) deaf mute, had 2 sons also d. m. (2d) had 1 son healthy. 2 mar. relatives (see cases 3 and 4). 3 unms.	Both above the average in intelligence. 1 died at 30, of phthisis.
*4	uncle and niece	son of No. 2	25+	2	2							Twins.
5	1st cousin		25+	3	2		1					
*6	1st cousin	son of No. 5	25+	3								2 children below par in intelligence. One child a hermaphrodite.
7	1st cousin		25+	5	3			2				The idiots also had talipes varus.
*8	1st cousin		25+	4	4							Wife = daughter of No. 7. Children "rather smart."
9	1st cousin		25+	1	1							

	Cases 1-32 Inclusive, all farmers or fishermen.											
	25+	5	1	1	1	1						
10 1st cousin										(1st) 3 children of whom 1 myopic, others healthy, (2d) 3 children died in infancy had several children, all healthy.	3 nervous (hysterical, neurasthenic).	
11 1st cousin	25+	4	3								1 child died at 40 years, of phthisis.	
12 1st cousin	25+	0										
13 1st cousin	25+	2	2									
14 1st cousin	25+	2	2							Daughter had 3 children, 1 d. of ovarian tumor.		
15 1st cousin	25+	6	3	3						(1st) deaf mute, had 4 chil. also d. m., and 3 or 4 who were not; one of the former = No. 16. 5 others all had chil. of average ability.	Wife = grand-child of 15, deaf mute.	
16 2d cousin	5	1			1					1 m. and had 2 deaf mutes.		
17 2d cousin	25+	4	4								The deaf mute also epileptic.	
18 2d cousin	25+	3	2	1								
19 1st cousin	25+	1		1								
20 1st cousin	25+	4	4									
21 1st cousin	25+	2										
22 1st cousin	25+	2	2								(1st) d. of phthisis, aged 25. (2d) always an invalid.	
23 1st cousin	10	2	1							See No. 23.	1 precocious, d. of cerebral meningitis.	
24 1st cousin	25+	3			1						2 had internal strabismus.	
25 2d cousin	25+	2									1 still-born; 1 d. at 3 yrs. of scrofulous meningitis. Wife also had 1 miscarriage.	

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No. of Case.	Relationship.	Husband's Occupation, etc.	Years Married.	No. of Children.	Healthy Children.	Deaf Mutes.	Insane.	Idiots.	Blind.	Died in Infancy.	Children's Children.	REMARKS.
25	1st cousin		25+	7	5		2				One, of average intelligence and health, m. and had 6 chil.; 3 d. in infancy, 1 d. of epilepsy, 1 is an inebriate.	
27	1st cousin		25+	5	4						1 nervous.	
28	3d cousin		25+	2	1			1				1st wife.
29	1st cousin		25+	1	1							Second wife of above.
30	1st cousin		25+	6	5	1						
31	1st cousin		25+	2	2						Daughter had 8 chil., some with scrofula. Two d. of phthisis.	
32	2d cousin		25+	3	3							One daughter d. of "softening of the brain" at the climacteric.
33	1st cousin			5	2		1				(1st) See case No. 34. (2d) mar., childless. (3d) two chil., 1 healthy, the other erratic and partially blind.	Wife's brother insane; one of her parents, two sisters and a brother d. of apoplexy. Husband d. of apoplexy. One child deaf (not congenital) and somnambulist. The daughter has periodical insanity, attributed to disappointment in love. A son d. at 40 of phthisis.
*34	2d cousin	Esou of No. 33		0								Apoplexy and insanity in husband's antecedents; himself healthy.

