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the undivided tremors, and if the tremors begin to be divided immediately at the entrance into brain substance, it seems a clear necessity to conceive the seat of sensation to be at the surface.

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*On the MENTAL DIFFERENCES between the SEXES.* By W. L. DISTANT.

THE question I propose to discuss is one which is intimately connected with the progress and evolution of the race. It is one which at the present day possesses more than usual interest, owing to the almost universal demand for higher education and more intellectual estimation of women. In endeavouring to ascertain what are the mental differences between men and women, I do not propose to take any cognisance in this paper of what are described as intuitive ideas and sexual intuitions, nor to pass any opinion upon the same, but rather to aim at dealing only with physical facts, in so far as my knowledge of the present progress of science in this field will enable me to do so. Nor can any claim be made that this paper has mastered the situation, but rather it is put forward as a note of interrogation on the subject. The question may be roughly stated thus. Is there clearly proved to be a mental difference between the sexes? And is that difference of kind or only of degree?

It is a well-established fact that the male brain is heavier than that of the female, and this even antecedent to the time of birth. Dr. Robert Boyd, who compiled statistics from 2,086 cases, 1,025 males and 1,061 females examined in St. Marylebone Parochial Infirmary from the years 1839 to 1847, observes: "The mean weight of the male brain was, at all periods, above that of the female, which was the probable cause of the large number of still-born male infants as compared with females, 51 to 32, and the necessity of resorting to craniotomy in five instances in the males only.\* The excess also exists in each of the several portions of the brain, Dr. Peacock writes, "the cerebrum, the cerebellum, with the pons varolii and medulla oblongata and the cerebellum alone, being uniformly heavier in the male than in the female."† Lauret measured the heads of two thousand individuals and found that both in diameter and circumference the female head is considerably smaller than the male.\* This has been further worked out by Dr. J. Cleland, who, in his paper "On the Variations of the Human Skull," in observing that if the head be balanced on the vertebral column it must change its position with growth, and be gradually tilted up more and more

\* "Philosophical Transactions," 1861.

† "Monthly Journal of Medical Science," 1846.

‡ Büchner, "Force and Matter," p. 112.

from childhood to adult life, to throw more weight behind the condyles, as the frontal and temporo-sphenoidal lobes of the brain increase in size and the face becomes heavier, the greater the growth of these parts the greater the tilting up, remarks also that the female skull is much less tilted back on the condyles than the male, being in this, as in various other respects, more child-like than the male skull.\* Schaffhausen in his lecture "On the Primitive Form of the Human Skull," states, "It also struck me that we so frequently find in ancient female skulls so decided a prognathism that they almost resemble the Ethiopian skulls, and have been mistaken for them. The most prognathous skull in the cave of Frontal is that of a female. This may be simply explained from the fact that the female skull retains in its growth more signs of imperfect development than the male, namely, the projection of the parietal protuberances, the lesser elevation of the frontal bone, the shorter and narrower cranial base, and with the latter is connected the more elliptical dental arch and the inclination to prognathism."† Ecker sums up his investigations on the characteristic peculiarity in the form of the female skull as follows:—

1. The slight elevation of the cranium.
2. The flattening of the vertical region.
3. The perpendicular forehead, the result of the predominance of the cranial roof over the cranial base, &c.‡

The European female brain as a rule weighs on an average four to six ounces less than the male, and this difference, according to Solly, is already perceptible in the new-born child.§ Now it is generally allowed that material growth of brain is correlative to mental capacity, and these facts therefore go to prove that at present the aptitude for mental achievements is decidedly possessed by the males. Still, as Dr. Peacock states, in accordance with the remarks of the Wenzels and Tiedemann, the female brain, though absolutely lighter than that of the male, maintains a higher proportion relatively to the weight of the body,|| and Professor Bain also observes that the mere propulsion of the muscles demands a large supply of nerve force, and animals whose muscles are large and active have correspondingly large brains.¶ Other reasons, however, I think can be adduced to account for the differences in male and female cerebral manifestations.

Investigations have also gone to prove that in primitive races

\* "Philosophical Transactions," 1870.

† "Anthropological Review," vol. vi, p. 425.

‡ "Anthropological Review," vol. vi, p. 356.

§ "The Human Brain," p. 162.

|| "Monthly Journal of Medical Science," 1846.

