island, where he starved and was afterwards found dead, on his knees, stiffened in a praying posture, with his hands lifted to heaven.

S. Josias Welch, the third son, was "a man highly favoured of God, . . . and commonly called 'the Cock of the Conscience,' because of his extraordinary talent in awakening and arousing the conscience of sinners." He was extremely troubled with doubts about his own salvation. He was still young when he died.

Whitaker, William, D.D. See under Nowell.*

u. Alexander Nowell,* D.D.

Wilkins, John, D.D., Bishop of Chester. See under Dod.*

g. John Dod.*

Witsius, Herman, D.D. (1636—1708, aet. 72). Born in Friesland, a premature child. Was always puny in stature, but had vast intellectual abilities. Was Theological Professor at Utrecht. His fame was European. Till within a little before his death he could easily read a Greek Testament of the smallest type by moonlight.

[g.] A most pious minister.

[u. The learned Peter Gerhard.

[2S., 34.] His family consisted of two sons, who died young, and of three remarkably pious and accomplished daughters.

SENIOR CLASSICS OF CAMBRIDGE.

The position of Senior Classic at Cambridge is of the same rank in regard to classical achievement as that of Senior Wrangler is to achievement in mathematics; therefore all that I said about the severity of the selection implied by the latter degree (see pp. 16–21) is strictly applicable to the former. I have chosen the Senior Classics for the subject of this chapter rather than the Senior Wranglers, for the reasons explained in p. 197.

The Classical Tripos was established in the year 1824. There have, therefore, been forty-six lists between that time and the year 1869, both inclusive. In nine cases out of these, two or more names were bracketed together at the head of the list as equal in merit, leaving thirty-six cases of men who were distinctly the first classics of their several years. Their names are as follow:—


It will be observed that the name of Kennedy occurs no less than four times, and that of Lushington twice, in this short series. I will give the genealogies of these, and of a
few others of which I have particulars, and which I have *italicized* in the above list, begging it at the same time to be understood that I do not mean to say that many of the remainder may not also be distinguished for the eminence of their kinsmen; I have not cared to make extensive and minute inquiries, because the following list is amply sufficient for my purpose. It is obvious that the descending relationships must be generally deficient, since the oldest of all the Senior Classics took his degree in 1834, and would therefore be only about fifty-seven at the present time. For the most part the sons have yet to be proved and the grandsons to be born.

There is no case in my list of only a single eminent relationship. There are four, namely Denman, Goulburn, Selwyn, and Sidgwick, of only two or three; all the others have four or upwards.

**APPENDIX TO THE SENIOR CLASSICS OF CAMBRIDGE.**

Out of 36 senior classics (all bracketed cases being excluded) since the establishment of the Tripos in 1834, 14 find a place in the appendix; they are grouped into 10 families. The Kennedy family has supplied 1 in 9 out of the entire number of the senior classics.

**Bunbury, Edward H.**; senior classic, 1833.
- gF. Henry, 1st Lord Holland, Secretary-at-War.
- gB. The Right Hon. Charles James Fox; illustrious statesman.
- gB. The 2d Lord Holland; statesman and social leader. *See Fox, in Statesmen*, for other relationships, including that of the Napier family.

**Butler, Rev. H. Montagu, D.D.**; senior classic, 1855; Head Master of Harrow.
- F. Rev. Dr. George Butler; Dean of Peterborough, previously Head Master of Harrow. He was senior wrangler in 1794, at which time there was no University test for classical eminence; however, the office he held is sufficient proof of his powers in that respect also.
- [G.] A man of considerable classical powers and literary tastes; was master of a school at Chelsea.
- B. The Rev. George Butler; Head Master of Liverpool College; 1st class, Oxford.
- B. Spencer P. Butler; barrister; wrangler and 1st class in classics, Cambridge.

**Denman, Hon. George, Q.C. M.P.**; senior classic, 1842.
- F. 1st Lord Denman; Chief Justice Queen’s Bench. *See in Judges.*
- G. Physician; a celebrated accoucheur.

**Goulburn, Henry**; senior classic, 1835. It was he who obtained the extraordinary distinction described in p. 22 (where I also have made a mistake in his pedigree). He died young.
- F. Right Hon. H. Goulburn, Chancellor of the Exchequer.
- [B.] Also an able classical scholar.
- U. Edward Goulburn, Serjeant at Law; a man of well-known high accomplishments and ability.

**Hawkins, F. Vaughan**; senior classic, 1854; one of the youngest at the time of his examination, yet is reputed to have obtained one of the largest number of marks, upon record.
- F. Francis Hawkins, M.D., Registrar of the College of Physicians.
- u. Sir Cesar Hawkins, Sergeant Surgeon to Her Majesty. This is the “blue ribbon” of the profession, being the highest post attainable by a surgeon.
- GB. Charles Hawkins, Sergeant Surgeon to George III.
- CF. Sir Cesar Hawkins, 1st Bart, Sergeant Surgeon to George III.
- GU. Pennell Hawkins, Sergeant Surgeon to George III.
- u. Halford Vaughan, Professor at Oxford.
Hawkins, F. Vaughan, continued—
g. Sir John Vaughan, Judge; Just. C.P. (See in Judges.)
g.B. Rev. Edward Vaughan of Leicester; Calvinist theologian.
g.B. Peter Vaughan, Dean of Chester; Warden of Merton College, Oxford.
g.B. Sir Chas. Vaughan, Envoy Extraordinary to the United States.
g.B. Sir Henry Vaughan, assumed the name of Halford, 1st Bart.; the well-known physician of George III.
g.N. The Rev. Charles J. Vaughan, D.D. joint senior classic of Cambridge, 1838; eminent scholar; Head Master of Harrow; Master of the Temple; has refused two bishoprics. The rigid rule I have prescribed to myself, of reckoning only those who were sole senior classics, prevents my assigning a separate paragraph to Dr. Vaughan.

Kennedy, Rev. Benjamin; senior classic, 1827; for many years Head Master of Shrewsbury School; professor of Greek at Cambridge. Educated at Shrewsbury, of which school he was head boy at 15; obtained the Porson prize at Cambridge at 18, before entering the University, and the Pitt University Scholarship at 19.

B. Charles Rann Kennedy, barrister; senior classic, 1831.
B. Rev. George Kennedy, senior classic, 1834; for many years one of the ablest of the private tutors at Cambridge.
B. Rev. William Kennedy, Inspector of Schools; gained the Porson prize, 1835, but was incapacitated for competition in the classical tripos through his not having taken the previous, then essential, mathematical degree.
N. W. R. Kennedy, son of the above; senior classic, 1868; was Newcastle scholar at Eton.
N. J. Kennedy, has not yet (1869) arrived at the period for taking his degree. He was Newcastle scholar at Eton, and Bell University scholar at Cambridge.
F. Benjamin Rann Kennedy. It is considered that he would have been an excellent scholar if he had had advantages. Had considerable poetic talent (poem on death of Princess Charlotte, quoted by Washington Irving in his “Sketchbook”). Was Master of King Edward’s School, Birmingham.
G. Her maiden name was Maddox, a lady of considerable intellectual and poetic ability.

Kennedy, Rev. Benjamin, continued—
g. — Hall, engraver to George III.; his portrait is in the Vernon Gallery; was a man of mark in his profession.
g. Her maiden name was Giles; she was the daughter of French emigrants; had excellent abilities, that were shared by others of her family, as follow —
u. Rev. Dr. Hall, late Master of Pembroke College, Oxford; a man of considerable classical attainments.
u.S. James Burchell, Under Sheriff of Middlesex; acting Judge of the Sheriff’s Court for forty-five years; a man of eminent business capacity.
u.S. William Burchell, most successful man of business; founder of important companies, as the first Electric Telegraph Company and the Metropolitan Railway.

Lushington, EDMUND; senior classic, 1832; Professor at Glasgow.

GF. James Law, Bishop of Carlisle; author.
GB. The 1st Lord Ellenborough, Chief Justice of the King’s Bench. (See under Judges.)
B. Henry Lushington, 4th classic of his year; Government Secretary at Malta.
B. Franklin Lushington, senior classic, 1846.
B. Charles H. Lushington, Secretary to Government in India. The four following are descended from a second marriage; they have the Lushington, but not the Law, blood.
U. Stephen Rumbold Lushington, Privy Councillor; Governor of Madras; Secretary of the Treasury.
[U.] Charles, Madras Civil Service; Member of Council.
US. Charles Hugh, Secretary to Government in India.

The branch of the Lushington family from which Sir Stephen Lushington, D.C.L., the eminent ex-Judge of the Admiralty, is descended, diverged from the one we are now considering, in the fifth ascending generation from the two senior classics. This branch also contains a considerable number of men of sterling ability, and very few others. There are fully eleven distinguished men within three grades of relationship to Sir Stephen Lushington.

Selwyn, Rev. Dr. William; senior classic, 1828; Margaret Professor of Divinity at Cambridge.
Selwyn, Rev. Dr. William, continued—
B. The Bishop of Lichfield, formerly Bishop of New Zealand; 2d classic in 1831.
B. Sir Jasper Selwyn, Judge; Lord Justice.
B. Miss Selwyn, eminent for philanthropical labours. (Crimean War, “Home” at Birmingham.)

Sidgwick, H.; senior classic, 1859.
B. 2d classic, 1863.
B. Able scholar; senior Tutor of Merton College, Oxford.

Gns., Gups., and GvPS. Dr. Benson, Head Master of Wellington College, is related, though distantly, through the paternal and maternal lines, to Mr. Sidgwick, being both second and third cousin by the first and third cousin by the second.

Wordsworth, Rev. Christopher, D.D., Bishop of Lincoln; senior classic, 1839. See under Poets for his relations, viz.:

U. The Poet.
F. The Master of Trinity College, Cambridge.
B. Excellent scholars; one, the Bishop of Dunkeld.

OARSMEN.

I propose to supplement what I have written about brain by two short chapters on muscle. No one doubts that muscle is hereditary in horses and dogs, but humankind are so blind to facts and so governed by preconceptions, that I have heard it frequently asserted that muscle is not hereditary in men. Oarsmen and wrestlers have maintained that their heroes spring up capriciously, so I have thought it advisable to make inquiries into the matter. The results I have obtained will beat down another place of refuge for those who insist that each man is an independent creation, and not a mere function, physically, morally, and intellectually, of ancestral qualities and external influences.

In respect to Oarsmen, let me assure the reader that they are no insignificant fraction of the community,—no mere waifs and strays from those who follow more civilized pursuits. A perfect passion for rowing pervades large classes. At Newcastle, when a great race takes place, all business is at a standstill, factories are closed, shops are shut, and offices deserted. The number of men who fall within the attraction of the career is very great; and there can be no doubt that a large proportion of those among them who are qualified to succeed brilliantly, obey the attraction and pursue it.

For the information in this and the following chapters, I am entirely indebted to the kind inquiries made for me.
by Mr. Robert Spence Watson of Newcastle, whose local knowledge is very considerable, and whose sympathies with athletic amusements are strong. Mr. Watson put himself into continual communication with one of the highest, I believe by far the highest, authority on boating matters, a person who had reported nearly every boating race to the newspapers for the last quarter of a century.

The list in the Appendix to this chapter includes the names of nearly all the rowing men of note who have figured upon the Tyne during the past six-and-twenty years. It also includes some of the rowers on the Thames, but the information about these is not so certain. The names are not picked and chosen, but the best men have been taken of whom any certain knowledge could be obtained.

It is not easy to classify the rowers, especially as many of the men have rarely, if ever, pulled in skiff matches, but formed part of crews in pair-oared, four-oared, or six-oared matches. Their performances have, however, been carefully examined and criticised by Mr. Watson and his assessor, who have divided them into four classes.

I have marked the names of the lowest with brackets [], and have attached to them the phrase "moderately good." These are men who have either disappointed expectations founded on early promise, or have not rowed often enough to show of what feats they are really capable. No complete failure is included. Few amateurs can cope with men of this class, notwithstanding the mediocrity of their abilities when judged by a professional standard.

The next ascending grade is also distinguished by brackets [], but no qualifying expression is added to their names. They consist of the steady reliable men who form good racing crews.

The two superior grades contain the men whose names are printed without brackets—whom, in short, I treat as being "eminently gifted." In order to make a distinction between the two grades, I add to the names of the men who belong to the higher of them, the phrase "very excellent oarsman."

It is not possible to do more than give a rough notion of the places into which these four grades would respectively fall in my table (p. 34) of natural gifts. I have only two data to help me. The first is, that I am informed that in the early part of 1868, the Tyne Amateur Rowing Club, which is the most important institution of that kind in the north of England, had been fifteen years in existence and had comprised, in all, 377 members; that three of these, as judged by amateur standards of comparison, had been considered of surpassing excellence as skiff-rowers, and that the best of these three was looked upon as equal to, or perhaps a trifle better than, the least good of the brothers Matfin, who barely ranks as an "excellent" rower.

The other datum is the deliberate opinion of the authorities to whom I am indebted for the materials of this chapter, that not 1 man in 10 will succeed as a rower even of the lower of the two grades whose names are marked in my Appendix by brackets, and that not 1 in 100 rowers attains to excellence. Hence the minimum qualification for excellence is possessed by only 1 man in 1,000.

There is a rough accordance between these two data. A rowing club consists in part of naturally selected men. They are not men, all of whom have been taken at haphazard as regards their powers of rowing. A large part are undoubtedly mere conscripts from the race of clubable men, but there must always be a considerable number who would not have joined the club save for their consciousness of possessing gifts and tastes that specially qualified them for success on the water. To be the best
oarsman of the 377 men who are comprised in a crack rowing club, means much more than to be the best of 377 men taken at haphazard. It would be much nearer the truth to say, that it means being the best of all who might have joined the club, had they been so inclined and had appeared desirable members. Upon these grounds (see also my remarks in p. 12) it is a very moderate estimate to conclude that the qualifications for excellence as an oarsman, are only possessed by 1 man in 1,000.

The “very excellent” oarsmen imply, I presume, a much more rigorous selection, but I really have no data whatever on which to found an estimate. Many men who found they could attain no higher rank than “excellence,” would abandon the unprofitable pursuit of match rowing for more regular and, as some would say, creditable occupations. We shall not be more than half a grade wrong if we consider the “excellent” oarsmen to rank in at least class F of natural gifts, with respect to rowing ability, and the “very excellent” to fall well within it.

I do not propose to take any pains in analysing these relationships, for the data are inadequate. Rowing was comparatively little practised in previous generations, so we cannot expect to meet with evidence of ancestral peculiarities among the oarsmen. Again, the successful rowers are mostly single men, and some of the best have no children. It is important, in respect to this, to recollect the frequent trainings they have gone through. Mr. Watson mentions to me one well-known man, who has trained for an enormous number of races, and during the time of each training was most abstemious and in amazing health; then, after each trial was over, he commonly gave way, and without committing any great excess, remained for weeks in a state of fuddle. This is too often the history of these men.