35	1st cousin			3	2 twins.	1 (s)	Children all unmarried.	Husband=brother of wife (in case No. 33). He d. of apoplexy at 60. Married cousin, mother's side. His sister (No. 33) mar- ried cousin, father's side.
36	1st cousin		2				(1st) see case No. 37. (2d) unmarried.	Wife=sister of wife, cases 33 and 36, and of husband cases 35 and 39. 1st child blind of one eye (congenital). 2d " " of both eyes. "
*37	2d cousin		2	1		1		Wife, blind of one eye=daughter of case 36. Idiotic son d. at 17 years; girl, in- telligent, d. young.
38	1st cousin		2	2			(1st) 3 healthy children. (2d) 4 " "	Wife = sister of husband of case No. 35. Died of apoplexy at 80.
39	1st cousin		1	1		1	Child unmarried.	Husband=brother of wife in case No. 38, and of husband case 35. Died of croup.
40	1st cousin	merchant	25+	6	6			
41	1st cousin	farmer	18	2	2			
42	1st cousin, 1 rem.	carpenter	15	2	2			
43	1st cousin	fisherman	25	3	3			
44	2d cousin	merchant	3½	3	3			
45	1st cousin		15	3	3			
46	1st cousin	druggist.	5	0				Wife had atresia vaginae.
47	1st cousin	professor.	25+	7	7	1	(1st) 4 children. (2d) 8 " " 1 son and 1 dau. d. in infancy. 1 son threatened with cho- rea, did not have it. (3d) 4 child. 1 dau. was tem- porarily insane (religious causes); recovered. (4th) 5 child.	Husband a man of note, 1 dau. a little " over developed," nervously (vivacity and tendency to exaggeration). Original marriage about 1800. 1st generation, 7 children. 2d " " 31 " " 3d " " 42 " " 4th " " 1 " " Total in 1885 =81

55	1st cousin	druggist	25+	4	4	1 married, 3 children, all healthy. 1 died of diphtheria.	1 died of scarlet fever.
56	1st cousin	merchant	10	4	4		Wife d. of anemia soon after birth of child. Son now 21, "full, strong and healthy."
57	1st cousin		1	1	1		Wife had 1 miscarriage.
58	1st cousin	merchant	20?	3	3		Wife's brother died of "wasting palsy." Her family nervous; some of the daughters not very robust, but yet in good health.
59	cousin	farmer	25+	8	8	(1st) 3 children. (2d) 3 " (3d) 4 " (4th) 4 " (5th) 2 "	
60	2d cousin	merchant	11	3	3	Dau. m., no issue. Son m., " In each of these cases there is uterine dis. in wife.	Son very bright, d. at 84 of an acute disease. Other son M.M.S.S.
61	1st cousin	merchant	25	5	5		All unusually intelligent. Son, athlete in college; now M.M.S.S.
62	1st cousin	farmer	25+	2	1		1st son very precocious, great memory, lawyer. 2d son died at 6 weeks, peculiar shaped head.
63	1st cousin	merchant	2	2	2		
64	1st cousin	farmer	1?	1	1		Wife = sister of wife in case No. 62. Child probably died of acute disease.
65	bro. & sist'r			1		Unmarried.	Intelligent, but peculiar owing to facts of percentage becoming known in the village. Died of phthisis at 25-30.
66	bro. & sist'r			1	1	Had 1 son, perfectly well in every way, now a leading citizen.	The son very strong, blacksmith, intelligent, carried on business for himself, lived to great age.

CONSANGUINEOUS MARRIAGES :

No. of Case.	Relationship.	Husband's Occupation, etc.	Years Married.	No. of Children.	Healthy Children.	Deaf Mutes.	Insane.	Idiots.	Blind.	Died in Infancy.	Children's Children.	REMARKS.
69	1st cousin	physician		2								Husband d. of phthisis. Both children intelligent and perfect, d. of phthisis at about 20 years.
68	1st cousin	farmer	25+	1	1						Unmarried.	Wife 15 years older than husband.
69	1st cousin	merchant	25+	8	3						(1st) married, no issue. (2d) 2 children. (3d) 1 or 2 children. (4th) 1 child. All of 3d generation healthy.	2 and probably 3 of husband's brothers forgers, defaulters, etc. Seemed to have no motive for dishonesty. (Two of these brothers had only 1 child each, one of latter died in infancy.) 1 son well served in war, died at 40 of phthisis. 2 sons are well except that they stutter, which has put them at disadvantage and interference with their education. Neither can write a good business letter. 1 son an athlete in college, now not strong. 1 son in business but thought "rather wanting in smartness," died at about 35 of brain disease.
70	1st cousin	merchant	+	3	2						1 married, no issue.	Husband's brother, chronic bronchitis and asthma many years; m., no issue. Another brother, invalid, unmarried. Wife, very deaf, has brother and sister each with issue. 1 son, well but not very enterprising. 1 daughter, deaf and nervous.