¶ "Mind and Body," p. 20.

the brain of woman approximates more closely to that of man, but although fresh facts slowly accumulate, the amount of evidence is perhaps still too small to allow of dogmatic assertion on the point. The weight of evidence, however, decidedly inclines to this assumption, and, as Vogt writes, the difference between the sexes, as regards the cranial cavity, increases with the development of the race, so that the male European excels much more the female than the negro the negress. Welcher confirms this statement of Huschke from his measurements of negro and German skulls.\* The tables furnished by Dr. Jos. Barnard Davies of the brain weights of 762 males and 377 females from various parts of the world also show the same result. The difference is greatest in the European and least in the African race.† Accepting these results it would appear that man has advanced somewhat alone in the intellectual evolution of the race; that the causes which produce a higher masculine cranial development are not felt or are powerless to produce the same effects on the female organisation. That the advance of man is clearly marked by a higher form of skull and increase of the cranial cavity seems borne out by all recent investigations. Already, says Herbert Spencer, the brain of the civilised man is larger by nearly thirty per cent. than the brain of the savage. Already, too, it presents an increased heterogeneity, especially in the distribution of its convolutions.‡ Mons. Paul Broca has perhaps made some of the most valuable contributions to our knowledge on this point. From his examination of a number of old skulls he has proved that the cranium of the Parisian population has in the course of centuries gained in capacity.§ He has also given some reliable information as to the effects of mental training in increasing the volume of the brain. He took as his subjects twenty attendants and eighteen pupils of the hospital of Bicêtre, and his cranial measurements showed that though the attendants had the advantage in age, the pupils surpassed them in cranial development, and that the increase was principally in the frontal lobes of the brain, which are taken as the seat of the highest faculties of intelligence.|| Before proceeding further it will perhaps be best to meet a probable objection that whereas not only quantity but quality (convolution, etc.) of brain denotes the higher intelligence, in discussing only weight of brain, I have not proved sufficiently the mental divergence of the sexes. Admitting that the nature and distribution of the convolutions are indicative of mental development or

\* Vogt, "Lectures on Man," p. 81.

† "Philosophical Transactions," 1868.

‡ "Principles of Biology," vol. ii, p. 502.

§ Vogt, "Lectures on Man," p. 90.

|| "Nature," vol. viii, p. 152.

capacity, the form of the skull and incidental cranial capacity have still been shown to improve with higher mental exertion, and the brain itself seems also affected by the same cause. Albers, of Bonn, states that having dissected the brains of many persons who had for years undergone much mental labour, he found in all of them the substance of the brain very firm and the grey matter as well as the convolutions highly developed.\* We have thus seen that as man progresses from a primitive condition he exhibits a higher cranial capacity, and that there is evidence which tends to show that woman approximates more closely to this in his earlier stage, and departs from it more as he advances. Can this difference be explained as the result of external conditions and masculine selection? If so, how far? And are there physiological conditions retarding the same?

The principal external conditions to be considered are such as in a somewhat complex condition of society would form the qualification necessary for woman's estimation in the same. We must, therefore, take a retrospective glance at her position in relation to man during his progress from a ruder existence. Among savage races we usually find a somewhat equal distribution of labour, both in nature and quantity, between the sexes. The wants, though pressing, are few, and equally needed by the male and female, and although the position of the woman may be in the very lowest and most degraded state, still mentally she is little surpassed by her lord, who rules by a purely physical superiority. But as in the struggle for existence he relies less upon physical conditions and more upon social organisation, and the assistance derived from the developing inventive powers of the mind, he becomes less brutal and to woman more forbearing. She is no longer almost the common property of the many, and favoured by man's improved ideas she ceases to be merely a slave, but runs some risk of becoming only an ornament or a plaything. Now in the struggle for the possession of the female, other things being equal, the man with the larger brain has the advantage. He must possess mental capacity of some sort to arrive at any position in the tribe or city, and without the possession of this position he has little chance of selecting his companion from the women held in the greatest esteem and highest estimation. The course of sexual selection thus tends to mentally strengthen the males, but applies in an inverse ratio to the females. Woman becomes sought after for her beauty, as the varying standard of which may happen to be. Thus, according to Winwood Reade, the Persians admire slim women; the Turks fatten girls for the harem, a custom which also prevails in the Bight of Benin and in certain parts of East Africa; the Tartars