There are in the Appendix only three families, each containing more than one excellent oarsman; they are Clasper, Matfin, and Taylor, and the total relationships existing towards the ablest member of each family are, 8 B and 1 S.

There appears to be no intermarriage, except in the one case that is mentioned, between the families of the rowers; indeed there is much jealousy between the rival families.

APPENDIX TO OARSMEN.

“I have not picked and chosen, but have simply taken all the best men I could hear anything certainly about.”—Extract from Mr. Watson’s Letter.
The 18 men whose names are printed in italics are described below as examples of hereditary gifts. The remaining 3 are not.
Candlish; Chambers; 5 Clasper; Coombe; Cooper; Kelly; Maddison; 2 Matfin; Kenforth; Sadler; 5 Taylor; Winskip.

Candlish, James; a Tyne mān, married sister of Henry Clasper; has no children.
[B.] Thomas; a good but not a great rower; has always pulled as one of a crew. Unmarried.
[B.] Robert; moderately good; has not rowed very often.

Clasper, Henry; very excellent oarsman. Is the most prominent member of a large and most remarkable family of oarsmen. He was for many years stroke of a four-oared crew, and frequently the whole crew, including the coxswain, were members of the Clasper family. For eight years this crew won the championship of the Tyne. Six times Henry Clasper pulled stroke for the crew winning the championship of the Thames, and Coombes declared that he was the best stroke that ever pulled. Up to the year 1859, when he was 47 years old, he had pulled stroke 78 times in pair- or four-oared matches, and his crew had been 54 times victorious. He had also pulled in 32 skiff matches and won 20 of them, and had been champion of Scotland upon the only two occasions on which he contested for it.
Nearly all these matches were over a 4 or 4½ mile course. He invented the light outrigger, and has been a very successful builder of racing boats.

**FAMILY OF CLASPER.**

[Edward Hawks.]  
◊ = Clasper, ◊ a keelman.

Henry.*  
[Wm.]  
[Edw.]  
Robert.  
Richard.*  
[Thos.]  
Drowned.

John Hawks.*  
Others  
A good rower.  
Young  
children.

The names marked with a * are very excellent oarsmen. Those in brackets [ ] are similarly marked in the letterpress.

S. John Hawks Clasper; very excellent oarsman. Has rowed more skiff matches than any man living. When he had contested 76 races, he had won 50 of them. He has brothers, but they are too young to have showed their powers.

B. Richard Clasper; very excellent oarsman, known as the "Little Wonder." Was, when 37 years old, only 5 feet 2 inches high, and weighed 8 stone 6 lbs. In spite of this he was bow-oarsman to the brothers' crew, and a rare good one. He has rowed many skiff races with first-class men, and has scarcely ever been beaten, but is too light to contend for the championship.

B. John Clasper; very excellent oarsman; was drowned when young (æt. 19). He had won several small matches, and one important match with a man called Graham, and his fine style and excellent performances (considering his age) caused him to be looked upon as a rower of extraordinary promise.

B. Robert Clasper; able oarsman.  
[N.] Son of the above; is a good rower.  
[B.] William; never pulled as one of a crew; he was recently drowned.

[B.] Edward; has the disadvantage of having lost a leg.  
[B.] (half-brother). Thomas; moderately good.  
[u.] Edward Hawks; a fair rower.

The father of the Clasper family was a keelman.
WRESTLERS OF THE NORTH COUNTRY.

I am wholly indebted for the information contained in this chapter, as I was for that in the last, to Mr. Robert Spence Watson. With the assistance of a well-informed champion wrestler, that gentleman has examined into the history of those of the 172 men of whom anything could be learnt, who were either first or second at Carlisle or Newcastle since the establishment of the championship at those places; at the first, in 1809, and at the second, in 1839.

It is exceedingly difficult to estimate the performances of the ancestors of the present generation, because there were scarcely any prizes in former days; matches were then made simply for honour. We must not expect to be able to trace ancestral gifts among the wrestlers to a greater degree than among the oarsmen.

I should add, that I made several attempts to obtain information on wrestling families in the Lake districts of Westmoreland and Cumberland, but entirely without success; no records seem to have been kept of the yearly meetings at Keswick and Bowness, and the wrestling deeds of past years have fallen out of mind.

There are eighteen families in my Appendix, containing between them forty-six wrestlers, and the relationships existing towards the ablest wrestler of the family are 1 F, 21 B, 7 S, and 1 n.

APPENDIX TO WRESTLERS OF THE NORTH COUNTRY.

Blair, Matthew; winner of Decies prize at Newcastle in 1859, champion of 11 stone men at Newcastle in 1862.
B. Robert; winner of Decies prize at Newcastle in 1857.
B. Joseph; winner of Decies prize in 1861; 2d 11 stone man at Newcastle in 1862, and at Carlisle, 1863.
Daley, Charles; champion 10½ stone, Newcastle, 1839.
B. John; 2d 10 stone, Newcastle, 1840 and 1842.
Ewbank, Noble; champion of all weights at Newcastle, 1858, 1859, 1860; champion of picked men at Newcastle, 1859; champion of all weights, Carlisle, 1858.
F. Joseph; champion of all weights at Newcastle, 1847.
[B.] Joseph; only a second-rate wrestler.
Glaister, William; champion, Newcastle, 11 stone, 1850; 2d all weights, Newcastle, 1851; 2d all weights, Carlisle, 1856.
B. George; very good.
Golightly, Frank; a famous wrestler in the last century.
B. Tom; champion at Melmerby.
Gordon, Robert; champion all weights, Carlisle, 1836 and 1846; 2d, 1837, 1839, 1840, 1845, and 1848; champion all weights at Newcastle, 1846.
B. William; a good wrestler.
[B.] Thomas; tolerably good.
B. Robert Lowthian; champion light weights, Newcastle, 1855 and 1860.
Harrington, Joseph; champion light weights at Newcastle, 1844, 1853, 1854; champion 11 stone, Newcastle, 1855; 2d all weights at Newcastle, 1845.
B. Charles; champion light weights, Newcastle, 1848; 2d, 1849.
S. James Scott.
Irving, George; champion all weights, Carlisle, 1827 and 1828.
S. George; very good light weight wrestler.

B.G. — W
WRESTLERS OF THE NORTH COUNTRY.

Ivison, Henry; a first-class man, but in old times, when the competition was less severe than now.
S. John; 2d for all weights at Newcastle, in 1842; champion of 10½ stone men at Newcastle, 1844; 2d 9½ stone men at Newcastle, 1850.
S. Henry; 2d light weights at Newcastle, 1852; 2d 11 stone men, ditto, 1856.

Jamieson, James; champion light weights at Carlisle, 1838; twice threw the champion of all weights the same year; 2d 11½ stone, Newcastle, 1843; and 10½ stone, 1845.
3 B. Robert, William, and George. All good wrestlers; among them they won all the prizes at Brampton, so that the wrestling there had to be given up. They challenged any four men in England of their weight.

Little, John; champion all weights, Carlisle.
B. James; 2d all weights, Carlisle, 1834.
Long, Rowland; wrestled for 30 years, and won nearly 100 prizes.
B. John; the best champion at Carlisle.

Lowthian. See Gordon.
Nichol, John; 2d all weights, Carlisle, 1832 and 1836.
[B.] James; a good, though not a first-rate wrestler.

Palmer, John; champion of all weights at Carlisle in 1851, and champion of light weights the same year,—a most unusual success.

2 B. Matthew and Walter; twins, both very good; not champions, but often second in great matches.

Robley, Joseph; a very good wrestler.
B. John; also a good wrestler.
S. William; 2d all weights at Newcastle, 1848; champion heavy stone men, 1852.

Robson, Thomas; champion all weights at Newcastle, 1857; champion 11 stone, 1858.
B. William; equally good.

Tinian, John; champion at Penrith. As a wrestler, boxer, runner, leaper, cudgei and foot-ball player, he never met an equal; was the greatest hero in athletic exercises England ever produced. "Wrestliana," by W. Litt (himself an excellent wrestler), Whitehaven, 1823.

Tinian, John, continued—
B. Job; nearly equal to his brother; he threw William Richardson, who afterwards won 240 belts and was champion.
S. John; a remarkably good wrestler.
S. Joseph; a more powerful man than his father.
[2 S.] Other sons were good wrestlers, but none remarkably so.

Tweddell, Joseph; champion 10 stone, Newcastle, 1842; 2d, ditto, 1841; champion 11½ stone, Newcastle, 1843.
B. Thomas; champion 10 stone, Newcastle, 1841.
B. Richard; 2d 11½ stone, Newcastle, 1841.
B. William; 2d 10½ stone, Newcastle, 1846.

Wearmouth, Launcelot; champion 11 stone men at Newcastle, 1860.
B. Isaac; 2d 9½ stone men at Newcastle, 1859.
COMPARISON OF RESULTS.

Let us now bring our scattered results side by side, for the purpose of comparison, and judge of the extent to which they corroborate one another,—how far they confirm the provisional calculations made in the chapter on Judges from more scanty data, and where and why they contrast.

The number of cases of hereditary genius analysed in the several chapters of my book, amounts to a large total. I have dealt with no less than 300 families containing between them nearly 1,000 eminent men, of whom 415 are illustrious, or, at all events, of such note as to deserve being printed in black type at the head of a paragraph. If there be such a thing as a decided law of distribution of genius in families, it is sure to become manifest when we deal statistically with so large a body of examples.

In comparing the results obtained from the different groups of eminent men, it will be our most convenient course to compare the columns B of the several tables. Column B gives the number of kinsmen in various degrees, on the supposition that the number of families in the group to which it refers is 100. All the entries under B have therefore the same common measure, they are all percentages, and admit of direct intercomparison. I hope I have made myself quite clear: lest there should remain any misapprehension, it is better to give an example. Thus, the families of Divines are only 25 in number, and in those 25 families there are 7 eminent fathers, 9 brothers, and 10 sons; now in order to raise these numbers to percentages, 7, 9, and 10 must be multiplied by the number of times that 25 goes into 100, namely by 4. They will then become 28, 36, and 40, and will be found entered as such, in column B, p. 275; the parent numbers 7, 9, 10, appearing in the same table in the column A.

In the following table, the columns B of all the different groups are printed side by side; I have, however, thrown Painters and Musicians into a single group of Artists, because their numbers were too small to make it worth

<table>
<thead>
<tr>
<th>Separate Groups</th>
<th>All Groups Together</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of families, each containing more than one eminent man</strong></td>
<td><strong>85</strong></td>
</tr>
<tr>
<td><strong>Total number of eminent men in all the families</strong></td>
<td><strong>265</strong></td>
</tr>
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</table>

| **Judges, p. 89** | **26** | **33** | **44** | **46** | **60** | **65** | **89** | **90** | **31** | **100** | **31** |
| **Stautes, p. 193** | **15** | **35** | **45** | **65** | **85** | **95** | **125** | **105** | **45** | **100** | **48** |
| **Commanders, p. 196** | **18** | **33** | **43** | **63** | **83** | **93** | **123** | **103** | **43** | **100** | **43** |
| **Scientific, p. 197** | **18** | **33** | **43** | **63** | **83** | **93** | **123** | **103** | **43** | **100** | **43** |
| **Literary, p. 198** | **18** | **33** | **43** | **63** | **83** | **93** | **123** | **103** | **43** | **100** | **43** |
| **Poets, p. 199** | **18** | **33** | **43** | **63** | **83** | **93** | **123** | **103** | **43** | **100** | **43** |
| **Artists, p. 200** | **18** | **33** | **43** | **63** | **83** | **93** | **123** | **103** | **43** | **100** | **43** |
| **Divines, p. 201** | **18** | **33** | **43** | **63** | **83** | **93** | **123** | **103** | **43** | **100** | **43** |

<table>
<thead>
<tr>
<th><strong>Illustrous and Eminent Men of all Classes.</strong></th>
<th><strong>B.</strong></th>
<th><strong>C.</strong></th>
<th><strong>D.</strong></th>
</tr>
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<tbody>
<tr>
<td>Father</td>
<td>26</td>
<td>33</td>
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</tr>
<tr>
<td>Brother</td>
<td>35</td>
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<td>50</td>
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<td>Son</td>
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<td>39</td>
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<td>0</td>
</tr>
<tr>
<td>Great-uncle</td>
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<td>5</td>
<td>8</td>
</tr>
<tr>
<td>First cousin</td>
<td>11</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Great-nephew</td>
<td>17</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Great-grandson</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All more remote</td>
<td>14</td>
<td>37</td>
<td>44</td>
</tr>
</tbody>
</table>

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while to consider them apart. Annexed to these is a column B calculated from the whole of the families put together, with the intention of giving a general average; and I have further attached to it its appropriate columns C and D, not so much for particular use in this chapter as for the convenience of the reader who may wish to make comparisons with the other tables, from the different point of view which D affords.

The general uniformity in the distribution of ability among the kinsmen in the different groups, is strikingly manifest. The eminent sons are almost invariably more numerous than the eminent brothers, and these are a trifle more numerous than the eminent fathers. On proceeding further down the table, we come to a sudden dropping off of the numbers at the second grade of kinship, namely, at the grandfathers, uncles, nephews, and grandsons: this diminution is conspicuous in the entries in column D, the meaning of which has already been fully described in pp. 81–83. On reaching the third grade of kinship, another abrupt dropping off in numbers is again met with, but the first cousins are found to occupy a decidedly better position than other relations within the third grade.

We further observe, that while the proportionate abundance of eminent kinsmen in the various grades is closely similar in all the groups, the proportions deduced from the entire body of illustrious men, 415 in number, coincide with peculiar general accuracy with those we obtained from the large subdivision of 109 Judges. There cannot, therefore, remain a doubt as to the existence of a law of distribution of ability in families, or that it is pretty accurately expressed by the figures in column B, under the heading of “eminent men of all classes.” I do not, however, think it worth while to submit a diagram like that in p. 83, derived from the column D in the last table, because little dependence can be placed on the entries in C by the help of which that column had to be calculated. When I began my inquiries, I did indeed try to obtain real and not estimated data for C, by inquiring into the total numbers of kinsmen in each degree, of every illustrious man, as well as of those who achieved eminence. I wearied myself for a long time with searching biographies, but finding the results very disproportionate to the labour, and continually open to doubt after they had been obtained, I gave up the task, and resigned myself to the rough but ready method of estimated averages.

It is earnestly to be desired that breeders of animals would furnish tables, like mine, on the distribution of different marked physical qualities in families. The results would be far more than mere matters of curiosity; they would afford constants for formulæ by which, as I shall briefly show in a subsequent chapter, the laws of heredity, as they are now understood, may admit of being expressed.