71	1st cousin	merchant	25+	2	1					Mothers of husband and wife=sisters; belonged to a family consisting of 7 daus. and 2 sons, all of whom d. of phthisis. Wife had 4 sisters and 1 brother; 3 of these have d. of phthisis. Dau. has narrow chest, subject to catarrh, colds and coughs, so that she "has to take care of" herself, but has had very little sickness, is very bright. Son, great eater, fat, dull and slow: supernumerary toe; myopia, tendency to pulmonary troubles.
72	1st cousin	farmer	25+	8	8					1 dau. d. 1st pregnancy. All the children in this and foregoing case plain, though parents, especially wife (71) good looking. No relation between 71 and 72.
73	1st cousin	lawyer	25+	8	2	1	5			Daughter beautiful and accomplished, m. and had 1 imbecile child.
74	1st cousin	farmer.	25	7	4		1			Heredity unknown. Idiot d. at 18. 1 son precocious, d. 7 years, cause unknown. Cause of infants' death unknown.
75	1st cousin	professor.		1	1					Infant d. umbilical hemorrhage. 2 others rather dull, one has some "malformation of throat."
76	1st cousin	manufacturer	15	1	1					Husband and wife "of opposite temperaments."
77	1st cousin			7	2		5	2		The 2 healthy ones d. in infancy. 4 idiots died; one now living at. 45, has a conical head.
78	1st cousin			1	1					Son now 20, very bright.
79	1st cousin			1	1					

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80	1st cousin			2								Both "deformed;" son a fine bass singer.
81	1st c., 1 rem.			7	4		3				All unmarried.	Husband's father drank and died insane. Wife's father had apoplexy late in life and died insane. Wife's brother now insane from use of alcohol. 3 children showed signs of insanity at puberty. 2 have passed puberty and are healthy. 2 are under 10 years.
82	1st cousin	merchant	18	7	5				2			Husband inclined to phthisis; also his father. Wife's mother nervous. 2 children d. cholera morbus. 1 d. scarlet fever; 1 stupid, slightly deaf. 1 daughter very nervous, has just m. double first cousin.
83	1st cousin	none	20	4	2							All child. bright. 1 has weak eyes, 1 has had "fits," epilepsy(?) but carries on business with success.
84	1st c., 1 rem.	member of the Bos. Tea Party.	24+	11	11				1			Family of much intellectual power, including 3 physicians of note, all college professors. In the oldest branch 5 males 6 ft. 3 in. and upward. (2 = 6 ft. 4½ in.) Only defects = 1 dipsomaniac (2d generation) who got alcoholic tendency from mother (of another family), and perhaps 1 insane (3d gen.).

*85	1st cousin			6	2	1 married twice, no issue.	Husband = grandson of 84. Wife = sister of dipsomaniac (see above). 1 dau. at 47 a dwarf and rather deficient in mind but not an imbecile. 1 son d. at 21 of phthisis.
86	1st cousin	25+	0				
87	1st cousin	25+	9	9	3	(1st) had 11 children. (2d) " " 2 " (3d) " " 14 " (4th) " " 3 " (5th) " " 7 " All healthy.	Husband an early Mass. settler, born 1694. Children died (except 3 in infancy) at 81, 61, 87, 78, and 47. (1 not known.)
88	1st cousin	25+	11	11	2	(1st) married a N. H. settler and was ancestress of well known N. H. family. (2d) see Case 89. (3d) " " 90. Records of descendants of others unknown.	Husband = nephew of 87 (born 1746), also brother of husband Case 91. Wife = sister of wife Case 91. Recorded ages of child. at death, 46, 61, 32, 69, 25, 65, 65.
*89	1st cousin	25+	7	7		All m. and had issue.	Husband, officer, killed war 1812 = son of 88. Children died at 73, 88, 69, 47, 72, 41 and 55 years.
*90	1st cousin	25+	8	8	2	3 married, not known if issue.	Husband = son of 88 and brother of 89. All children but 1 girls. All bright & pretty. Died at 28, 26, 32, 26, 15 and 19. No inherited disease.

