

*Some Observations on the
Weight of the Brain in the Insane:
A Record of Five Hundred Cases.*

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Some Observations on the Weight of the Brain in the Insane: A Record of Five Hundred Cases.

The weight of the brain in persons who have died insane has been extensively investigated by many anatomists and specialists both on the Continent of Europe & in this country.

The observers who have recorded the largest number of observations in this country are probably: Dr. Boyd who published his results in the "Philosophical Transactions" in 1861; Dr. Thurnam who subsequently analysed, retabulated & greatly extended them in his paper in the Journal of Mental Science. Vol. I. 1866; & Mr. Crochley Clapham, formerly of the West-Riding Asylum, Wakefield, who wrote a paper on the subject published in the "Reports" of that Asylum for 1876.

As every contribution to the subject may prove of some interest or value to investigators in

In this field of research, I have in this paper collected & partially analysed the brain-weights of five hundred persons who have died in the Kent County Asylum at Maidstone during the past four years.

For the sake of convenience and comparison I have taken a round number of either 250. These cases have not, however, been selected in any way, but merely taken in the chronological order of their death. In the large majority of the cases the post mortem examinations have been made within twenty-four hours after death, & in very few, if any, has the time elapsing between death & examination exceeded forty-eight hours.

The method of examining the brain has been the same in all cases, viz. - on removal, the cerebrum was separated from the cerebellum, & it in its turn from the Pons & Medulla. The organ was then sliced from above downwards in the usual manner,

and the several parts weighed with the pie mater & arachnoid. The weights were taken in ounces avoirdupois, smaller fractions than quarter ounces being disregarded. This standard is necessarily less exact than if grammes had been adopted, but is, I think, sufficiently accurate for most practical purposes.

Before entering fully on the subject - it will be as well to make a few remarks on the normal weights of the brain of sane persons, & then to compare them briefly with the results I have obtained.

Most observers have agreed that the average brain-weight in Europeans of sound mind is 49 oz. in the male, & 44 oz. in the female, & I have adopted these figures as a standard for comparison. There is however a very wide range of difference between the weights of the highest & lowest cases that have been recorded; - According

to Sharpey, (Inch's Anatomy Vol. II)
from 34 oz. to 65 oz. in 278 adult-
male brains; and from 31 oz. to
56 oz. in 191 adult-female brains.

It is thus seen that the average
male brain exceeds that of the
female by about 10 per cent.

To a certain extent this differ-
:ence may be accounted for by
the relative stature of the sexes,
but this will not account
for it all, as it has been
ascertained that whereas the
average female brain weighs
10 per cent. less than the male,
the average stature is only 8
per cent. less, - the diminution
is, therefore, not only relative
but absolute.

The weight of the brain ap-
:pears to bear some relation
to the amount of intelligence
in the individual, as the aver-
:tained weights of the brains of
many great men have been
found to be exceptionally
high; but then, per contra,
those of many distinguished men

have been found to be materially below the average. Again several remarkably high weights have been recorded in Idiots & insane persons, perhaps the heaviest brain on record being one mentioned by Clapham, (loc. cit.), which was that of an Idiot who died in the Hunts County Asylum, & whose brain, weighed by Dr. Heringe, reached the enormous figure of $70\frac{1}{2}$ oz.

The evidence is therefore very conflicting, but, taking the average brain-weight of twenty-three distinguished Europeans as 53 oz., it is found to exceed the average European brain, 49 oz., by a little over 10 per cent. On the other hand there appears to be a limit below which it is impossible that ordinary intelligence can exist. This appears to be about 34 oz. in the male & 32 oz. in the female.

In the five hundred cases which I have collected and

analysed I purpose briefly to re-
 view the question & results under
 three headings viz. - Sex, Age &
 the Form of Mental Disorder
 at the time of death, but I
 shall preface this with a few
 general remarks on the varia-
 tions in weight - in some of
 the cases. The lowest brain-
 weight of the series was that of
 a case of Senile Dementia, aged 60,
 in a male patient who had only
 been about six months an in-
 mate. It was atrophied to a
 most remarkable degree, the
 lateral ventricles being enormous-
 ly dilated at the expense of
 the brain tissue; the whole organ
 only weighed 18 oz. The Cerebellum
 with the Pons & Medulla weighed
 5 oz. & the Cerebrum 13 oz. The
 patient was almost totally de-
 void of intelligence, & dirty &
 degraded in his habits, but
 there was nothing to distinguish
 him in this respect from
 the usual condition of that
 only too common class in

all Anplums. The heaviest male brains in the series were two of 55 $\frac{3}{4}$ oz., one a case of Dementia with Epilepsy, aged 24, who had been an inmate for about nine months & who died of phthisis, the other a case of Melancholia, aged 44, who had been an inmate for about one month only & who died of Valvular Disease of the Heart. These two, although considerably above the average, are by no means phenomenal when compared with cases that have been met with in several other anplums & elsewhere.