In contrasting the columns B of the different groups, the first notable peculiarity that catches the eye is the small number of the sons of Commanders; they being 31, while the average of all the groups is 48. There is nothing anomalous in this irregularity. I have already shown, when speaking of the Commanders, that they usually begin their active careers in youth, and therefore, if married at all, they are mostly away from their wives on military service. It is also worth while to point out a few particular cases where exceptional circumstances stood in the way of the Commanders leaving male issue, because the total number of those included in my lists is so small, being only 32, as to make them of appreciable importance in affecting the results. Thus, Alexander the Great was continually engaged in distant wars, and died in early manhood: he had one posthumous son, but that son was murdered for political reasons when still a boy. Julius Cæsar, an exceedingly profligate man, left one ille-
COMPARISON OF RESULTS.

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COMPARISON OF RESULTS.

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gitimate son, by Cleopatra, but that son was also murdered for political reasons when still a boy. Nelson married a widow who had no children by her former husband, and therefore was probably more or less infertile by nature. Napoleon I. was entirely separated from Marie Louise after she had borne him one son.

Though the great Commanders have but few immediate descendants, yet the number of their eminent grandsons is as great as in the other groups. I ascribe this to the superiority of their breed, which ensures eminence to an unusually large proportion of their kinsmen.

The next exceptional entry in the table is, the number of eminent fathers of the great scientific men as compared with that of their sons, there being only 26 of the former to 60 of the latter, whereas the average of all the groups gives 31 and 48. I have already attempted to account for this by showing, first, that scientific men owe much to the training and to the blood of their mothers; and, secondly, that the first in a family who has scientific gifts is not nearly so likely to achieve eminence, as the descendant who is taught to follow science as a profession, and not to waste his powers on profitless speculations.

The next peculiarity in the table is, the small number of eminent fathers, in the group of Poets. This group is too small to make me attach much importance to the deviation; it may be mere accident.

The Artists are not a much larger group than the Poets, consisting as they do of only 28 families, but the number of their eminent sons is enormous and quite exceptional. It is 89, whereas the average of all the groups is only 48. The remarks I made about the descendant of a great scientific man prospering in science, more than his ancestor, are eminently true as regards Artists, for the fairly-gifted son of a great painter or musician is far more likely to become a professional celebrity, than another man who has equal natural ability, but is not especially educated for professional life. The large number of artists' sons who have become eminent, testifies to the strongly hereditary character of their peculiar ability, while, if the reader will turn to the account of the Herschel family, pp. 215, 216, he will readily understand that many persons may have decided artistic gifts who have adopted some other more regular, solid, or lucrative occupation.

I have now done with the exceptional cases; it will be observed that they are mere minor variations in the law expressed by the general average of all the groups; for, if we say that to every 10 illustrious men, who have any eminent relations at all, we find 3 or 4 eminent fathers, 4 or 5 eminent brothers, and 5 or 6 eminent sons, we shall be right in 17 instances out of 24; and in the 7 cases where we are wrong, the error will consist of less than 1 unit in 2 cases (the fathers of the commanders and men of literature), of 1 unit in 4 cases (the fathers of poets, and the sons of judges, commanders, and divines), and of more than 1 unit in the sole case of the sons of artists.

The deviations from the average are naturally greater in the second and third grades of kinship, because the numbers of instances in the several groups are generally small; but as the proportions in the large subdivision of the 85 Judges correspond with extreme closeness to those of the general average, we are perfectly justified in accepting the latter with confidence.

The final and most important result remains to be worked out; it is this: if we know nothing else about a person than that he is a father, brother, son, grandson, or other relation of an illustrious man, what is the chance that he is or will be eminent? Column E in p. 61 gives the reply for Judges; it remains for us to discover what it is for illustrious men generally. In each of the chapters I have given such data as I possessed, fit for combining
with the results in column D, in order to make the required calculation. They consist of the proportion of men whose relations achieved eminence, compared with the total number into whose relationships I inquired. The general result is, that exactly one-half of the illustrious men have one or more eminent relations. Consequently, if we divide the entries in column D, of "eminent men of all classes," p. 317, by 2, we shall obtain the corresponding column E.

The reader may, however, suspect the fairness of my selection. He may recollect my difficulty, avowed in many chapters, of finding suitable selections, and will suspect that I have yielded to the temptation of inserting more than a due share of favourable cases. And I cannot wholly deny the charge, for I can recollect a few names that probably occurred to me owing to the double or treble weight given to them, by the cumulated performances of two or three persons. Therefore I acknowledge it to be quite unnecessary, in the interests of truth, to appeal to some wholly independent selection of names; and will take for that purpose the saints, or whatever their right name may be, of the Comtist Calendar. Many of my readers will know to what I am referring; how Auguste Comte, desiring to found a "Religion of Humanity," selected a list of names, from those to whom human development was most indebted, and assigned the months to the most important, the weeks to the next class, and the days to the third. I have nothing whatever to do with Comtist doctrines in these pages: his disciples dislike Darwinism, and therefore cannot be expected to be favourable to many of the discussions in this book; so I have the more satisfaction in the independence of the testimony afforded by his Calendar to the truth of my views. Again, no one can doubt that Comte's selections are entirely original; for he was the last man to pin his faith upon that popular opinion which he aspired to lead. Every name in his Calendar was weighed, we may be sure, with scrupulous care, though, I dare say, with a rather crazy balance, before it was inserted in the place which he assigned for it, in his Calendar.

The Calendar consists of 13 months, each containing 4 weeks. The following table gives the representatives of the 13 months in capital letters, and those of the 52 weeks in ordinary type. I have not thought it worth while to transcribe the representatives of the several days. Those marked with a * are included in my appendices, as having eminent relations; those with a † might have been so included. It will be observed that there are from 10 to 20 persons of whose kinships we know nothing or next to nothing, and therefore they should be struck out of the list, such as Numa, Buddha, Homer, Phidias, Thales, Pythagoras, Archimedes, Apollonius, Hipparchus, St. Paul. Among the remaining 55 or 45 persons, no less than 27, or one-half, have eminent relations.

1. **Theocracy**  

2. **Ancient poetry**  

3. **Ancient philosophy**  
   *Aristotle, -Thales, Pythagoras, Socrates, Plato.

4. **Ancient science**  

5. **Military civilization**  

6. **Catholicism**  
   *St. Paul, -St. Augustine, Hildebrand, St. Bernard, Bossuet.

7. **Feudal civilization**  
   *Charlemagne, -Alfred, Godfrey, Innocent III., St. Louis.

8. **Modern epic**  

9. **Modern industry**  

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1 Lord Chancellors, p. 64, 24 in 30; Statesmen of George III., p. 111, 33 in 53; Premiers, p. 111, not included in the "Statesmen," 8 in 16; Commanders, p. 150, 32 in 59; Literary Men, p. 172, 37 in 56; Scientific Men, pp. 194, 199, 65 in 83; Poets, p. 228, 40 in 100; Musicians, p. 239, 26 in 100; Painters, p. 249, 18 in 42; Divines, pp. 274, 285, 33 in 196; Scholars, p. 300, 14 in 36. These proportions reduced to decimals are .8, .6 and .5, .5, .7, .8, .4, .3, .4, .2, .4; giving a general average of .5 or one-half.
wives of a large body of illustrious men were held by
their intimate friends, but the two following arguments
are not without weight. First, the lady whom a man
marries is very commonly one whom he has often met in
the society of his own friends, and therefore not likely to
be a silly woman. She is also usually related to some of
them, and therefore has a probability of being hereditarily
gifted. Secondly, as a matter of fact, a large number of
eminent men marry eminent women. If the reader runs
his eye through my Appendices, he will find many such
instances. Philip II. of Macedon and Olympias; Caesar's
liaison with Cleopatra; Marlborough and his most able
wife; Helvetius married a charming lady, whose hand
was also sought by both Franklin and Turgot; August
Wilhelm von Schlegel was heart and soul devoted to
Madame de Stael; Necker's wife was a blue-stocking of
the purest hue; Robert Stephens, the learned printer, had
Petronella for his wife; the Lord Keeper Sir Nicholas
Bacon and the great Lord Burleigh married two of the
highly accomplished daughters of Sir Anthony Cooke.
Every one of these names, which I have taken from the
Appendices to my chapters on Commanders, Statesmen,
and Literary Men, are those of decidedly eminent women.
They establish the existence of a tendency of "like to
like" among intellectual men and women, and make it
most probable, that the marriages of illustrious men with
women of classes E and D are very common. On the
other hand, there is no evidence of a strongly marked
antagonistic taste—of clever men liking really half-witted
women. A man may be conscious of serious defects in his
character, and select a wife to supplement what he wants,
as a shy man may be attracted by a woman who has no
other merits than those of a talker and manager. Also,
a young awkward philosopher may accredit the first girl
who cares to show an interest in him, with greater intelli-
COMPARISON OF RESULTS.

gence than she possesses. But these are exceptional instances; the great fact remains that able men take pleasure in the society of intelligent women, and, if they can find such as would in other respects be suitable, they will marry them in preference to mediocrities.

I think, therefore, that the results given in my tables, under the head of “Sons,” should be ascribed to the marriages of men of class F and above, with women whose natural gifts are, on the average, not inferior to those of class B, and possibly between B and C.

I will now contrast the power of the male and female lines of kinship in the transmission of ability, and for that purpose will reduce the actual figures into percentages. As an example of the process, we may take the cases of the Judges. Here—as will be observed in the foot-note\(^1\)—the actual figures corresponding to the specified varieties of kinship are 41, 16, 19, 1, making a total of 77; now I raise these to what they would be if this total were raised to 100; in short, I multiply them by 100 and divide by 77, which converts them into 53, 21, 25, 1; and these are the figures inserted in the table.

\(^1\) The actual figures are—

<table>
<thead>
<tr>
<th></th>
<th>Judges</th>
<th>Statesmen</th>
<th>Commanders</th>
<th>Literary</th>
<th>Scientific</th>
<th>Poets</th>
<th>Artists</th>
<th>Divines</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>G. + U. + N. + P. . .</td>
<td>41</td>
<td>19</td>
<td>12</td>
<td>18</td>
<td>20</td>
<td>13</td>
<td>4</td>
<td>12</td>
<td>139</td>
</tr>
<tr>
<td>GF. + GB. + US. + {NS. + PS. . .</td>
<td>16</td>
<td>4</td>
<td>5</td>
<td>7</td>
<td>12</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td>g. + u. + &amp;c. .</td>
<td>19</td>
<td>10</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>73</td>
</tr>
<tr>
<td>gF. + gB. + &amp;c. .</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>36</strong></td>
<td><strong>25</strong></td>
<td><strong>34</strong></td>
<td><strong>45</strong></td>
<td><strong>16</strong></td>
<td><strong>20</strong></td>
<td><strong>22</strong></td>
<td><strong>275</strong></td>
</tr>
</tbody>
</table>
female descent, and that the apparent inferiority is in exact proportion to that difficulty. Thus the parentage of a man's mother is invariably stated in his biography; consequently, an eminent g. is no less likely to be overlooked than a G.; but a u. is more likely to be overlooked than a U., and an n. and p. much more likely than an N. and P. However, the solution suggested by these facts is not wholly satisfactory, because the differences appear to be as great in the well-known families of the Statesmen and Commanders, as in the obscure ones of the Literary and Scientific men. It would seem from this and from what I shall have to say about the Divines, that I have hunted out the eminent kinsmen in these degrees, with pretty equal completeness, in both male and female lines.

The only reasonable solution which I can suggest, besides that of inherent incapacity in the female line for transmitting the peculiar forms of ability we are now discussing, is, that the aunts, sisters, and daughters of eminent men do not marry, on the average, so frequently as other women. They would be likely not to marry so much or so soon as other women, because they would be accustomed to a higher form of culture and intellectual and moral tone in their family circle, than they could easily find elsewhere, especially, if, owing to the narrowness of their means, their society were restricted to the persons in their immediate neighbourhood. Again, one portion of them would certainly be of a dogmatic and self-asserting type, and therefore unattractive to men, and others would fail to attract, owing to their having shy, odd manners, often met with in young persons of genius, which are disadvantageous to the matrimonial chances of young women. It will be observed, in corroboration of this theory, that it accounts for g. being as large as G., because a man must have an equal number of g. and G., but he need not have an equal number of u., u., p., and U., N., P. Owing to want of further information, I am compelled to leave this question somewhat undecided. If my column C of the tables had been based on facts instead of on estimate, those facts would have afforded the information I want.

In the case of Poets and Artists, the influence of the female line is enormously less than the male, and in these the solution I have suggested would be even more appropriate than in the previous groups.

Among the Divines we come to a wholly new order of things. Here, the proportions are simply inverted, the female influence being to the male as 73 to 27, instead of as, in the average of the first five columns, 30 to 70. I have already, in the chapter on Divines, spoken at so much length about the power of female influence in nurturing religious dispositions, that I need not recur to that question. As regards the presumed disinclination to marriage among the female relatives of eminent men generally, an exception must certainly be made in the case of those of the Divines. They consider intellectual ability and a cultured mind of small importance compared with pious professions, and religious society is particularly large, owing to habits of association for religious purposes; therefore the necessity of choosing a pious husband is no material hindrance to the marriage of a near female relation of an eminent divine.

There is a common opinion that great men have remarkable mothers. No doubt they are largely indebted to maternal influences, but the popular belief ascribes an undue and incredible share to them. I account for the belief, by the fact that great men have usually high moral natures, and are affectionate and reverential, inasmuch as mere brain without heart is insufficient to achieve eminence. Such men are naturally disposed to show extreme filial regard, and to publish the good qualities of their mothers, with exaggerated praise.
I regret I am unable to solve the simple question whether, and how far, men and women who are prodigies of genius, are infertile. I have, however, shown, that men of eminence, such as the Judges, are by no means so, and it will be seen, from my point of view of the future of the human race, as described in a subsequent chapter, that the fertility of eminent men is a more important fact for me to establish, than that of prodigies. There are many difficulties in the way of discovering whether genius is, or is not, correlated with infertility. One—and a very serious one—is that people will not agree upon the names of those who are pre-eminently men of genius, nor even upon the definition of the word. Another is, that the men selected as examples are usually ancients, or at all events those who lived so long ago that it is often impossible, and always very difficult, to learn anything about their families. Another difficulty lies in the fact, that a man who has no children is likely to do more for his profession, and to devote himself more thoroughly to the good of the public, than if he had them. A very gifted man will almost always rise, as I believe, to eminence; but if he is handicapped with the weight of a wife and children in the race of life, he cannot be expected to keep as much in the front as if he were single. He cannot pursue his favourite subject of study with the same absorbing passion as if he had no other pressing calls on his attention, no domestic sorrows, anxieties, and petty cares, no yearly child, no periodical infantine epidemics, no constant professional toil for the maintenance of a large family.

There are other obstacles in the way of leaving descendants in the second generation. The daughters would not be so likely as other girls to marry, for the reasons stated a few pages back; while the health of the sons is liable to be ruined by over-work. The sons of gifted men are decidedly more precocious than their parents, as a reference to my Appendices will distinctly show; I do not care to quote cases, because it is a normal fact, analogous to what is observed in diseases, and in growths of all kinds, as has been clearly laid down by Mr. Darwin. The result is, that the precocious child is looked upon as a prodigy, abler even than his parent, because the parent’s abilities at the same age were less, and he is pushed forward in every way by home influences, until serious harm is done to his constitution.