\* Büchner, "Force and Matter," p. 112.

admire small oblique eyes (Vambery); the tawny Moors, according to Caillie, prefer women whose front teeth project; and it would take pages to enumerate the fashionable disfigurements which prevail at various parts of the world—the teeth made black or blue, the feet crippled, and the skull compressed.\* Even amongst ourselves we find the same power of sexual selection at work. Ecker, after describing the differences between the male and female skulls he had examined, remarks that the characteristic cranial profile may be seen in especially handsome living female heads, and whoever has once paid attention to these peculiarities will generally find them. We need not, he says, be surprised that we do not find this female type equally pronounced in every head, just as little as we find in every male figure the masculine *habitus*. But that this form occurs so well pronounced in heads which we designate beautiful and womanly proves that this form is typical for the female sex.† From this it appears that our standard of female beauty consists, amongst other qualifications, of a more or less perpendicular forehead, the result of a predominance of the cranial roof over the cranial base. In man we do not consider this the highest form of skull, but for how long have we been selecting, perpetuating, and increasing this type in the female cranium.

We have considered the action of education and mental training in affecting the cranial development of man. Have women gone through the same mental exercise, or have other causes militated against their doing so? I think we may fearlessly reply that women altogether have had but a moiety of the education supplied to the other sex, and that from the one extreme, where she is valued for her domestic services, to the other, where she is admired for her beauty and accomplishments, there has been no sufficient cause or opportunity for real development of mind. The common practice of secluding the women, owing to the jealousy or precautionary measures of the men in preventing an intercourse with the outside world, produces a paucity of ideas and feebleness of intellect. We need not only look for this in the harem of the east, nor at the police-like supervision of the Chinese, but even in our own country we have from the earliest time, either rightly or wrongly, drawn a hard and fast line between what shall be considered as subjects and pursuits for men, and what shall be considered as such for women. That this seclusion can but have proved detrimental to cranial capacity, we may judge by analogy from the result of Mr. Darwin's experiments and researches with rabbits. He has shown that the brain of the domestic rabbit is considerably reduced in bulk in comparison with that of the wild rabbit or hare; and he

\* "African Sketch Book," vol. ii, p. 522.

† "Anthropological Review," vol. vi, p. 355.

remarks that when we remember that rabbits, from having been domesticated and closely confined during many generations, cannot have exerted their intellect, instincts, senses, and voluntary movements, either in escaping from various dangers or in searching for food, we may conclude that their brains will have been feebly exercised, and consequently have suffered in development. We thus see that the most important and complicated organ in the whole organisation is subject to the law of decrease in size from disuse.\* The only one common field on which both sexes seem to have met is that of religion. At all times the church has been solicitous for the support of a female laity, who have, from their little idea of the knowledge of the age and their seclusion from most intellectual topics, shown a fondness for dogma and an absence of scepticism. We frequently hear of the so called innate religious ideas of women, which may be merely the result of the clergy having for a length of time alone solicited their services in another field to the duties of housekeeping or the mysteries of fashion. Women with any activity of disposition and absence of employment have often to seek in church or other religious work a relief from the *ennui* of inanity, and not only form their estimate of spiritual but also of temporal matters from the clergy. The result has been little in intellectual development. The cares of the family and home might be generally accepted as involving much about the usual amount of mental anxiety and exercise in the midst of a more primitive as well as in a highly organised society, and hence, if that has been the only horizon of female mental activity in both those social conditions, we should expect to find what the facts show us, that in primitive peoples the brain of woman approximates more closely to that of man than it does in a higher state of civilisation, because man has comparatively alone pursued those avocations and undergone that educational discipline that tends to produce a highly developed cranial capacity. By educational discipline I do not allude to the mere teaching of schools or of books, but to those habits of inductive analysis which are incidental and necessary to maintain a position in the mental struggle for existence in a society which is ever approaching a higher evolution both in the conception of natural conditions and in the power to make use of the same. It has been pointed out again and again how the mental acquirements of woman have proved of no pecuniary value, and how a strong mindedness has been considered as converse to attractive. It is also worthy of remark how the most intellectual women consort with men for mental companionship rather than with their own sex.