The lowest weight amongst the females was 25 oz. This was an Epileptic idiot, aged 12, an inmate for about one month, & who died after a severe succession of epileptic seizures.

The Cerebellum with the Pons & Medulla weighed 6 oz. & the Cerebrum only 19 oz. Another, a case of Chronic Mania, aged 60,

fifteen years an inmate, was only 26½ oz., the Cerebellum with the Pons & Medulla being 4½ oz. This brain showed a very great degree of atrophy. The highest (female) weight recorded was 55¼ oz., & occurred in a case of Secondary Dementia, succeeding Chronic Mania, aged 46, an inmate for ten years. The Cerebellum with the Pons & Medulla weighed 6¼ oz. & the Cerebrum 49 oz. This was a remarkably large brain for a female, not many larger having been recorded. There was nothing very remarkable about the brain beyond its great size and weight, but the convolutions showed a degree of atrophy.

Having made these few preliminary remarks I shall proceed to review the total cases in the manner before indicated.

I. Sex.

As formerly stated I have adopted 49 oz. as the average weight of the male brain in the normal

same condition, & 44oz. as that of the female as a standard for comparison.

On comparing these figures with the ascertained average in 250 male & a like number of female insane persons we find a very considerable reduction in weight in the insane. The average, which has been obtained by carefully adding together the total weights in each sex & then taking the mean, was found in this series to be 44.5oz. in the male, and 40.7oz. in the female. From this we observe that the difference between the average weights in the two sexes is less in the case of the insane, the female being only $8\frac{1}{2}$ per cent. less as compared with nearly 10 per cent. in the sane. In the following table (after Sharpey. loc. cit.) I have endeavoured to give an analysis of the weights which compose this average. For the sake of convenience fractions of ounces are disregarded:—

Table I.

| Oz. <i>Arundinopsis</i> . | Male. | | Female. | |
|---------------------------|---------------|--|---------------|--|
| | No. of Cases. | | No. of Cases. | |
| Under 30 | 1 | | 3 | |
| 30 | 2 | | 2 | |
| 31 | ... | | ... | |
| 32 | 1 | | 4 | |
| 33 | 5 | | 4 | |
| 34 | 2 | | 4 | |
| 35 | 1 | | 10 | |
| 36 | 9 | | 13 | |
| 37 | 7 | | 22 | |
| 38 | 2 | | 10 | |
| 39 | 9 | | 34 | |
| 40 | 9 | | 21 | |
| 41 | 16 | | 30 | |
| 42 | 16 | | 20 | |
| 43 | 18 | | 13 | |
| 44 | 18 | | 17 | |
| 45 | 39 | | 22 | |
| 46 | 14 | | 5 | |
| 47 | 23 | | 5 | |
| 48 | 15 | | 2 | |
| 49 | 11 | | 2 | |
| 50 | 12 | | 5 | |
| 51 | 6 | | 1 | |
| 52 | 5 | | ... | |
| 53 | 4 | | ... | |
| 54 | 3 | | ... | |
| 55 | 2 | | 1 | |
| | 250 | | 250 | |

43 or 17.2% attain or above the same average.

15.2 or 6.8% nearly attain or exceed average

60 or 22% attain or above same average.

14.4 or 5.7% nearly attain or exceed average.

We here find that of the 250 males only 43 attain or exceed the same average, whilst 60 females do so.

If, however, we take the insane average weight as a standard, we find that 15.2 males as compared with 14.4 females either very nearly attain or exceed the average of 44.5 oz. & 40.7 oz. respectively.

It is thus interesting to note that of these female brains 22 per cent. exceed the same average as compared with 17.2 per cent. in the male, whilst, on the contrary, the male brains exceed the insane average in the proportion of 60.8 per cent. to 57.6 per cent. in the female.

The consideration of these figures appears to point to a sort of levelling process which is downward in the male & upward in the female.

This may be shortly stated thus:-

| | | | | | |
|-----------------|---|---|-------------------|---|-------------|
| Male Same Brain | } | : | Female Same Brain | } | 100 : 89.8. |
| 49 oz | | | 44 oz | | |

or a difference in favour of the male of 10.2 per cent.