So much for the difficulties in the way of arriving at a right judgment on the question before us. Most assuredly, a surprising number of the ablest men appear to have left no descendants; but we are justified, from what I have said, in ascribing a very considerable part of the adduced instances to other causes than an inherent tendency to barrenness in men and women of genius. I believe there is a large residuum which must be so ascribed, and I agree thus far with the suggestion of Prosper Lucas, that, as giants and dwarfs are rarely prolific, so men of prodigiously large or small intellectual powers may be expected to be deficient in fertility. On the other hand, I utterly disagree with the assertion of that famous author on heredity, that true genius is invariably isolated.

There is a prevalent belief somewhat in accordance with the subject of the last paragraph but one, that men of genius are unhealthy, puny beings—all brain and no muscle—weak-sighted, and generally of poor constitutions. I think most of my readers would be surprised at the stature and physical frames of the heroes of history, who fill my pages, if they could be assembled together in a hall. I would undertake to pick out of any group of them, even out of that of the Divines (see pp. 270, 271), an “eleven” who should compete in any physical feats whatever, against similar selections from groups of twice or thrice their numbers, taken at hap-hazard from equally
COMPARISON OF RESULTS.

This double culmination was strongly marked in the group of Artists, and distinctly so in that of the Poets, but it came out with most startling definition when I laid out the cases, of which I had made notes, 92 in number, of men remarkable for their precocity. Their first culmination was at the age of 38, then the death-rate sank till the age of 42; at 52 it had again risen to what it was at 38, and it attained its maximum at 64. The mortality of the men who did not appear to have been eminently precocious, 180 cases in all, followed a perfectly normal curve, rising steadily to a maximum at 68 years, and then declining as steadily. The scientific men lived the longest, and the number of early deaths among them was decidedly less than in any of the other groups.

The last general remark I have to make is, that features and mental abilities do not seem to be correlated. The son may resemble his parent in being an able man, but it does not therefore follow that he will also resemble him in features. I know of families where the children who had not the features of their parents inherited their disposition and ability, and the remaining children had just the converse gifts. In looking at the portraits in the late National Exhibitions I was extremely struck with the absence of family likeness, in cases where I had expected to find it. I cannot prove this point without illustrations; the reader must therefore permit me to leave its evidence in an avowedly incomplete form.

In concluding this chapter, I may point out some of the groups that I have omitted to discuss. The foremost Engineers are a body of men possessed of remarkable natural qualities; they are not only able men, but are also possessed of singular powers of physical endurance and of boldness, combined with clear views of what can and what cannot be effected. I have included Watt and Stephenson among the men of science, but the Brunels,
and the curious family of Mylne, going back for nine, if not twelve generations,—all able and many eminent in their professions,—and several others, deserve notice. I do not, however, see my way to making a selection of eminently gifted engineers, because their success depends, in a very great degree, on early opportunities. If a great engineering business is once established, with well-selected men at the heads of its various departments, it is easy to keep up the name and credit for more than one generation, after the death of its gifted originator.

The Actors are very closely connected—so much so as to form a caste; but here, as with the Engineers, we have great difficulty in distinguishing the eminently gifted from those whose success is largely due to the accident of education. I do not, however, like to pass them over without a notice of the Kemble family, who filled so large a space in the eyes of the British world, two generations ago. The following is their pedigree:

Roger Kemble.
Manager of a theatrical company; tall and comely; made an excellent Falstaff.

Sarah Ward; daughter of a strolling manager. She was austere and stately; her voice had much of the emphasis of her daughter's; tall and comely.

Sarah
(Mrs. Siddons)
Great actress.

John
Phillip
Tragedian.

Stephen
Come-
dian.

Frances
(Mrs. Twiss).

Elizabeth
(Mrs. White- lock).

Charles
Trage-
dian.

Anne
Under Sec. State
Home Dept.

Adelaide
(Mrs. Sar-
toris).

John,
Anglo-
Saxon
scholar.

X

X

Mary Frances Siddons.
Actress of much promise.

I was desirous of obtaining facts bearing on heredity from China, for there the system of examination is notoriously strict and far-reaching, and boys of promise are sure to be passed on from step to step, until they have reached the highest level of which they are capable. The first honour of the year in a population of some 400 millions—the senior classic and senior wrangler rolled into one—is the "Chuan-Yuan." Are the Chuan-Yuans ever related together? is a question I have asked, and to which a reply was promised me by a friend of high distinction in China, but which has not reached me up to the time I am writing these lines. However, I put a question on the subject into the pages of the Hong-Kong Notes and Queries (Aug. 1868), and found at all events one case, of a woman who, after bearing a child who afterwards became a Chuan-Yuan, was divorced from her husband, but marrying again, she bore a second child, who also became a Chuan-Yuan, to her next husband. I feel the utmost confidence that if the question were thoroughly gone into by a really competent person, China would afford a perfect treasury of facts bearing on heredity. There is, however, a considerable difficulty in making these inquiries, arising from the paucity of surnames in China, and also from the necessity of going back to periods (and there are many such) when corruption was far less rife in China than it is at present.

The records of the Olympian Games in the palmy days of Greece, which were scrupulously kept by the Eleans, would have been an excellent mine to dig into, for facts bearing on heredity; but they are not now to be had. However, I find one incidental circumstance in their history that is worth a few lines of notice. It appears, there was a single instance of a married woman having ventured to be present, while the games were going on, although death was the penalty of the attempt. She was found out, but excused, because her father, brothers, and son had all been victors.
THE COMPARATIVE WORTH OF DIFFERENT RACES.

I have now completed what I have to say concerning the kinships of individuals, and proceed, in this chapter, to attempt a wider treatment of my subject, through a consideration of nations and races.

Every long-established race has necessarily its peculiar fitness for the conditions under which it has lived, owing to the sure operation of Darwin's law of natural selection. However, I am not much concerned, for the present, with the greater part of those aptitudes, but only with such as are available in some form or other of high civilization. We may reckon upon the advent of a time, when civilization, which is now sparse and feeble and far more superficial than it is vaunted to be, shall overspread the globe. Ultimately it is sure to do so, because civilization is the necessary fruit of high intelligence when found in a social animal, and there is no plainer lesson to be read off the face of Nature than that the result of the operation of her laws is to evoke intelligence in connexion with sociability. Intelligence is as much an advantage to an animal as physical strength or any other natural gift, and therefore, out of two varieties of any race of animal who are equally endowed in other respects, the most intelligent variety is sure to prevail in the battle of life. Similarly, among animals as intelligent as man, the most social race is sure to prevail, other qualities being equal.

Under even a very moderate form of material civilization, a vast number of aptitudes acquired through the "survival of the fittest" and the unsparing destruction of the unfit, for hundreds of generations, have become obsolete as the old mail-coach habits and customs, since the establishment of railroads, and there is not the slightest use in attempting to preserve them; they are hindrances, and not gains, to civilization. I shall refer to some of these a little further on, but I will first speak of the qualities needed in civilized society. They are, speaking generally, such as will enable a race to supply a large contingent to the various groups of eminent men, of whom I have treated in my several chapters. Without going so far as to say that this very convenient test is perfectly fair, we are at all events justified in making considerable use of it, as I will do, in the estimates I am about to give.

In comparing the worth of different races, I shall make frequent use of the law of deviation from an average, to which I have already been much beholden; and, to save the reader's time and patience, I propose to act upon an assumption that would require a good deal of discussion to limit, and to which the reader may at first demur, but which cannot lead to any error of importance in a rough provisional inquiry. I shall assume that the intervals between the grades of ability are the same in all the races—that is, if the ability of class A of one race be equal to the ability of class C in another, then the ability of class B of the former shall be supposed equal to that of class D of the latter, and so on. I know this cannot be strictly true, for it would be in defiance of analogy if the variability of all races were precisely the same; but, on the other hand, there is good reason to expect that the error introduced by the assumption cannot sensibly affect the off-
hand results for which alone I propose to employ it; moreover, the rough data I shall adduce, will go far to show the justice of this expectation.

Let us, then, compare the negro race with the Anglo-Saxon, with respect to those qualities alone which are capable of producing judges, statesmen, commanders, men of literature and science, poets, artists, and divinities. If the negro race in America had been affected by no social disabilities, a comparison of their achievements with those of the whites in their several branches of intellectual effort, having regard to the total number of their respective populations, would give the necessary information. As matters stand, we must be content with much rougher data.

First, the negro race has occasionally, but very rarely, produced such men as Toussaint l'Ouverture, who are of our class F; that is to say, its X, or its total classes above G, appear to correspond with our F, showing a difference of not less than two grades between the black and white races, and it may be more.

Secondly, the negro race is by no means wholly deficient in men capable of becoming good factors, thriving merchants, and otherwise considerably raised above the average of whites—that is to say, it can not infrequently supply men corresponding to our class C, or even D. It will be recollected that C implies a selection of 1 in 16, or somewhat more than the natural abilities possessed by average foremen of common juries, and that D is as 1 in 64—a degree of ability that is sure to make a man successful in life. In short, classes E and F of the negro may roughly be considered as the equivalent of our C and D—a result which again points to the conclusion, that the average intellectual standard of the negro race is some two grades below our own.

Thirdly, we may compare, but with much caution, the relative position of negroes in their native country with that of the travellers who visit them. The latter, no doubt, bring with them the knowledge current in civilized lands, but that is an advantage of less importance than we are apt to suppose. A native chief has as good an education in the art of ruling men, as can be desired; he is continually exercised in personal government, and usually maintains his place by the ascendancy of his character, shown every day over his subjects and rivals. A traveller in wild countries also fills, to a certain degree, the position of a commander, and has to confront native chiefs at every inhabited place. The result is familiar enough—the white traveller almost invariably holds his own in their presence. It is seldom that we hear of a white traveller meeting with a black chief whom he feels to be the better man. I have often discussed this subject with competent persons, and can only recall a few cases of the inferiority of the white man,—certainly not more than might be ascribed to an average actual difference of three grades, of which one may be due to the relative demerits of native education, and the remaining two to a difference in natural gifts.

Fourthly, the number among the negroes of those whom we should call half-witted men, is very large. Every book alluding to negro servants in America is full of instances. I was myself much impressed by this fact during my travels in Africa. The mistakes the negroes made in their own matters, were so childish, stupid, and simpleton-like, as frequently to make me ashamed of my own species. I do not think it any exaggeration to say, that their c is as low as our e, which would be a difference of two grades, as before. I have no information as to actual idiocy among the negroes—I mean, of course, of that class of idiocy which is not due to disease.

The Australian type is at least one grade below the African negro. I possess a few serviceable data about the
natural capacity of the Australian, but not sufficient to induce me to invite the reader to consider them.

The average standard of the Lowland Scotch and the English North-country men is decidedly a fraction of a grade superior to that of the ordinary English, because the number of the former who attain to eminence is far greater than the proportionate number of their race would have led us to expect. The same superiority is distinctly shown by a comparison of the well-being of the masses of the population; for the Scotch labourer is much less of a drudge than the Englishman of the Midland counties—he does his work better, and “lives his life” besides. The peasant women of Northumberland work all day in the fields, and are not broken down by the work; on the contrary, they take a pride in their effective labour as girls, and, when married, they attend well to the comfort of their homes. It is perfectly distressing to me to witness the dragged, drugged, mean look of the mass of individuals, especially of the women, that one meets in the streets of London and other purely English towns. The conditions of their life seem too hard for their constitutions, and to be crushing them into degeneracy.

The ablest race of whom history bears record is unquestionably the ancient Greek, partly because their master-pieces in the principal departments of intellectual activity are still unsurpassed, and in many respects unequalled, and partly because the population that gave birth to the creators of those master-pieces was very small. Of the various Greek sub-races, that of Attica was the ablest, and she was no doubt largely indebted to the following cause, for her superiority. Athens opened her arms to immigrants, but not indiscriminately, for her social life was such that none but very able men could take any pleasure in it; on the other hand, she offered attractions such as men of the highest ability and culture could find in no other city. Thus, by a system of partly unconscious selection, she built up a magnificent breed of human animals, which, in the space of one century—viz. between 530 and 430 B.C.—produced the following illustrious persons, fourteen in number:

**Statesmen and Commanders.**—Themistocles (mother an alien), Miltiades, Aristides, Cimon (son of Miltiades), Pericles (son of Xanthippus, the victor at Mycale).

**Literary and Scientific Men.**—Thucydides, Socrates, Xenophon, Plato.

**Poets.**—Aeschylus, Sophocles, Euripides, Aristophanes.

**Sculptor.**—Phidias.

We are able to make a closely-approximate estimate of the population that produced these men, because the number of the inhabitants of Attica has been a matter of frequent inquiry, and critics appear at length to be quite agreed in the general results. It seems that the little district of Attica contained, during its most flourishing period (Smith’s Class. Geog. Dict.), less than 90,000 native free-born persons, 40,000 resident aliens, and a labouring and artisan population of 400,000 slaves. The first item is the only one that concerns us here, namely, the 90,000 free-born persons. Again, the common estimate that population renews itself three times in a century is very close to the truth, and may be accepted in the present case. Consequently, we have to deal with a total population of 270,000 free-born persons, or 135,000 males, born in the century I have named. Of these, about one-half, or 67,500, would survive the age of 26, and one-third, or 45,000, would survive that of 50. As 14 Athenians became illustrious, the selection is only as 1 to 4,822 in respect to the former limitation, and as 1 to 3,214 in respect to the latter. Referring to the table in page 34, it will be seen that this degree of selection corresponds very fairly to the
classes F (1 in 4,300) and above, of the Athenian race. Again, as G is one-sixteenth or one-seventeenth as numerous as F, it would be reasonable to expect to find one of class G among the fourteen; we might, however, by accident, meet with two, three, or even four of that class—say Pericles, Socrates, Plato, and Phidias.

Now let us attempt to compare the Athenian standard of ability with that of our own race and time. We have no men to put by the side of Socrates and Phidias, because the millions of all Europe, breeding as they have done for the subsequent 2,000 years, have never produced their equals. They are, therefore, two or three grades above our G—they might rank as I or J. But, supposing we do not count them at all, saying that some freak of nature acting at that time, may have produced them, what must we say about the rest? Pericles and Plato would rank, I suppose, the one among the greatest of philosophical statesmen, and the other as at least the equal of Lord Bacon. They would, therefore, stand somewhere among our unclassed X, one or two grades above G—let us call them between H and I. All the remainder—the F of the Athenian race—would rank above our G, and equal to or close upon our H. It follows from all this, that the average ability of the Athenian race is, on the lowest possible estimate, very nearly two grades higher than our own—that is, about as much as our race is above that of the African negro. This estimate, which may seem prodigious to some, is confirmed by the quick intelligence and high culture of the Athenian commonalty, before whom literary works were recited, and works of art exhibited, of a far more severe character than could possibly be appreciated by the average of our race, the calibre of whose intellect is easily gauged by a glance at the contents of a railway book-stall.