\* "Variation of Animals and Plants under domestication," vol. i, p. 129.



Some confusion of idea may arise from taking the most highly intellectual and educated men as the standard to which we are considering it possible for women to arrive. This must be quite negatived, as though we find the brains of illustrious men as Cuvier, Abercrombie, and many others, attaining great weights, the masculine average is far below, and it is only to this degree we are discussing the possibility of female elevation. It will be equally foreign to the argument to adduce the names of very eminent women, or the fact of Professor Wagner meeting with the brain of a woman which was absolutely heavier than that of Cuvier. We are dealing with the aggregate and not comparing the choicest units.

It cannot, I think, however, be denied that there are physiological conditions which must for ever tend against the possibility of women as a rule arriving at an equal, much less acquiring a superior, position to men in the mental struggle. We have seen that not only in the form of the skull, but also in the weight of the brain, women hold an intermediate position between the child and the man, and we must discriminate how much of this difference is structural, and how much developmental, or the result of arrested development. Now, it cannot be derogatory to the true estimation of women to describe as her principal mission the reproduction of the race. This is both the Alpha and the Omega of the inquiry. And the cost of this reproduction is most severe. For, as pointed out by Herbert Spencer, whereas in man individual evolution continues until the physiological cost of self-maintenance very nearly balances what nutrition supplies, in woman an arrest of individual development takes place while there is yet a considerable margin of nutrition, otherwise there could be no offspring. This rather earlier cessation of individual evolution, thus necessitated, showing itself in a rather smaller growth of the nervo-muscular system, so that both the limbs which act and the brain which makes them act are somewhat less.\* Mr. Spencer also inclines to the belief that where exceptional fertility exists there is sluggishness of mind, and that where there has been during education excessive expenditure in mental action there frequently follows a complete or partial infertility.† Again, the nervous system of women is subject to unusual excitement and agitation by sexual causes, as the hysteric affections of puberty, the nervous susceptibility which occurs during every menstrual period, the nervous affections of breeding and the nervous susceptibilities of lying-in women.‡ These causes must of course militate to a great extent

\* "Study of Sociology."

† "Principles of Biology," vol. ii, p. 502.

‡ Gooch, New Sydenham Society's Publications, vol. ii.



against prolonged and continuous mental labour, but certainly are not sufficient to prevent a far higher mental training than at present, and thus necessarily a higher mental development and cranial capacity. Among other differences of an allied nature between the sexes may be noticed that of temperature, which closely follows the rule of cranial form and weight of brain. From a very interesting memoir which has lately appeared from the pen of Dr. J. Stockton Hough it appears that males have, as a rule, from the beginning to the end of life a higher temperature and a less frequent pulsation of the heart than females, varying, nevertheless, according to temperament, constitution, age, and condition of health; that they also appear to have a greater variation in temperature than females; thus agreeing with their variation in stature and many other peculiarities, from which he concludes that the woman approaches more to her condition as a child than the man does, and is consequently less highly developed.\*

It seems that we can therefore greatly account for the mental divergence between men and women. Firstly, by sexual selection, difference of education, and force of custom; and secondly, by physiological conditions. The first we may accept as arbitrary, tentative, and temporary, and therefore capable of amelioration and improvement. The second we must look upon as final and unalterable. The first gives a hope of sure and certain progress to be effected by a higher evolution of society; the second shows only a physiological check to excessive mental expenditure. This check is also in a different manner sustained by man, though perhaps less suddenly than by woman, and there can be little doubt that as the race progresses the cranial capacity of the sexes, though not becoming identical, which is a physiological impossibility, will yet become much less distinct and divergent, which is a moral certainty if based on moral conclusions.