Male Insane Brain } Female Insane Brain } :: 100 : 91.4
 44.5 } 40.7 }

or a difference in favour of the male of 8.6 per cent. :

then taking the difference between 10.2 and 8.6 we find that the female insane brain loses less by 1.6 per cent than the male.

Table II.

| Oz. Airclips. | Male. | | Female. | |
|-----------------------|---------------|---------------|---------------|---------------|
| | No. of Cases. | Rate p. cent. | No. of Cases. | Rate p. cent. |
| From 30 & under to 35 | 12 | 4.8 | 27 | 10.8 |
| " 35 to 40 | 36 | 14.4 | 100 | 40. |
| " 40 " 45 | 107 | 42.8 | 102 | 40.8 |
| " 45 " 50 | 75 | 30. | 19 | 7.6 |
| Upwards of 50 | 20 | 8. | 2 | .8 |
| | 250. | 100. | 250 | 100. |

Table II is a sort of summary of Table I & takes 45 oz as a common stand-point for both sexes, showing that whilst 95 (or 38 per cent) exceed it in the male, only 21 (or 8.4 per cent.) do so in the female. It also shows the number of cases in each sex

in series of 5-oz. - increase, with the per centage each bears to the whole.

The averages I have obtained fall considerably below those given by Thurman as the result of his observations in three English asylums. Many of his cases, however, were of a much higher social status than that occupied by the inmates of most County Asylums, & it is an undoubted fact that the intellectual development & average brain-weight in the middle & lower middle classes are considerably higher than they are in the lower.

The large majority of the cases I have examined either belonged to the agricultural labouring class, or, in the case of those coming from the towns, to the ordinary labouring class, very few belonging to that of skilled artisans. These, even at their best, are by no means remarkable for superior intelligence, & it is highly probable that

the average brain-weight - rules low in the same as well as in the insane. It has already been observed that the average weights vary considerably in different County Asylums.

As to the other causes which bring about the lowering of the average: - it is doubtless to a great extent due to the general atrophic process which so constantly takes place in the whole organ, & more especially in the cerebral convolutions of persons who die insane, but it is an undoubted fact - that many of the brains are congenitally small & badly developed. Dr. Thurnman says: - "The average brain-weights of those dying in asylums is made up of weights which are above the average of the healthy brain, & of others which are materially below it. This is no doubt the case to a certain extent, but, - as far as my observations go, I find that whereas a considerable number

fall far below the average, a very much smaller number rise above it.

This becomes apparent - see on reference to Table III, which is one used by Thurnham. He states the medium brain weight as averaging from 40 to 52½ oz. in the male, & from 35 to 47½ oz. in the female, classifying those that fall below these figures as more or less microcephalous brains, & those which rise above them as more or less megaloccephalous. The table shows the great difference in weight - that - may exist - between the two extremes.

Table III.

| Microcephalous. | | | | Medium. | | Megaloccephalous. | | | |
|------------------|------------------|------------------|------------------|---------------|---------------|-------------------|------------------|--------------------|--------------------|
| Incipient | | Decided | | | | Incipient. | | Decided. | |
| Male. | Female. | Male. | Female. | Male. | Female. | Male. | Female. | Male. | Female. |
| 40 to 37½ oz. | 35 to 32½ oz. | Under 37½ oz. | Under 32½ oz. | 40 to 52½ oz. | 35 to 47½ oz. | 52½ to 55 oz. | 47½ to 50 oz. | 55 oz. & Upward | 50 oz. & Upward |
| 17 | 14 | 24 | 5 | 197 | 219 | 10 | 5 | 2 | 7 |

It also demonstrates the fact be-
:fore noted that many fall below
whilst few exceed the medium.

It is also noteworthy that
more than double the number
of males as compared with
females fall under the micro-
:cephalous class, whilst the
number of megalcephalous
brains is equal in the two
sexes. Again, of the medium
weights - I have noticed that, -
taking the mean between 40 &
52½ oz. more than double the
number of cases fall below it
in the male (136 below to 61 above);
whilst - in the female taking the
mean between 35 & 47½ oz. the
proportion of those falling be-
:low it is considerably lower
(135 below to 85 above).