We know, and may guess something more, of the reason why this marvellously-gifted race declined. Social morality grew exceedingly lax; marriage became unfashionable, and was avoided; many of the more ambitious and accomplished women were avowed courtesans, and consequently infertile, and the mothers of the incoming population were of a heterogeneous class. In a small sea-bordered country, where emigration and immigration are constantly going on, and where the manners are as dissolute as were those of Greece in the period of which I speak, the purity of a race would necessarily fail. It can be, therefore, no surprise to us, though it has been a severe misfortune to humanity, that the high Athenian breed decayed and disappeared; for if it had maintained its excellence, and had multiplied and spread over large countries, displacing inferior populations (which it well might have done, for it was exceedingly prolific), it would assuredly have accomplished results advantageous to human civilization, to a degree that transcends our powers of imagination.

If we could raise the average standard of our race only one grade, what vast changes would be produced! The number of men of natural gifts equal to those of the eminent men of the present day, would be necessarily increased more than tenfold, as will be seen by the fourth column of the table p. 34, because there would be 2,423 of them in each million instead of only 233; but far more important to the progress of civilization would be the increase in the yet higher orders of intellect. We know how intimately the course of events is dependent on the thoughts of a few illustrious men. If the first-rate men in the different groups had never been born, even if those among them who have a place in my appendices on account of their hereditary gifts, had never existed, the world would be very different to what it is. Now the table shows that the numbers in these, the loftiest grades of intellect, would be increased in a still higher proportion than that of which
I have been speaking; thus the men that now rank under class G would be increased seventeenfold, by raising the average ability of the whole nation a single grade. We see by the table that all England contains (on the average, of course, of several years) only six men between the ages of thirty and eighty, whose natural gifts exceed class G; but in a country of the same population as ours, whose average was one grade higher, there would be eighty-two of such men; and in another whose average was two grades higher (such as I believe the Athenian to have been, in the interval 530—430 B.C.) no less than 1,355 of them would be found. There is no improbability in so gifted a breed being able to maintain itself, as Athenian experience, rightly understood, has sufficiently proved; and as has also been proved by what I have written about the Judges, whose fertility is undoubted, although their average natural ability is F, or 5½ degrees above the average of our own, and 3½ above that of the average Athenians.

It seems to me most essential to the well-being of future generations, that the average standard of ability of the present time should be raised. Civilization is a new condition imposed upon man by the course of events, just as in the history of geological changes new conditions have continually been imposed on different races of animals. They have had the effect either of modifying the nature of the races through the process of natural selection, whenever the changes were sufficiently slow and the race sufficiently pliant, or of destroying them altogether, when the changes were too abrupt or the race unyielding. The number of the races of mankind that have been entirely destroyed under the pressure of the requirements of an incoming civilization, reads us a terrible lesson. Probably in no former period of the world has the destruction of the races of any animal whatever, been effected over such wide areas and with such startling rapidity as in the case of savage man. In the North American Continent, in the West Indian Islands, in the Cape of Good Hope, in Australia, New Zealand, and Van Diemen's Land, the human denizens of vast regions have been entirely swept away in the short space of three centuries, less by the pressure of a stronger race than through the influence of a civilization they were incapable of supporting. And we too, the foremost labourers in creating this civilization, are beginning to show ourselves incapable of keeping pace with our own work. The needs of centralization, communication, and culture, call for more brains and mental stamina than the average of our race possess. We are in crying want for a greater fund of ability in all stations of life; for neither the classes of statesmen, philosophers, artisans, nor labourers are up to the modern complexity of their several professions. An extended civilization like ours comprises more interests than the ordinary statesmen or philosophers of our present race are capable of dealing with, and it exacts more intelligent work than our ordinary artisans and labourers are capable of performing. Our race is over-weighted, and appears likely to be drugged into degeneracy by demands that exceed its powers. If its average ability were raised a grade or two, our new classes F and G would conduct the complex affairs of the state at home and abroad as easily as our present F and G, when in the position of country squires, are able to manage the affairs of their establishments and tenantry. All other classes of the community would be similarly promoted to the level of the work required by the nineteenth century, if the average standard of the race were raised.

When the severity of the struggle for existence is not too great for the powers of the race, its action is healthy and conservative, otherwise it is deadly, just as we may see exemplified in the scanty, wretched vegetation that leads a precarious existence near the summer snow line of the
Alps, and disappears altogether a little higher up. We want as much backbone as we can get, to bear the racket to which we are henceforth to be exposed, and as good brains as possible to contrive machinery, for modern life to work more smoothly than at present. We can, in some degree, raise the nature of man to a level with the new conditions imposed upon his existence, and we can also, in some degree, modify the conditions to suit his nature. It is clearly right that both these powers should be exerted, with the view of bringing his nature and the conditions of his existence into as close harmony as possible.

In proportion as the world becomes filled with mankind, the relations of society necessarily increase in complexity, and the nomadic disposition found in most barbarians becomes unsuitable to the novel conditions. There is a most unusual unanimity in respect to the causes of incapacity of savages for civilization, among writers on those hunting and migratory nations who are brought into contact with advancing colonization, and perish, as they invariably do, by the contact. They tell us that the labour of such men is neither constant nor steady; that the love of a wandering, independent life prevents their settling anywhere to work, except for a short time, when urged by want and encouraged by kind treatment. Meadows says that the Chinese call the barbarous races on their borders by a phrase which means "hither and thither, not fixed." And any amount of evidence might be adduced to show how deeply Bohemian habits of one kind or another, were ingrained in the nature of the men who inhabited most parts of the earth now overspread by the Anglo-Saxon and other civilized races. Luckily there is still room for adventure, and a man who feels the cravings of a roving, adventurous spirit to be too strong for resistance, may yet find a legitimate outlet for it in the colonies, in the army, or on board ship. But such a spirit is, on the whole, an heirloom that brings more impatient restlessness and beating of the wings against cage-bars, than persons of more civilized characters can readily comprehend, and it is directly at war with the more modern portion of our moral natures. If a man be purely a nomad, he has only to be nomadic, and his instinct is satisfied; but no Englishmen of the nineteenth century are purely nomadic. The most so among them have also inherited many civilized cravings that are necessarily starved when they become wanderers, in the same way as the wandering instincts are starved when they are settled at home. Consequently their nature has opposite wants, which can never be satisfied except by chance, through some very exceptional turn of circumstances. This is a serious calamity, and as the Bohemianism in the nature of our race is destined to perish, the sooner it goes, the happier for mankind. The social requirements of English life are steadily destroying it. No man who only works by fits and starts is able to obtain his living nowadays; for he has not a chance of thriving in competition with steady workmen. If his nature revolt against the monotony of daily labour, he is tempted to the public-house, to intemperance, and, it may be, to poaching, and to much more serious crime: otherwise he banishes himself from our shores. In the first case, he is unlikely to leave as many children as men of more domestic and marrying habits, and, in the second case, his breed is wholly lost to England. By this steady riddance of the Bohemian spirit of our race, the artisan part of our population is slowly becoming bred to its duties, and the primary qualities of the typical modern British workman are already the very opposite of those of the nomad. What they are now, was well described by Mr. Chadwick, as consisting of "great bodily strength, applied under the command of a steady, persevering will, mental self-contentedness, impassibility, to external irrelevant impres-
sions, which carries them through the continued repetition of toilsome labour, ‘steady as time.’”

It is curious to remark how unimportant to modern civilization has become the once famous and thoroughly-bred looking Norman. The type of his features, which is, probably, in some degree correlated with his peculiar form of adventurous disposition, is no longer characteristic of our rulers, and is rarely found among celebrities of the present day; it is more often met with among the undistinguished members of highly-born families, and especially among the less conspicuous officers of the army. Modern leading men in all paths of eminence, as may easily be seen in a collection of photographs, are of a coarser and more robust breed; less excitable and dashing, but endowed with far more ruggedness and real vigour. Such also is the case, as regards the German portion of the Austrian nation; they are far more high-caste in appearance than the Prussians, who are so plain that it is disagreeable to travel northwards from Vienna, and watch the change; yet the Prussians appear possessed of the greater moral and physical stamina.

Much more alien to the genius of an enlightened civilization than the nomadic habit, is the impulsive and uncontrolled nature of the savage. A civilized man must bear and forbear, he must keep before his mind the claims of the morrow as clearly as those of the passing minute; of the absent, as well as of the present. This is the most trying of the new conditions imposed on man by civilization, and the one that makes it hopeless for any but exceptional natures among savages, to live under them. The instinct of a savage is admirably consonant with the needs of savage life; every day he is in danger through transient causes; he lives from hand to mouth, in the hour and for the hour, without care for the past or forethought for the future: but such an instinct is utterly at fault in civilized life. The half-reclaimed savage, being unable to deal with more subjects of consideration than are directly before him, is continually doing acts through mere maladroitness and incapacity, at which he is afterwards deeply grieved and annoyed. The nearer inducements always seem to him, through his uncorrected sense of moral perspective, to be incomparably larger than others of the same actual size, but more remote; consequently, when the temptation of the moment has been yielded to and passed away, and its bitter result comes in its turn before the man, he is amazed and remorseful at his past weakness. It seems incredible that he should have done that yesterday which to-day seems so silly, so unjust, and so unkindly. The newly-reclaimed barbarian, with the impulsive, unstable nature of the savage, when he also chances to be gifted with a peculiarly generous and affectionate disposition, is of all others the man most oppressed with the sense of sin.

Now it is a just assertion, and a common theme of moralists of many creeds, that man, such as we find him, is born with an imperfect nature. He has lofty aspirations, but there is a weakness in his disposition, which incapacitates him from carrying his nobler purposes into effect. He sees that some particular course of action is his duty, and should be his delight; but his inclinations are fickle and base, and do not conform to his better judgment. The whole moral nature of man is tainted with sin, which prevents him from doing the things he knows to be right.

The explanation I offer of this apparent anomaly, seems perfectly satisfactory from a scientific point of view. It is neither more nor less than that the development of our nature, whether under Darwin's law of natural selection, or through the effects of changed ancestral habits, has not yet overtaken the development of our moral civilization. Man was barbarous but yesterday, and therefore it is not to
be expected that the natural aptitudes of his race should already have become moulded into accordance with his very recent advance. We, men of the present centuries, are like animals suddenly transplanted among new conditions of climate and of food: our instincts fail us under the altered circumstances.

My theory is confirmed by the fact that the members of old civilizations are far less sensible than recent converts from barbarism, of their nature being inadequate to their moral needs. The conscience of a negro is aghast at his own wild, impulsive nature, and is easily stirred by a preacher, but it is scarcely possible to ruffle the self-complacency of a steady-going Chinaman.

The sense of original sin would show, according to my theory, not that man was fallen from a high estate, but that he was rising in moral culture with more rapidity than the nature of his race could follow. My view is corroborated by the conclusion reached at the end of each of the many independent lines of ethnological research—that the human race were utter savages in the beginning; and that, after myriads of years of barbarism, man has but very recently found his way into the paths of morality and civilization.

INFLUENCES THAT AFFECT THE NATURAL ABILITY OF NATIONS.

Before speaking of the influences which affect the natural ability and intelligence of nations and races, I must beg the reader to bring distinctly before his mind how reasonable it is that such influences should be expected to exist. How consonant it is to all analogy and experience to expect that the control of the nature of future generations should be as much within the power of the living, as the health and well-being of the individual is in the power of the guardians of his youth.

We are exceedingly ignorant of the reasons why we exist, confident only that individual life is a portion of some vaster system that struggles arduously onwards, towards ends that are dimly seen or wholly unknown to us, by means of the various affinities—the sentiments, the intelligences, the tastes, the appetites—of innumerable personalities who ceaselessly succeed one another on the stage of existence.

There is nothing that appears to assign a more exceptional or sacred character to a race, than to the families or individuals that compose it. We know how careless Nature is of the lives of individuals; we have seen how careless she is of eminent families—how they are built up, flourish, and decay: just the same may be said of races, and of
INFLUENCES THAT AFFECT THE

the world itself; also, by analogy, of other scenes of existence than this particular planet of one of innumerable suns. Our world appears hitherto to have developed itself, mainly under the influence of unreasoning affinities; but of late, Man, slowly growing to be intelligent, humane, and capable, has appeared on the scene of life and profoundly modified its conditions. He has already become able to look after his own interests in an incomparably more far-sighted manner, than in the old pre-historic days of barbarism and flint knives; he is already able to act on the experiences of the past, to combine closely with distant allies, and to prepare for future wants, known only through the intelligence, long before their pressure has become felt. He has introduced a vast deal of civilization and hygiene which influence, in an immense degree, his own well-being and that of his children; it remains for him to bring other policies into action, that shall tell on the natural gifts of his race.

It would be writing to no practically useful purpose, were I to discuss the effect that might be produced on the population, by such social arrangements as existed in Sparta. They are so alien and repulsive to modern feelings, that it is useless to say anything about them, so I shall wholly confine my remarks to agencies that are actually at work, and upon which there can be no hesitation in speaking.

I shall have occasion to show that certain influences retard the average age of marriage, while others hasten it; and the general character of my argument will be to prove, that an enormous effect upon the average natural ability of a race may be produced by means of those influences. I shall argue that the wisest policy is, that which results in retarding the average age of marriage among the weak, and in hastening it among the vigorous classes; whereas, most unhappily for us, the influence of numerous social agencies has been strongly and banefully exerted in the precisely opposite direction.

An estimate of the effect of the average age of marriage on the growth of any section of a nation, is therefore the first subject that requires investigation. Everybody is prepared to admit that it is an element, sure to produce some sensible effect, but few will anticipate its real magnitude, or will be disposed to believe that its results have so vast and irresistible an influence on the natural ability of a race, as I shall be able to demonstrate.

The average age of marriage affects population in a threefold manner. Firstly, those who marry when young, have the larger families; secondly, they produce more generations within a given period, and therefore the growth of a prolific race, progressing as it does, "geometrically," would be vastly increased at the end of a long period, by a habit of early marriages; and, thirdly, more generations are alive at the same time, among those races who marry when they are young.