CONSANGUINEOUS MARRIAGES :

No. of Case.	Relationship.	Husband's Occupation, etc.	Years Married.	No. of Children.	Healthy Children.	Deaf Mutes.	Insane.	Idiots.	Blind.	Died in Infancy.	Children's Children.	REMARKS.
91	1st cousin	physician	25+	9	9					1	8 married, all had issue. (1st) 4 children. (2d) 10 " (3d) 2 " (4th) 6 " (5th) 5 " (6th) 6 " (7th) 8 " (8th) 9 " No diseases in 2d generation except 2 cases of phthisis (d. 46 & 38) both in 1 family. 6 of the 50 child. of this 2d generation are recorded as having d. in infancy. 1 child in 3d generation has epilepsy.	Husband=brother of husband in Case 88, was medical director of Continental army in Revolution. Child. d. at 67, 71, 78, 82, 78, 70, 80 (1 living at 77). The descendants of this family remarkable, comprising in 1st & 2d generations—2 R. R. presidents, 1 bank president, 2 Atty. Generals (State), 2 overseers Harvard Univ., 3 state senators (1 pres. of senate), 1 college professor and president, 1 judge, 1 supt. of schools, 2 clergymen, 2 lawyers, 5 successful phys. (1 ex. pres. M. M. S.), etc.
92	1st cousin	naval officer	25+	6	5						1 m., has 1 healthy child.	1 child d. young (18?), cause unknown. 1 dau. invalid, neuralgia. 2 sons, healthy, dissipated. 1 son (m'd) d. scarlet fever.
93	2d cousin		15	3	1					1	Unmarried.	1 still-birth from neglected labor. 1 d. marasmus when a few hours old (born soon after a miscarriage). 1 dau. very intelligent and cultivated.

94	1st c., 1 rem.				3				1	1st dan. m., childless. 2 next daus. married brothers, 1 without issue. 1 had 6 child, small in stature and some not robust. All very bright. Of these 1 m. and has issue.	Husband=brother of Case 93. His mother had "weak lungs." The two older dan's were much worn by teaching before marriage. 1 of them (now at. 70) said to have "weak lungs."
95	1st cousin	Cal. pioneer	1	1							Heredity not known. Child now 25 years, dwarf, cannot walk: brutish.
96	2d cousin	farmer	25+	3	1					1 m. (see Case 97).	Husband's 2 brothers d. phthisis. 5 chil- dren of 3d brother d. phthisis. A sister had "weak lungs." 2 children d. phthisis at 24 or 25.
*97	1st cousin	merchant	25+	8	3				1	1 m., 2 healthy children.	Husband=son of #6. 1 child d. at 8, "sero- fula." 1 d. phthisis at 23. 1 " " " 25. 2 others not robust.
98	1st cousin			3							Heredity unknown. 1st child deaf, myopia, night blindness (no oph. examin.), very bright. 2d not bright, talks indistinctly. 3d bright, feeble health.
99	1st cousin	none	25	2	2						
100	1st cousin	master painter	6	2	2				2		Both d. acute non-tuberculous infantile diseases.
101	1st cousin	merchant	18	3	3						

CONSANGUINEOUS MARRIAGES :