#### DISCUSSION.

Mr. G. HARRIS said that thanks were due to Mr. Distant for his interesting paper, the subject of which was particularly opportune, as the representative of the borough in which they were assembled had already given notice of a measure for conferring upon women Parliamentary suffrage. He (Mr. Harris) regretted, therefore, that this special branch of the topic had not been touched upon by the paper, so far as regarded the qualifications of women for exercising the functions of legislation. One fallacy appeared to pervade the arguments generally availed of in relation to this subject, which was that the education of women was in most cases very inferior to that of men,

\* "Philadelphia Medical Times," Nov. 8th, 1873.

and it was attempted to be concluded that this was the main cause of the intellectual difference between them. He (Mr. Harris) doubted the inferiority asserted. Women had as good an elementary education as men had, while they had much greater opportunities of following it up from their ample leisure. It had been urged, however, that what leisure they had was peculiarly liable to be interfered with by duties connected with fecundity and different household avocations. Only those, however, of the women, who comprised but a limited portion, who were wives, were absorbed by duties of the former class. He should like to hear from their president, who was peculiarly well qualified to express an opinion on the subject, what was the essential ascertained difference as regards structure, texture, and general material between the brains of males and those of females; whether attention had been directed to this subject in the case of the brains of animals as well as those of the human species. Differences in the mental constitution of the sexes there undoubtedly were, and in many respects; and to him (Mr. Harris) they appeared much greater than any variety. Both the education of males and of females could possibly account for it.

Mr. JEREMIAH, JUN., could not quite agree with Mr. Distant in his estimate of the mental capacity of women. He admits there are and have been exceptionally learned women, but the fact does not serve the requirements of his conclusion. Exceptions in the male or female sex are the product or resultants of truly natural laws, known or unknown, and one must, if truth is of value, examine into the causes that have made men and women exceptionally learned or clever, before any well studied conclusion can be arrived at. As some are believers in the notion that the brains of women are different from those of men, I would be glad if the president would give us his views upon the point, and tell us whether the brains of exceptionally clever men and women have been examined, and any differences in texture or weight been discovered. It seems as if the unknown quantity of the problem was to be sought as much in the nature of the brain as in the moral standard of cleverness, or learning, or general superiority formed by society.

Mr. Serjeant Cox said that the paper challenged these questions. 1st. Is it a fact that women are inferior to men in mental capacity? 2nd. If so, is it the result of education? 3rd. Or by force of a natural law? The fact could not be disputed. Women excel us in some intellectual qualities, as perceptive power and, perhaps, memory, and in imagination. But they are inferior to men in respect of the reasoning faculties. The ablest woman in almost every intellectual pursuit has been found inferior to the ablest man. To what is this difference due? Having less bodily strength than man, and by her maternal duties incapacitated from cultivating the same pursuits, her mental structure has become moulded to her position. If originally she had been man's equal in mind, during long ages of subsequent depression, her structure would have become moulded to the conditions of her existence. But the important question is, if other treatment could make her

other than she is, and that raises the third question. Is woman's mental structure the result of what he must term a natural law? for, if so, no change of conditions could bring about equality of the sexes. He was inclined to the conclusion that it was the result of natural law, because it was universal throughout the human race, and still more because it was a good and not an evil. Woman excelled in the faculties most useful to her, as man excels in the faculties most required by him. But not the less might the intellectual position of woman be improved. For instance, if otherwise qualified for the franchise, she ought not to be excluded simply because of her sex. She is, at least, as well qualified intellectually as numbers of the men to whom to vote is given. There are many employments for which her special intellectual faculties peculiarly adapt her, and to which more easy access ought to be permitted to her.

Mr. DISTANT said, in consequence of the late hour I will endeavour to reply as briefly as possible. I have not alluded to the political enfranchisement of women, considering that to scarcely fall within the province of a scientific discussion, but as a question to be decided elsewhere. A gentleman has asked me why ladies have not made more use of their large amount of leisure for educational purposes. I can only reply that leisure to acquire in this case is not combined with opportunity for the useful exercise of the same, and that while learning is not sought after in women, and it often only brings the recommendation of "blue stocking," we cannot be surprised either at the little mental use made of spare time, or the little knowledge possessed. I must again reiterate that I have not argued in my paper as to the possibility or probability of the cranial capacity of both sexes becoming identical, but most strongly believe that it will and ought to become much less distinct and divergent. I have also only dealt with aggregates and not with choice examples of either sex, and by the education of the race I have not alluded alone to schools and books but to the healthy exercise of the mind by observation and induction, to which liberty is essential to the first and knowledge to the second.

Mr. HYDE CLARKE and the PRESIDENT also joined in the discussion, and the meeting separated.

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APRIL 14TH, 1874.

Professor BUSK, F.R.S., *President, in the Chair.*

THE minutes of the previous ordinary meeting were read and confirmed.