In explanation of the aggregate effect of these three influences, it will be best to take two examples that are widely but not extremely separated. Suppose two men, M and N, about 22 years old, each of them having therefore the expectation of living to the age of 55, or 33 years longer; and suppose that M marries at once, and that his descendants, when they arrive at the same age, do the same; but that N delays until he has laid by money, and does not marry before he is 33 years old, that is to say, 11 years later than M, and his descendants also follow his example. Let us further make the two very moderate suppositions, that the early marriages of race M result in an increase of $1\frac{1}{2}$ in the next generation, and also in the production of $3\frac{3}{4}$ generations in a century, while the late marriages of race N result in an increase of only $1\frac{1}{4}$ in the next generation and in $2\frac{1}{4}$ generations in one century.
It will be found that an increase of \( 1\frac{1}{2} \) in each generation, accumulating on the principle of compound interest during \( 3\frac{3}{4} \) generations, becomes rather more than \( 1\frac{9}{10} \) times the original amount; while an increase of \( 1\frac{1}{2} \) for \( 2\frac{3}{4} \) generations is barely as much as \( 1\frac{1}{4} \) times the original amount. Consequently the increase of the race of \( M \) at the end of a century, will be greater than that of \( N \) in the ratio of \( 18 \) to \( 7 \); that is to say, it will be rather more than \( 2\frac{3}{4} \) times as great. In two centuries the progeny of \( M \) will be more than \( 6 \) times, and in three centuries more than \( 15 \) times, as numerous as those of \( N \).

The proportion which the progeny of \( M \) will bear at any time, to the total living population, will be still greater than this, owing to the number of generations of \( M \) who are alive at the same time, being greater than those of \( N \). The reader will not find any difficulty in estimating the effect of these conditions, if he begins by ignoring children and all others below the age of \( 22 \), and also by supposing the population to be stationary in its number, in consecutive generations. We have agreed in the case of \( M \) to allow \( 3\frac{3}{4} \) generations to one century, which gives about \( 27 \) years to each generation; then, when one of this race is \( 22 \) years old, his father will (on the average of many cases) be \( 27 \) years older, or \( 49 \); and as the father lives to \( 55 \), he will survive the advent of his son to manhood for the space of \( 6 \) years. Consequently, during the \( 27 \) years intervening between each two generations, there will be found one mature life for the whole period and one other mature life during a period of \( 6 \) years, which gives for the total mature life of the race \( M \), a number which may be expressed by the fraction \( \frac{8}{11} \), or \( \frac{4}{7} \). The diagram represents the course of three consecutive generations of race \( M \): the middle line refers to that of the individual about whom I have just been speaking, the upper one to that of his father, and the lower to his son. The dotted line indicates the period of life before the age of \( 22 \); the double line, the period between \( 22 \) and the average time at which his son is born; the dark line is the remainder of his life.

On the other hand, a man of the race \( N \), which does not contribute more than \( 2\frac{3}{4} \) generations to a century, that is to say, \( 40 \) years to a single generation, does not attain the age of \( 22 \) until (on the average of many cases) \( 7 \) years after his father's death; for the father was \( 40 \) years old when his son was born, and died at the age of \( 55 \) when the son was only \( 15 \) years old. In other words, during each period of \( 18 + 15 + 7 \), or \( 40 \) years, men of mature life of the race \( N \) are alive for only \( 18 + 15 \), or \( 33 \) of them; hence the total mature life of the race \( N \) may be expressed by the fraction \( \frac{4}{8} \).

It follows that the relative population due to the races of \( M \) and \( N \), is as \( \frac{8}{11} \) to \( \frac{4}{7} \), or as \( 40 \) to \( 27 \), which is very nearly as \( 5 \) to \( 3 \).

1 A little consideration of the diagram will show that the proportion in question, will invariably be in the inverse ratio of the intervals between the two generations, which in the present case are \( 27 \) and \( 40 \) years.
We have been calculating on the supposition that the population remains stationary, because it was more convenient to do so, but the results of our calculation will hold nearly true for all cases. Because, if population should increase, the larger number of living descendants tends to counterbalance the diminished number of living ancestry; and, conversely, if it decreases.

Combining the above ratio of 5 to 3 with those previously obtained, it results that at the end of one century from the time when the races $M$ and $N$ started fair, with equal numbers, the proportion of mature men of race $M$ will be four times as numerous as those of race $N$; at the end of two centuries, they will be ten times as numerous, and at the end of three centuries, no less than twenty-six times as numerous.

I trust the reader will realize the heavy doom which these figures pronounce against all sub-sections of prolific races in which it is the custom to put off the period of marriage until middle age. It is a maxim of Malthus that the period of marriage ought to be delayed in order that the earth may not be overcrowded by a population for whom there is no place at the great table of nature. If this doctrine influenced all classes alike, I should have nothing to say about it here, one way or another, for it would hardly affect the discussions in this book; but, as it is put forward as a rule of conduct for the prudent part of mankind to follow, whilst the imprudent are necessarily left free to disregard it, I have no hesitation in saying that it is a most pernicious rule of conduct in its bearing upon race. Its effect would be such as to cause the race of the prudent to fall, after a few centuries, into an almost incredible inferiority of numbers to that of the imprudent, and it is therefore calculated to bring utter ruin upon the breed of any country where the doctrine prevailed. I protest against the abler races being encouraged to withdraw in this way from the struggle for existence. It may seem monstrous that the weak should be crowded out by the strong, but it is still more monstrous that the races best fitted to play their part on the stage of life, should be crowded out by the incompetent, the ailing, and the desponding.

The time may hereafter arrive, in far distant years, when the population of the earth shall be kept as strictly within the bounds of number and suitability of race, as the sheep on a well-ordered moor or the plants in an orchard-house; in the meantime, let us do what we can to encourage the multiplication of the races best fitted to invent and conform to a high and generous civilization, and not, out of a mistaken instinct of giving support to the weak, prevent the incoming of strong and hearty individuals.

The long period of the dark ages under which Europe has lain is due, I believe in a very considerable degree, to the celibacy enjoined by religious orders on their votaries. Whenever a man or woman was possessed of a gentle nature that fitted him or her to deeds of charity, to meditation, to literature, or to art, the social condition of the time was such that they had no refuge elsewhere than in the bosom of the Church. But the Church chose to preach and exact celibacy. The consequence was that these gentle natures had no continuance, and thus, by a policy so singularly unwise and suicidal that I am hardly able to speak of it without impatience, the Church brutalized the breed of our forefathers. She acted precisely as if she had aimed at selecting the rudest portion of the community to be, alone, the parents of future generations. She practised the arts which breeders would use, who aimed at creating ferocious, currish and stupid natures. No wonder that club-law prevailed for centuries over Europe; the wonder rather is that enough good remained in the veins of Europeans.
to enable their race to rise to its present, very moderate level of natural morality.

A relic of this monastic spirit clings to our Universities, who say to every man who shows intellectual powers of the kind they delight to honour, "Here is an income of from one to two hundred pounds a year, with free lodging and various advantages in the way of board and society; we give it you on account of your ability; take it and enjoy it all your life if you like: we exact no condition to your continuing to hold it but one, namely, that you shall not marry."

The policy of the religious world in Europe was exerted in another direction, with hardly less cruel effect on the nature of future generations, by means of persecutions which brought thousands of the foremost thinkers and men of political aptitudes to the scaffold, or imprisoned them during a large part of their manhood, or drove them as emigrants into other lands. In every one of these cases, the check upon their leaving issue was very considerable. Hence the Church, having first captured all the gentle natures and condemned them to celibacy, made another sweep of her huge nets, this time fishing in stirring waters, to catch those who were the most fearless, truth-seeking, and intelligent in their modes of thought, and therefore the most suitable parents of a high civilization, and put a strong check, if not a direct stop, to their progeny. Those she reserved on these occasions, to breed the generations of the future, were the servile, the indifferent, and, again, the stupid. Thus, as she—to repeat my expression—brutalized human nature by her system of celibacy applied to the gentle, she demoralised it by her system of persecution of the intelligent, the sincere, and the free. It is enough to make the blood boil to think of the blind folly that has caused the foremost nations of struggling humanity to be the heirs of such hateful ancestry, and that has so bred our instincts as to keep them in an unnecessarily long-continued antagonism with the essential requirements of a steadily advancing civilization. In consequence of this inbred imperfection of our natures, in respect to the conditions under which we have to live, we are, even now, almost as much harassed by the sense of moral incapacity and sin, as were the early converts from barbarism, and we steep ourselves in half-unconscious self-deception and hypocrisy, as a partial refuge from its insistance. Our avowed creeds remain at variance with our real rules of conduct, and we lead a dual life of barren religious sentimentalism and gross materialistic habitudes.

The extent to which persecution must have affected European races is easily measured by a few well-known statistical facts. Thus, as regards martyrdom and imprisonment, the Spanish nation was drained of free-thinkers at the rate of 1,000 persons annually, for the three centuries between 1471 and 1781; an average of 100 persons having been executed and 900 imprisoned every year during that period. The actual data during those three hundred years are 32,000 burnt, 17,000 persons burnt in effigy (I presume they mostly died in prison or escaped from Spain), and 291,000 condemned to various terms of imprisonment and other penalties. It is impossible that any nation could stand a policy like this, without paying a heavy penalty in the deterioration of its breed, as has notably been the result in the formation of the superstitious, unintelligent Spanish race of the present day.

Italy was also frightfully persecuted at an earlier date. In the diocese of Como, alone, more than 1,000 were tried annually by the inquisitors for many years, and 300 were burnt in the single year 1416.

The French persecutions, by which the English have been large gainers, through receiving their industrial refugees, were on a nearly similar scale. In the seventeenth century
three or four hundred thousand Protestants perished in prison, at the galleys, in their attempts to escape, or on the scaffold, and an equal number emigrated. Mr. Smiles, in his admirable book on the Huguenots, has traced the influence of these and of the Flemish emigrants on England, and shows clearly that she owes to them almost all her industrial arts and very much of the most valuable life-blood of her modern race. There has been another emigration from France of not unequal magnitude, but followed by very different results, namely that of the Revolution in 1789. It is most instructive to contrast the effects of the two. The Protestant emigrants were able men, and have profoundly influenced for good both our breed and our history; on the other hand, the political refugees had but poor average stamina, and have left scarcely any traces behind them.

It is very remarkable how large a proportion of the eminent men of all countries bear foreign names, and are the children of political refugees,—men well qualified to introduce a valuable strain of blood. We cannot fail to reflect on the glorious destiny of a country that should maintain, during many generations, the policy of attracting eminently desirable refugees, but no others, and of encouraging their settlement and the naturalization of their children.

No nation has parted with more emigrants than England, but whether she has hitherto been on the whole a gainer or a loser by the practice, I am not sure. No doubt she has lost a very large number of families of sterling worth, especially of labourers and artisans; but, as a rule, the very ablest men are strongly disinclined to emigrate; they feel that their fortune is assured at home, and unless their spirit of adventure is overwhelmingly strong, they prefer to live in the high intellectual and moral atmosphere of the more intelligent circles of English society, to a self-banishment among people of altogether lower grades of mind and interests. England has certainly got rid of a great deal of refuse, through means of emigration. She has found an outlet for men of adventurous and Bohemian natures, who are excellently adapted for colonizing a new country, but are not wanted in old civilizations; and she has also been disembarassed of a vast number of turbulent radicals and the like, men who are decidedly able but by no means eminent, and whose zeal, self-confidence, and irreverence far outbalance their other qualities.

The rapid rise of new colonies and the decay of old civilizations is, I believe, mainly due to their respective social agencies, which in the one case promote, and in the other case retard, the marriages of the most suitable breeds. In a young colony, a strong arm and an enterprising brain are the most appropriate fortune for a marrying man, and again, as the women are few, the inferior males are seldom likely to marry. In an old civilization, the agencies are more complex. Among the active, ambitious classes, none but the inheritors of fortune are likely to marry young; there is especially a run against men of classes C, D, and E,—those, I mean, whose future fortune is not assured except through a good deal of self-denial and effort. It is almost impossible that they should succeed well and rise high in society, if they hamper themselves with a wife in their early manhood. Men of classes F and G are more independent, but they are not nearly so numerous, and therefore their breed, though intrinsically of more worth than E or D, has much less effect on the standard of the nation at large. But even if men of classes F and G marry young, and ultimately make fortunes and achieve peerages or high social position, they become infected with the ambition current in all old civilizations, of founding families. Thence result the evils I have already described, in speaking of the marriages of eldest sons with heiresses and
of the suppression of the marriages of the younger sons. Again, there is a constant tendency of the best men in the country, to settle in the great cities, where marriages are less prolific and children are less likely to live. Owing to these several causes, there is a steady check in an old civilization upon the fertility of the able classes; the improvident and unambitious are those who chiefly keep up the breed. So the race gradually deteriorates, becoming in each successive generation less fitted for a high civilization, although it retains the external appearances of one, until the time comes when the whole political and social fabric caves in, and a greater or less relapse to barbarism takes place, during the reign of which the race is perhaps able to recover its tone.

The best form of civilization in respect to the improvement of the race, would be one in which society was not costly; where incomes were chiefly derived from professional sources, and not much through inheritance; where every lad had a chance of showing his abilities, and, if highly gifted, was enabled to achieve a first-class education and entrance into professional life, by the liberal help of the exhibitions and scholarships which he had gained in his early youth; where marriage was held in as high honour as in ancient Jewish times; where the pride of race was encouraged (of course I do not refer to the nonsensical sentiment of the present day, that goes under that name); where the weak could find a welcome and a refuge in celibate monasteries or sisterhoods, and lastly, where the better sort of emigrants and refugees from other lands were invited and welcomed, and their descendants naturalized.

GENERAL CONSIDERATIONS.

It is confidently asserted by all modern physiologists that the life of every plant and animal is built up of an enormous number of subordinate lives; that each organism consists of a multitude of elemental parts, which are to a great extent independent of each other; that each organ has its proper life, or autonomy, and can develop and reproduce itself independently of other tissues (see Darwin on “Domestication of Plants and Animals,” ii. 368, 369). Thus the word “Man,” when rightly understood, becomes a noun of multitude, because he is composed of millions, perhaps billions of cells, each of which possesses in some sort an independent life, and is parent of other cells. He is a conscious whole, formed by the joint agencies of a host of what appear to us to be unconscious or barely conscious elements.

Mr. Darwin, in his remarkable theory of Pangeneses, takes two great strides from this starting point. He supposes, first, that each cell, having of course its individual peculiarities, breeds nearly true to its kind, by propagating innumerable germs, or to use his expression, “gemmules,” which circulate in the blood and multiply there; remaining in that inchoate form until they are able to fix themselves upon other more or less perfect tissue, and then they become developed into regular cells. Secondly, the germs are supposed to be solely governed by their respective
natural affinities, in selecting their points of attachment; and that, consequently, the marvellous structure of the living form is built up under the influence of innumerable blind affinities, and not under that of a central controlling power.

This theory, propounded by Mr. Darwin as "provisional," and avowedly based, in some degree, on pure hypothesis and very largely on analogy, is—whether it be true or not—of enormous service to those who inquire into heredity. It gives a key that unlocks every one of the hitherto unopened barriers to our comprehension of its nature; it binds within the compass of a singularly simple law, the multifarious forms of reproduction, witnessed in the wide range of organic life, and it brings all these forms of reproduction under the same conditions as govern the ordinary growth of each individual. It is, therefore, very advisable that we should look at the facts of hereditary genius, from the point of view which the theory of Pangenesis affords, and to this I will endeavour to guide the reader.