No. of Case.	Relationship.	Husband's Occupation, etc.	Years Married.	No. of Children.	Healthy Children.	Deaf Mutes.	Insane.	Idiots.	Blind.	Died in Infancy.	Children's Children.	REMARKS.
102	1st cousin	merchant	10?	5	4						(1st) phthisis, m., childless. (2d) 7 healthy children.	Husband d. " quick consump." et. 31=bro. of husband Case 103. Wife d. of phthisis = sister of wife Case 103. 1 child d. phthisis. 1 drowned. 2 d. unknown causes. All bright; no diseases except 1 case phth.
103	1st cousin	merchant	25+	16	16						1 son unm. 1 son m. (see Case 104). 12 daus., all m., 1 had no child. The other 11 all had issue and most of them large families. All healthy. (1 dau.=Case 108.)	Husband = bro. husband Case 102. Wife = sister of wife Case 102. 4 sons & 12 daus. all grew up. 2 sons drowned, unmarried. Oldest child now living at age of 80.
*104	1st cousin		25+	6	6						(1st) son, m. (see Case 105). (2d) dau., 4 chn. (3d) son m., has issue. (4th) son, 3 chn., all healthy. (5th) unm.	Husband = son of Case 103. 1 child, killed by accident, unmarried.
*105	1st cousin	merchant		3	3				3			Husband = son of Case 104, grandson of Case 103. The children all perfectly formed but d. just after birth.
*106	1st cousin		2	0	0							Wife = grand-d. Case 103. This her second marriage. By former husband had 3 chn.
*107	1st cousin	pay mast. U.S.N.		4	4							Wife = grand-d. Case 103 and sister of wife Case 106.
*108	1st cousin		25+	10	9						7 chn. m. and all had issue (1 had 10 chn.), all healthy.	Wife = d. of Case 103. 1 child d. phthisis, unmarried.

In all of the one hundred and eight marriages, save five, there was issue. In one of these infertile cases there was mechanical impediment present in the wife, and in another the marriage has lasted only two years. In fifty-seven cases only, is it known that husband and wife lived together the average period of fertile married life, which I have assumed at twenty-five¹ years. The total number of children born from these fifty-seven unions, only two being infertile, is two hundred and eighty-two,—an average of about five children per marriage.

In seventeen of the marriages the contracting parties were one or both descended themselves in the first or second generation from consanguineous unions; one of them was blind, another a deaf mute, child of a deaf mute. Fifteen of these marriages have thus far been fertile, with a total of sixty-eight children, of whom forty-eight, or 70½ per cent., were "healthy." The remaining twenty comprise two idiots, three below average intelligence, five who died of phthisis, one of meningitis, five who died in infancy, one hermaphrodite, one scrofulous, two not robust.

Only nine of these consecutive consanguineous marriages are known to have lasted through the complete period of conjugal fertility. These nine produced fifty children, an average of 5.5 each.

The statement has often been made, as for instance by Guipon,² that when sterility does not attend the marriage of relatives it yet shows itself in their offspring. Our tables give the facts regarding one hundred and twenty-eight marriages in which one or both parties were descended in the first or second generation from consanguineous unions,

¹ Bemiss has assumed the extreme average length of time that married women continue to produce in this country as twenty-two years. That standard would not have admitted any larger number of my own cases into the category of those having completed their reproductive career than does the one I have preferred.

² Comptes Rendus. vol. lvii. p. 513.

but themselves married persons not related to them. Of these one hundred and twenty-eight unions, some of which have lasted but a short time, one hundred and ten, or 86 per cent., have thus far proved fertile. The number of children cannot be told, because my information in many cases is simply that there was issue. Interpreting that expression to mean only one child, there are, at least, three hundred and seventy-two children. In forty-seven of the cases only is there evidence that the union has lasted twenty-five years, and at the same time a definite record of the number of children. These forty-seven marriages give two hundred and forty children, an average of 5.1 children each. As to the proportion of disease among the offspring, no calculation can be made in the absence of a definite statement of the number of the offspring. Suffice it to say, that only thirty-seven cases of abnormality are recorded among all these children. They include eight cases of deaf-mutism, six being in children of deaf mutes. This point will be again referred to. Eighty-eight of the one hundred and ten fertile marriages have no cases of disease among any of the offspring.

The first thirty-two cases are all from one isolated community on the north side of the island of Martha's Vineyard. They were kindly furnished me by Dr. L. H. Luce, a member of this Society, resident upon the island. The inhabitants are farmers and fishermen of average intelligence and good character, not addicted to drunkenness. A lack of enterprise, associated doubtless with the nature of their occupations, seems to be the cause of their intermarrying. It will be noticed that all the instances of deaf-mutism occurring in the whole series of cases are to be found in this group representing one little town of Martha's Vineyard.

Cases 33 to 39 inclusive, are from another isolated community on Point Judith, in which was a marked inheritance of apoplexy and insanity. The remaining cases are scattered

about, many of them in this vicinity. All are of American birth, and represent perhaps the better classes socially.