Every type of character in a living being may be compared to the typical appearance always found in different descriptions of assemblages. It is true that the life of an animal is conscious, and that the elements on which it is based are apparently unconscious, while exactly the reverse is the case in the corporate life of a body of men. Nevertheless the employment of this analogy will help us considerably in obtaining a clear understanding of the laws which govern heredity, and they will not mislead us, when used in the manner I propose. The assemblages of which I speak are such as are uncontrolled by any central authority, but have assumed their typical appearance through the free action of the individuals who compose them, each man being bent on his immediate interest, and finding his place under the sole influence of an elective affinity to his neighbours. A small rising watering-place affords as good an illustration as any of which I can think. It is often hardly possible to trace its first beginnings; two or three houses were perhaps built for private use, and becoming accidentally vacant, were seen and rented by holiday folk, who praised the locality, and raised a demand for further accommodation; other houses were built to meet the requirement; this led to an inn, to the daily visit of the baker's and butcher's cart, the postman, and so forth. Then as the village increased and shops began to be established, young artisans, and other floating gemmules of English population, in search of a place where they might advantageously attach themselves, became fixed, and so each new opportunity was seized upon and each opening filled up, as soon or very soon after it existed. The general result of these purely selfish affinities is, that watering-places are curiously similar, even before the speculative builder has stepped in. We may predict what kind of shops will be found and how they will be placed; nay, even what kind of goods and placards will be put up in the windows. And so, notwithstanding abundant individual peculiarities, we find them to have a strong generic identity.

The type of these watering-places is certainly a durable one; the human materials of which they are made remain similar, and so are the conditions under which they exist, of having to supply the wants of the average British holiday seeker. Therefore the watering-place would always breed true to its kind. It would do so by detaching an offshoot on the fissiparous principle, or like a polyp, from which you may snap off a bit, which thenceforward lives an independent life and grows into a complete animal. Or, to compare it with a higher order of life, two watering-places at some distance apart might between them afford material to raise another in an intermediate locality.

Precisely the same remarks might be made about fishing villages, or manufacturing towns, or new settlements in the
Bush, or an encampment of gold diggers, and each of these would breed true to its kind. If we go to more stationary forms of society than our own, we shall find numerous examples of the purest breed: thus, the Hottentot kraal or village of to-day differs in no way from those described by the earliest travellers; or, to take an immensely longer leap, the information gathered from the most ancient paintings in Egypt, accords with our observations of the modern life of the descendants of those peoples, whom the paintings represent.

Next, let us consider the nature of hybrids. Suppose a town to be formed under the influence of two others that differ, the one a watering-place and the other a fishing town; what will be the result? We find that particular combination to be usually favourable, because the different elements do not interfere with, but rather support one another. The fishing interest gives greater solidity to the place than the more ephemeral presence of the tourist population can furnish; the picturesque seaside life is also an attraction to visitors, and the fishermen cater for their food. On the other hand, the watering-place gives more varied conditions of existence to the fishermen; the visitors are very properly mulcted, directly or indirectly, for charities, roads, and the like, and they are not unwelcome customers in various ways to their fellow-townsmen.

Let us take another instance of an hybrid; one that leads to a different result. Suppose an enterprising manufacturer from a town at no great distance from an incipient watering-place, discovers advantages in its minerals, water power, or means of access, and prepares to set up his mill in the place. We may predict what will follow, with much certainty. Either the place will be forsaken as a watering-place, or the manufacturer will be in some way or other got rid of. The two elements are discordant. The dirt and noise and rough artisans engaged in the manufactory, are uncongenial to the population of a watering-place.

The moral I have in view will be clear to the reader. I wish to show that because a well-conditioned man marries a well-conditioned woman, each of pure blood as regards any natural gift, it does not in the least follow that the hybrid offspring will succeed.

I will continue to employ the same metaphor, to explain the manner in which apparent sports of nature are produced, such as the sudden appearance of a man of great abilities in undistinguished families. Mr. Darwin maintains, in the theory of Pangeneis, that the gemmules of innumerable qualities, derived from ancestral sources, circulate in the blood and propagate themselves, generation after generation, still in the state of gemmules, but fail in developing themselves into cells, because other antagonistic gemmules are prepotent and overmaster them, in the struggle for points of attachment. Hence there is a vastly larger number of capabilities in every living being, than ever find expression, and for every patent element there are countless latent ones. The character of a man is wholly formed through those gemmules that have succeeded in attaching themselves; the remainder that have been overpowered by their antagonists, count for nothing; just as the policy of a democracy is formed by that of the majority of its citizens, or as the parliamentary voice of any place is determined by the dominant political views of the electors: in both instances, the dissentient minority is powerless. Let, however, by the virtue of the more rapid propagation of one class of electors, say of an Irish population, the numerical strength of the weaker party be supposed to gradually increase, until the minority becomes the majority, then there will be a sudden reversal or revolution of the political equilibrium, and the character of the borough or nation, as evidenced by its corporate acts, will be entirely
changed. This corresponds to a so-called “sport” of nature. Again, to make the simile still more closely appropriate to our wants, suppose that by some alteration in the system of representation, two boroughs, each containing an Irish element in a large minority, the one having always returned a Whig and the other a Conservative, to be combined into a single borough returning one member. It is clear that the Whig and Conservative party will neutralize one another, and that the union of the two Irish minorities will form a strong majority, and that a member professing Irish interests is sure to be returned. This strictly corresponds to the case where the son has marked peculiarities, which neither of his parents possessed in a patent form.

The dominant influence of pure blood over mongrel alliances is also easily to be understood by the simile of the two boroughs; for if every perfect and inchoate voter in one of them—that is to say, every male, man and child—be a radical to his backbone, the incoming of such a compact mass would overpower the divided politics of the inhabitants of the other, with which it was combined.

These similes, which are perfectly legitimate according to the theory of Pangenesis, are well worthy of being indulged in, for they give considerable precision to our views on heredity, and compel facts that appear anomalous at first sight, to fall into intelligible order.

I will now explain what I presume ought to be understood, when we speak of the stability of types, and what is the nature of the changes through which one type yields to another. Stability is a word taken from the language of mechanics; it is felt to be an apt word; let us see what the conception of types would be, when applied to mechanical conditions. It is shown by Mr. Darwin, in his great theory of “The Origin of Species,” that all forms of organic life are in some sense convertible into one another, for all have, according to his views, sprung from common ancestry, and therefore A and B having both descended from C, the lines of descent might be remounted from A to C, and redescended from C to B. Yet the changes are not by insensible gradations; there are many, but not an infinite number of intermediate links; how is the law of continuity to be satisfied by a series of changes in jerks? The mechanical conception would be that of a rough stone, having, in consequence of its roughness, a vast number of natural facets, on any one of which it might rest in “stable” equilibrium. That is to say, when pushed it would somewhat yield, when pushed much harder it would again yield, but in a less degree; in either case, on the pressure being withdrawn, it would fall back into its first position. But, if by a powerful effort the stone is compelled to overpass the limits of the facet on which it has hitherto found rest, it will tumble over into a new position of stability, whence just the same proceedings must be gone through as before, before it can be dislodged and rolled another step onwards. The various positions of stable equilibrium may be looked upon as so many typical attitudes of the stone, the type being more durable as the limits of its stability are wider. We also see clearly that there is no violation of the law of continuity in the movements of the stone, though it can only repose in certain widely separated positions.

Now for another metaphor, taken from a more complex system of forces. We have all known what it is to be jammed in the midst of a great crowd, struggling and pushing and swerving to and fro, in its endeavour to make a way through some narrow passage. There is a dead lock; each member of the crowd is pushing, the mass is agitated, but there is no progress. If, by a great effort, a man drives those in front of him but a few inches forwards, a recoil is pretty sure to follow, and there is no ultimate advance. At length, by some accidental unison of effort, the dead
lock yields, a forward movement is made, the elements of the crowd fall into slightly varied combinations, but in a few seconds there is another dead lock, which is relieved, after a while, through just the same processes as before. Each of these formations of the crowd, in which they have found themselves in a dead lock, is a position of stable equilibrium, and represents a typical attitude.

It is easy to form a general idea of the conditions of stable equilibrium in the organic world, where one element is so correlated with another that there must be an enormous number of unstable combinations for each that is capable of maintaining itself unchanged, generation after generation.

I will now make a few remarks on the subject of individual variation. The gemmules whence every cell of every organism is developed, are supposed, in the theory of Pangenesis, to be derived from two causes: the one, unchanged inheritance; the other, changed inheritance. Mr. Darwin, in his latter work, "Variation of Animals and Plants under Domestication," shows very clearly that individual variation is a somewhat more important feature than we might have expected. It becomes an interesting inquiry to determine how much of a person's constitution is due, on an average, to the unchanged gifts of a remote ancestry, and how much to the accumulation of individual variations. The doctrine of Pangenesis gives excellent materials for mathematical formulae, the constants of which might be supplied through averages of facts, like those contained in my tables, if they were prepared for the purpose. My own data are too lax to go upon; the averages ought to refer to some simple physical characteristic, unmistakable in its quality, and not subject to the doubts which attend the appraisement of ability. Let me remark, that there need be no hesitation in accepting averages for this purpose; for the meaning and value of an average are perfectly clear. It would represent the results, supposing the competing "gemmules" to be equally fertile, and also supposing the proportion of the gemmules affected by individual variation, to be constant in all the cases.

The immediate consequence of the theory of Pangenesis is somewhat startling. It appears to show that a man is wholly built up of his own and ancestral peculiarities, and only in an infinitesimal degree of characteristics handed down in an unchanged form, from extremely ancient times. It would follow that under a prolonged term of constant conditions, it would matter little or nothing what were the characteristics of the early progenitors of a race, the type being supposed constant, for the progeny would invariably be moulded by those of its more recent ancestry.

The reason for what I have just stated is easily to be comprehended if easy though improbable figures be employed in illustration. Suppose, for the sake merely of a very simple numerical example, that a child acquired one-tenth of his nature from individual variation, and inherited the remaining nine-tenths from his parents. It follows, that his two parents would have handed down only nine-tenths of nine-tenths, or 81/100 from his grandparents, 729/1000 from his great-grandparents, and so on; the numerator of the fraction increasing in each successive step, less rapidly than the denominator, until we arrive at a vanishing value of the fraction.1

1 The formula is as follows:—

\[ G = \text{the total number of gemmules}; \quad \text{of which those derived unchanged through parentage} = Gr; \quad \text{the remainder,} \quad G(1 - r), \quad \text{being changed through individual variation.} \quad \text{Then—} \]

[The
in the way of mathematicians, in framing a compact formula, based on the theory of Pangenesis, to express the composition of organic beings in terms of their inherited and individual peculiarities, and to give us, after certain constants had been determined, the means of fortelling

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<th>Derived unchanged through Parents</th>
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<td>$Gr$</td>
<td>$G (1 - r)$</td>
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<td>The part $Gr$ derived through the parents is similarly composed of two parts; namely $Gr^2$ + $Gr (1 - r) = G (r - r^2)$</td>
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<tr>
<td>The part $Gr^2$ derived through the grandparents is composed of $Gr^3$ + $Gr^2 (r - r^2) = G (r^2 - r^2)$ &amp;c. &amp;c.</td>
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<tr>
<td>That derived from the $n^{th}$ ascending generation is composed of $Gr^{n+1}$ + $Gr (r^n - r^n) = G (r^n - r^{n+1})$ &amp;c. &amp;c.</td>
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Hence $G$ consists of $Gr^{n+1}$ unchanged gemmules derived from generations higher than the $n^{th} + G$ multiplied into the sum of the following series, every term of which expresses gemmules, modified by individual variation—

$$1 - r + r^2 - r^3 + ... + r^{n-1}$$

as $r$ is a fraction less than 1 (it was $\frac{3}{4}$ in the imaginary case discussed in my text, and would generally be very small, but I have no conception what, perhaps as small as $\frac{1}{1000}$ or some numbers still nearer unity), the value of $r^{n+1}$ will vanish if $n$ be taken sufficiently large, in which case the individual may be considered as wholly derived from gemmules modified by individual variations posterior to the $n^{th}$ generation.

It must be understood that I am speaking of variations well within the limits of stability of the race, and also that I am not speaking of cases where the individuals are selected for some peculiarity, generation after generation. In this event a new element must be allowed for, inasmuch as the average value of $r$ cannot be constant. In proportion as the deviation from the mean position of stability is increased, the tendency of individual variation may reasonably be expected to lie more strongly towards the mean position than away from it. The treatment of all this seems well within the grasp of analysis, but we want a collection of facts, such as the breeders of animals could well supply, to guide us for a few steps out of the region of pure hypothesis.

The formula also shows how much of a man's nature is derived on the average from any given ancestor; for if we call the father the 1st generation, the grandfather the 2d, and so on, as a man has $a^n$ parents in the $n^{th}$ generation, and as the formula shows that he only inherits $Gr^n$ unchanged gemmules from all of them put together, it follows that the portion derived from each person in that generation is, as $\left(\frac{a}{2}\right)^n$.

The average distribution of characteristics among a large multitude of offspring whose parentage was known. The problem would have to be attacked on the following principle.

The average proportion of gemmules, modified by individual variation under various conditions preceding birth, clearly admits of being determined by observation; and the deviations from that average may be determined by the same theory in the law of chances, to which I have so often referred. Again, the proportion of the other gemmules which are transmitted in an unmodified form, would be similarly treated; for the children would, on the average, inherit the gemmules in the same proportions that they existed in their parents; but in each child there would be a deviation from that average. The table in page 34 is identical with the special case in which only two forms of gemmules had to be considered, and in which they existed in equal numbers in both parents.

If the theory of Pangenesis be true, not only might the average qualities of the descendants of groups A and B, A and C, A and D, and every other combination be predicted, but also the numbers of them who deviate in various proportions from those averages. Thus, the issue of F and A ought to result in so and so, for an average, and in such and such numbers, per million, of A, B, C, D, E, F, G, &c., classes. The latent gemmules equally admit of being determined from the patent characteristics of many previous generations, and the tendency to reversion into any ancient form ought also to admit of being calculated. In short, the theory of Pangenesis brings all the influences that bear on heredity into a form, that is appropriate for the grasp of mathematical analysis.