Do these facts warrant us in supposing that there is a specific degenerative effect caused *ipso facto* by consanguinity? Regarding first the rate of fertility; the offspring averaged 5 to each marriage of relations, 5.5 to each case of the children of relations marrying kinsmen, and 5.1 where the children of relations married strangers. Unfortunately we have no fixed standard with which to compare these figures. The article on population in the Encyclopædia Britannica gives 4.51 children as the average product per marriage in England. We know, however, that social and economic considerations affect the number of births as much as do physiological factors. I think it will be generally admitted that the average fertility of these cases compares very favorably with that of most American families. As to the general health rate of the children, we are again without a normal standard of comparison. Each must judge for himself as to the significance of the figures. For one, however, I doubt if more than three-quarters of the general community are free of the major and minor defects and diseases for which the children of these consanguineous unions have been excluded from the category of the healthy. The ratio of those dying of phthisis is remarkably small, being only 3.6 per cent. of the whole number born. Even if we add those "not robust," the proportion of consumptives remains well within the average bounds.

There are three defects only which attract attention as being more frequent than would be expected. These are deaf-mutism, in 2.9 per cent. of all the children, insanity in 1.7 per cent., and idiocy in 3.1 per cent. Regarding the first of these, we notice that all twelve of the cases of deaf-mutism in the children of persons related, and the eight cases which occur in the children of those consanguineously descended but not marrying kin, were found in one locality,

viz., the town of Chilmark on the island of Martha's Vineyard. Of the eight cases last mentioned six were the children of deaf mutes. Dr. Luce, to whom I am indebted for these facts, and who is well acquainted throughout the island, informs me that there has never been to his knowledge a case of deaf-mutism anywhere on the island save in the town of Chilmark. To be sure, he adds, that so far as he knows there is no intermarrying in the other portions of the island, because the inhabitants are more enterprising and have freer intercourse with the main land. He also sends me, however, the particulars of two families in Chilmark, in neither of which was there any consanguinity among the ancestors. The bride in one case was from New Brunswick and in the other was a Portuguese. The former gave birth to one deaf mute, the latter to two. Moreover, other degenerative conditions appear to prevail in this same town, owing to some cause which is not consanguinity. For I learn on the same authority of a case of idiocy where none of the ancestors had ever married a relative. Again, in another family equally free from any consanguineous "taint," among five children there were three hermaphrodites.

The seven cases of insanity occurred in four families. Four of the individuals so affected had a marked inheritance of insanity, three of them deriving it from both the father's and the mother's side. The two families in which the remainder of the cases were found, were both from Chilmark, and nothing definite is reported as to the mental soundness of their ancestry.

The proportion of cases of idiocy, while very small compared with the figures given in some of those observations that have become the standard for the popular ideas on this subject, is yet in excess of the ratio of idiots to the community at large. How far this proportion is representative of the actual facts, and how far it is affected by imperfections in the data, I am not certain. Of the thirteen cases of idiocy

among the four hundred and thirteen children, six are reported from the two isolated communities already mentioned. One of these had a mother and grandmother both deaf mutes. The other seven cases all came to me through non-professional sources, and particulars regarding the parentage are unfortunately wanting. The memorandum as to one family said to contain five "fools" was given me through a second person, and it has not been possible to obtain any further information. I have included the case for what it may be worth, but do not feel quite certain that the total figures for idiocy are not unduly augmented by some error in the one case that furnishes so large a part of them.

Taking into account the fact already alluded to, that some of my lay informants have sent me an unfair proportion of the *causes célèbres* of their vicinity, the total results, it seems to me, are not such as to show any special or conspicuous deterioration peculiar to the children of relations. Of course no one will deny that a union, consanguineous or otherwise, which brings together two individuals having any disease or morbid tendency in common, will involve a direct danger to the offspring. Is it not possible, then, to account by the ordinary laws of morbid inheritance for such untoward results as sometimes follow the marriages of kindred?

The first objection that is raised against this view is that the children of relations are sometimes diseased when the parents themselves seem to be quite healthy. In answer to this, we may say that a more careful examination would often show that the opinion entertained by a merely casual observer regarding the parents' health was ill-founded. Again, the well-known phenomenon of atavism will account for cases where diseases are absent, or rather latent, in both the persons marrying, which were yet present in their common ancestor or in some close collateral branch, and which are capable of transmission through the married kinsfolk to appear again with reinforcement in their offspring.