I will conclude by saying a few words upon what is to be understood by the phrase "individuality." The artificial breeding of fish has been the subject of so many books,
shows, and lectures, that every one has become more or less familiar with its processes. The milt taken from the male is allowed to fall upon the ova that have been deposited by the female, which thereupon rapidly change their appearance, and gradually, without any other agency, an embryo fish may be observed to develop itself inside each of them. The ova may have been separated for many days from the female, the milt for many hours from the male. They are, therefore, entirely detached portions of organized matter, leading their own separate organic existences; and at the instant or very shortly after they touch, the foundations are laid of an individual life. But where was that life during the long interval of separation of the milt and roe from the parent fish? If these substances were possessed of conscious lives in the interim, then two lives will have been merged into one "individuality" by the process; which is a direct contradiction in terms. If neither had conscious lives, then consciousness was produced by an operation as much under human control as anything can be. It may not be said that the ovum was always alive, and the milt had merely an accessory influence, because the young fish inherits its character from its parents equally, and there is an abundance of other physiological data to disprove the idea. Therefore so far as fish are concerned, the creation of a new life is as unrestrictedly within the compass of human power, as the creation of any material product whatever, from the combination of given elements.

Again, suppose the breeder of fish to have two kinds of milt, belonging to salmon of different characters, each in a separate cup, A and B, and two sorts of ova, each also in a separate cup, C and D. Then he can make at his option the fish AC and BD, or else the fish AD and BC. Therefore not only the creation of the lives of fish, in a general sense, but also the specific character of individual lives, within wide limits, is unrestrictedly under human control. The power of the director of an establishment for breeding fish is of exactly the same quality as that of a cook in her kitchen. Both director and cook require certain elements to work upon; but, having got them, they can create a fish or a dinner, as the case may be, according to a predetermined pattern.

Now, all generation is physiologically the same, and therefore the reflections raised by what has been stated of fish are equally applicable to the life of man. The entire human race, or any one of its varieties, may indefinitely increase its numbers by a system of early marriages, or it may wholly annihilate itself by the observance of celibacy; it may also introduce new human forms by means of the intermarriage of varieties and of a change in the conditions of life. It follows that the human race has a large control over its future forms of activity,—far more than any individual has over his own, since the freedom of individuals is narrowly restricted by the cost, in energy, of exercising their wills. Their state may be compared to that of cattle in an open pasture, each tethered closely to a peg by an elastic cord. These can graze in any direction, for short distances, with little effort, because the cord stretches easily at first; but the further they range, the more powerfully does its elastic force pull backwards against them. The extreme limit of their several ranges must lie at that distance from the peg where the maximum supply of nervous force which the chemical machinery of their bodies can evolve, is only just equivalent to the outflow required to resist the strain of the cord. Now, the freedom of humankind, considered as a whole, is far greater than this; for it can gradually modify its own nature, or, to keep to the previous metaphor, it can cause the pegs themselves to be continually shifted. It can advance them

---

1 The Address of the President of the Royal Society, 1867, in presenting the Copley medal to Von Baer.
from point to point, towards new and better pastures, over wide areas, whose bounds are as yet unknown.

Nature teems with latent life, which man has large powers of evoking under the forms and to the extent which he desires. We must not permit ourselves to consider each human or other personality as something supernaturally added to the stock of nature, but rather as a segregation of what already existed, under a new shape, and as a regular consequence of previous conditions. Neither must we be misled by the word "individuality," because it appears from the many facts and arguments in this book, that our personalities are not so independent as our self-consciousness leads us to believe. We may look upon each individual as something not wholly detached from its parent source,—as a wave that has been lifted and shaped by normal conditions in an unknown, illimitable ocean. There is decidedly a solidarity as well as a separateness in all human, and probably in all lives whatsoever; and this consideration goes far, as I think, to establish an opinion that the constitution of the living Universe is a pure theism, and that its form of activity is what may be described as co-operative. It points to the conclusion that all life is single in its essence, but various, ever varying, and inter-active in its manifestations, and that men and all other living animals are active workers and sharers in a vastly more extended system of cosmic action than any of ourselves, much less of them, can possibly comprehend. It also suggests that they may contribute, more or less unconsciously, to the manifestation of a far higher life than our own, somewhat as—I do not propose to push the metaphor too far—the individual cells of one of the more complex animals contribute to the manifestation of its higher order of personality.

APPENDIX.

THE deviations from an average are given in the following table of M. Quetelet as far as 80 grades; they are intended to be reckoned on either side of the average, and therefore extend over a total range of 160 grades. The eightieth is a deviation so extreme, that the chances of its being exceeded (upwards or downwards, whichever of the two events we please to select) is only \( \frac{5,000,000 - 4,999,999}{10,000,000} = \frac{1}{10,000,000} \) or less than one in a million. That is to say, when firing at a target (see Diagram, p. 28) less than one out of a million shots, taking the average of many millions, will hit it at a greater height than 80 of Quetelet's grades above the mean of all the shots; and an equally small number will hit it lower than the 80th grade below the same mean.

Column M gives the chance of a shot falling into any given grade (80 \times 2 or) 160 in total number. Column N represents the chances from another point of view; it is derived directly from M, and shows the probability of a shot lying between any specified grade and the mean; each figure in N consisting of the sum of all the figures in M up to the grade in question, and inclusive. Thus, as we see by Column M, the chance against a shot falling into the 1st grade (superior or inferior, whichever we please to select) is .025225 to 1, and .025124 to 1 against its falling into
the 2d, and \(0.024924\) to 1 against its falling into the 3d; then the chance against its falling between the mean and the third grade, inclusive, is clearly the sum of these 3 numbers, or \(0.075273\), which is the entry in Column N, opposite the grade 3.

**TABLE BY QUETELET.**

<table>
<thead>
<tr>
<th>Grade or Rank of the Group</th>
<th>Probability of Drawing each Group</th>
<th>Sum of the Probabilities, commencing at the most probable Group.</th>
<th>Number of the Grade</th>
<th>Probability of Drawing each Group</th>
<th>Sum of the Probabilities, commencing at the most probable Group.</th>
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<td>0.012125</td>
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These columns may be used for two purposes.

The one is to calculate a table like that in p. 34, where I have simply lumped II of Quetelet's grades into I, so that my classes A and a correspond to his grade II in column N, my classes B and b to the difference between his grades 22 and 11, my C and c to that between his grades 33 and 22, and so on.

The other is as a test, whether or no a group of events are due to the same general causes; because, if they are, their classification will afford numbers that correspond with those in the table; otherwise, they will not. This test has been employed in pp. 30, 31, and 33. The method of conducting the comparison is easily to be understood by the following example, the figures of which I take from Quetelet. It seems that 487 observations of the Right Ascension of the Polar Star were made at Greenwich between 1836 and 1839, and are recorded in the publications of the Observatory, after having been corrected for precession, nutation, &c., and subject only to errors of observation. If they are grouped into classes separated by grades of 0.5 sec. the numbers in each of these classes will be as shown in Column III. page 380. We raise them in the proportion of 1,000 to 487 in order to make the ratios decimal, and therefore comparable with the figures in Quetelet's table, and then insert them in Column IV. These tell us that it has been found by a pretty large experience, that the chance of an observation falling within the class of \(-0.5\) sec. from the mean, is 150 to 1,000; of its falling within the class of \(-1.0\) sec. is 125 to 1,000; and so on, for the rest. This information is analogous to that given in Column M of Quetelet's table, and we shall now proceed to calculate from IV. the Column V. which is analogous to Quetelet's N. The method of doing so is, however, different. N was formed by adding the entries in M from the average outwards; we must set to work in the
converse way, of working from the outside inwards, because the exact mean is not supposed to have been ascertained, and also because this method of working would be somewhat more convenient, even if we had ascertained the mean. Now, wherever the mean may lie, it is certain that the chance is 500 to 1,000 against an observation being on one specified side of it—say the minus side. Therefore Column IV. by showing that no observation lies outside the class - 3.5 sec. tacitly states that it is 500 to 1,000 (or .500 to 1.00) against any observation lying between - 3.5 sec. and the mean; 1500 is therefore written in Column V. opposite - 3.5 sec. Again, as according to IV. there are only 2 cases in the class - 3.5 sec. it is (500 - 2 =) 498 to 1,000 that any observation will lie between class - 3.0 sec. and the average, and .498 is written in Column V. opposite to - 3.0 sec. Similarly (498 - 12 =) .486 is written opposite to - 2.5 sec. and we proceed in this way until we fall within the observations that form part of the group of the mean, 168 in number. Our remainder is 68; it ought, strictly speaking, to be equal to one half of 168, or 84; we therefore may conclude that the mean has been taken a trifle too high.

A calculation made in exactly the same way, from + 3.5 sec. inwards to the mean, will take in the other portion of the mean group, namely, 100. Now we compare our results with Quetelet's Column N, and see to which of his grades the numbers in our Column V. are severally equal; the grades in question are written in Column VI. In proportion as these observations are strictly accordant with the law of deviation from a mean, so the intervals between the grades in Column VI. will approach to equality. What they actually are, is shown in Column VII. We cannot expect the two extreme terms to give results of much value, because the numbers of observations are too few; but taking only the remainder into consideration, we find that the average

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<th>X. Events</th>
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<td>All grades (above + .70).</td>
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<th>VII.</th>
<th>Probabilities from Experience.</th>
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<td>All grades (above + .70).</td>
</tr>
<tr>
<td></td>
<td>500</td>
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<th>VI.</th>
<th>Corresponding Grades of Data.</th>
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<th>Data rated as 900 by Experience.</th>
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<th>No. of Data in each Grade.</th>
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<th>Grades of Data in each Class.</th>
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interval of 6.5 is very generally adhered to. Now, then, let us see what the numbers in the classes would have been by theory if, starting either from 2.5 (a little lower than 2.6, as we agreed it ought to be) above the average, or from 4, below it, we construct a series of classes, according to Quetelet's grades, having a common interval of 6.5. Column VIII. shows what these classes would be; Column IX. shows the corresponding figures taken directly from Quetelet's N, and Column X. gives the difference between these figures, which are so closely accordant with the entries in Column IV., as to place it beyond all doubt that the errors in the Greenwich observations are strictly governed by the law of a deviation from an average.

It remains that I should say a very few words on the principle of the law of deviation from an average, or, as it is commonly called, the law of Errors of Observations, due to Laplace. Every variable event depends on a number of variable causes, and each of these, owing to the very fact of its variability, depends upon other variables, and so on step after step, till one knows not where to stop. Also, by the very fact of each of these causes being a variable event, it has a mean value, and, therefore, it is (I am merely altering the phrase), an even chance in any case, that the event should be greater or less than the mean. Now, it is asserted to be a matter of secondary moment to busy ourselves in respect to these minute causes, further than as to the probability of their exceeding or falling short of their several mean values, and the chance of a larger or smaller number of them doing so, in any given case, resembles the chance, well known to calculators, of the results that would be met with when making a draw out of an urn containing an equal quantity of black and white balls in enormous numbers. Each ball that is drawn out has an equal chance of being black or white, just as each subordinate event has an equal chance of exceeding or falling short of its mean value. I cannot enter further here into the philosophy of this view; the latest writer upon it is Mr. Crofton, in a Paper read before the Royal Society in April 1869.

A table, made on the above hypothesis, has been constructed by Cournot, and will be found in the Appendix, p. 267, of Quetelet's "Letters on Probabilities" (translated by Downes; Layton & Co., 1849), but it does not extend nearly so far as that of M. Quetelet. The latter is calculated on a very simple principle, being the results of drawing 999 balls out of an urn, containing white and black balls in equal quantities and in enormous numbers. His grade No. 1 is the case of drawing 499 white and 500 black, his 2 in 498 white and 501 black, and so on, the 80th being 420 white and 579 black. It makes no sensible difference in the general form of the results, when these large numbers are taken, what their actual amount may be. The value of a grade will of course be very different, but almost exactly the same quality of curve would be obtained if the figures in Quetelet's or in Cournot's tables were protracted. All this is shown by Quetelet in his comparison of the two tables.
ALPHABETICAL LIST OF THE LETTERS AND
THE RELATIONSHIPS TO WHICH THEY CORRESPOND.

See also the Chapter on Notation, pp. 50—53.

B. Brother
b. Sister.

F. Father.
f. Mother.

G. Grandfather, viz. Father's father.
g. Grandfather, viz. Mother's father.
G. Grandmother, viz. Father's mother.
g. Grandmother, viz. Mother's mother.

GB. Great-uncle, viz. Father's father's brother.
gB. Great-uncle, viz. Mother's father's brother.
GB. Great-uncle, viz. Father's mother's brother.
gB. Great-uncle, viz. Mother's mother's brother.

gf. Great-aunt, viz. Mother's father's sister.

GF. Great-grandfather, viz. Father's father's father.
gF. Great-grandfather, viz. Mother's father's father.
GF. Great-grandfather, viz. Father's mother's father.
gF. Great-grandfather, viz. Mother's mother's father.

GF. Great-grandmother, viz. Father's father's mother.
gF. Great-grandmother, viz. Mother's father's mother.
GF. Great-grandmother, viz. Father's mother's mother.
gF. Great-grandmother, viz. Mother's mother's mother.

GG. Great-great-grandfather, 8 forms, see p. 53.
GG. Great-great-grandmother, 8 forms, also.

GN. First cousin once removed ascending, male, 8 forms.
GN. First cousin once removed ascending, female, 8 forms.

GU. Great-great-uncle, 8 forms, see p. 53.
GU. Great-great-aunt, also 8 forms.

N. Nephew, viz. Brother's son.
N. Niece, viz. Brother's daughter.

NS. Great-nephew, viz. Brother's son's son.
nS. Great-nephew, viz. Sister's son's son.

NS. Great-nephew, viz. Brother's daughter's son.
nS. Great-nephew, viz. Sister's daughter's son.

Ns. Great-niece, viz. Brother's son's daughter.
nS. Great-niece, viz. Sister's son's daughter.

Ns. Great-niece, viz. Brother's daughter's daughter.
nS. Great-niece, viz. Sister's daughter's daughter.

P. Grandson, viz. Son's son.
P. Granddaughter, viz. Son's daughter.

PS. Great-grandson, viz. Son's son's son.
pS. Great-grandson, viz. Daughter's son's son.
PS. Great-grandson, viz. Son's daughter's son.
pS. Great-grandson, viz. Daughter's daughter's son.

P. Great-granddaughter, viz. Son's daughter's daughter.
P. Great-granddaughter, viz. Daughter's daughter's daughter.
P. Great-granddaughter, viz. Son's daughter's daughter.
P. Great-granddaughter, viz. Daughter's daughter's daughter.

PP. Great-great-grandson, 8 forms, see p. 53.
PP. Great-great-granddaughter, also 8 forms.

S. Son.
s. Daughter.

U. Uncle, viz. Father's brother.
u. Uncle, viz. Mother's brother.
U. Aunt, viz. Father's sister.

UP. First cousin once removed descending, male, 8 forms.
UP. First cousin once removed descending, female, 8 forms.

US. First cousin, viz. Father's brother's son.
us. First cousin, viz. Mother's brother's son.
US. First cousin, viz. Father's sister's son.
us. First cousin, viz. Mother's sister's son.
U. First cousin, viz. Father's brother's daughter.
u. First cousin, viz. Mother's brother's daughter.
U. First cousin, viz. Father's sister's daughter.
v. First cousin, viz. Mother's sister's daughter.
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