Another and stronger objection urged by those who believe in a specific evil effect produced by non-renewal of the blood, is furnished by one or two diseases which are sometimes difficult to account for on the ground even of atavistic heredity. Foremost of them in importance for this argument, though a very rare affection, is hemeralopia or retinitis pigmentosa. Some of the leading of ophthalmologists believe that the disease has a specific relation to consanguineous descent. Dr. Derby, for instance, who has kept a careful record of all such cases, informs me that in a total of 12,130 cases in his ophthalmic practice, he has met twenty-three cases of retinitis pigmentosa. In nine instances, the individuals were descended from relations, in six the parents being first cousins, in three being second cousins, and in one the grand-parents being first cousins. In one instance there was no information obtained on this point, and in thirteen there was no relationship in any of the ancestors. In none of these twenty-three cases was any other form of weakness or disease noted. Dr. Derby has also kindly placed at my disposal his collection of the recorded cases of other observers. These amount, including his own just referred to, to two hundred and ten cases; in seventy there was relationship, in one hundred and thirty-nine no relationship, in one no information.¹ The records of the ophthalmic service of

¹ The statistics reported by other observers are as follows :

Pagenstecher reports eleven cases. Parents not related.

Liebreich, ninety-five cases. Parents first cousins in forty-three.

Mooren, thirty-four cases. Parents first cousins in nine; not related in the others.

Hoering, two cases. No relationship.

Stoer, one case. " "

Hoering, four cases. Parents first cousins in one.

Hutchinson, one case. No relationship.

Haase, one case. " "

Monoyer, five cases. " "

Jeffries, three cases. " "

Simri, three cases. " "

Windsor, one case. " "

Swanzy, one case. " "

Harlan, one case. " "

Landolt, one case. " "

Mooren, eight cases. Parents first cousins in three.

Hocquard, fifteen cases. Parents first cousins in five.

the Carney Hospital of this city, which have been kept with especial care on this point, and which Dr. Standish has kindly gone over for me, show in a total of 3,726 patients three cases of retinitis pigmentosa. In one there is no record as to consanguinity, in one there was no relationship, and in one the parents were first cousins.

Deaf-mutism is another defect that is often not transmitted directly from an identical form of disease in the ancestor, and it has therefore been ascribed to consanguinity of parents. But Roosa¹ states, that inasmuch as the disease is often due to inflammatory action, it is not likely to be transmitted as such by inheritance. He says that the causes of deaf-mutism are as numerous as those of deafness unaccompanied by mutism. The intra-uterine causes of the disease, operative perhaps in one-half the cases, are quite unknown. The proximate antecedents of hemeralopia are equally obscure. There is some reason to believe that transitory mental states, such as intoxication, may determine the procreation of an idiotic child. On the whole it seems likely, as has been pointed out by Dr. Child (*loc. cit.*), that all these disease may stand in a relation, as yet unrecognized, to other neuroses present in the ancestors of the persons afflicted, as chorea is connected with rheumatism, or as the phenomenon of blue eyes in cats is associated with deafness.

If we were to accept the conclusions even of Chazerain, who assigns 30 per cent. of deaf mutes to consanguineous descent (a figure vastly in excess of anything that can be substantiated), and if we allow that a third of the cases of retinitis pigmentosa are in the offspring of relations; it yet remains true that the large majority of cases of these defects are due to causes independent of consanguinity. The hereditary taint under these circumstances is not always recognizable, but we know it is there. Why assume two

¹ Practical Treatise on Diseases of the Ear. By D. B. St. John Roosa, New York, 1885.

specific causes to account for one effect, especially when the cause assumed for the minority of cases accounts for them no more intelligibly than would the other cause which is known to be operative in the majority of cases? Is it not more reasonable to suppose that those confessedly obscure nervous affections whose connection with any similar defects in the ancestors we are unable in some cases to trace, may yet, with growing knowledge of the pathogeny and relations of disease, be brought under those great laws whose effects upon heredity are so well established?

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