With regard to those brains
which are congenitally small
& undeveloped the only class of
cases whence any satisfactory
deductions can be drawn is
that embracing Imbeciles and
Idiots. Of the latter there are

15 males & 8 females in this series of cases. The averages of these are very low, being about $37\frac{1}{2}$ oz. in the male & about $36\frac{1}{2}$ oz. in the female. The latter being a very small collection, the average is, no doubt, materially affected by one very low weight - viz. 25 oz.

Consideration of the few megalocéphalous brains in this series brings out no very striking facts. The numbers are equal in both sexes, but here again the number of the female brains that attain the higher standard is much higher than in the opposite sex. None of the male brains attained the weight of 56 oz. This is a very low maximum as both Thurman & Clapham found that about 10 p. cent. in the male & 7 p. cent. in the female could be classed as incipiently, & 3 to 4 p. cent. in both sexes as decidedly megalocéphalous.

Having considered these fluctuations in the weight of the entire brain it may be as well to enquire what portion or portions of the organ appears to suffer in the general deterioration. The loss in weight in the insane ap-
 :pears to take place in the
 :whole organ, each portion suf-
 :fering in almost equal ratio.
 On comparing results in the two sexes the fluctuation in weight appears to take place al-
 :most entirely in the Cerebrum, there being only a difference of 0.4 oz. in the average weights of the Cerebellum with the Pons and Medulla, thus: -

| Male. | | Female. | |
|--|------|--|------|
| Cerebrum. | 38.8 | Cerebrum. | 35.4 |
| Cerebellum, Pons & Med. ^a . | 5.7 | Cerebellum, Pons & Med. ^a . | 5.3 |
| Total Encephalon. | 44.5 | Total Encephalon. | 40.7 |

All these points would therefore appear to show that diseased conditions of the brain, such as are met with in the cases now under consideration, seem to affect not only the

weight but the general condition of the male brain to a considerably greater degree than the female. This appears to be borne out by ~~the conclusions from the fact that~~ the male ears do not attain so high an age as the female; the disease of the brain seems to run a more acute course, & to cause a greater degree of atrophic change to take ^{place} in the former, & this again to react on the vital conditions & cause a shortening of life.

II. Age.

According to Boyd & Thurman (loc. cit.) the human brain at: term is about $\frac{2}{5}$ ths. of its ultimate weight by the end of the seventh year of life in the male, & in the female about $\frac{1}{4}$ ths. of its ultimate weight by the same period. It, however, undergoes a gradual & small increase till between the ages of 30 & 40 in the former, & 20 & 30 in the latter, after which a gradual diminution takes place, being slight - from 40 to 50

greater from 50 to 60, & more pro:
:nounced still after 60 to between
40 & 80 when the average loss a-
:mounts to a little more than
3 oz.

In the case of the insane this
apparently is very much less notice:
:able, to judge from an examina:
:tion of the average weights. But
these are apt to be very mislead:
:ing in the present instance.

A very large number of Idiots
whose brain weights fall very
much below the average die in
early life; only three of the
twenty-three cases I have col:
:lected exceeded thirty years of
age, & thirteen of them died
under the age of twenty. As a
matter of fact, all the cases
I have tabulated as dying
under twenty were Idiots with
the exception of three. For
purposes of comparison, therefore,
those dying under twenty may
be left out of the question.

I have arranged the cases in
Tables IV. A & B. in decennial

Table IV. A.

| Males. Age. | No. of Cases. | Maximum Weight. | Minimum Weight. | Average Weight. | | | Ratio of Cerebellum, Pons & Med. ³ to Encephalon. |
|---------------------|---------------------|--------------------|--------------------|-----------------|---|------------------|---|
| | | | | Cerebrum. | Cerebellum, Pons & Med. ³ | Total Encephalon | |
| Under 20 years. | 8 | 47.5 | 30 | 36.81 | 4.81 | 37.62 | 1 to 7.82 |
| From 20 to 30 years | 23 | 55.75 | 36.5 | 39.9 | 5.66 | 45.54 | 8.44 |
| .. 30 .. 40 .. | 45 | 52.5 | 33.5 | 37.83 | 5.64 | 43.47 | 7.7 |
| .. 40 .. 50 .. | 57 | 55.75 | 35 | 39.33 | 5.7 | 45 | 7.97 |
| .. 50 .. 60 .. | 40 | 52.75 | 35 | 38.56 | 5.71 | 44.27 | 7.77 |
| .. 60 .. 70 .. | 33 | 51.5 | 18 | 37.69 | 5.49 | 43.18 | 8.86 |
| .. 70 .. 80 .. | 39 | 53.5 | 32.75 | 38.08 | 5.36 | 43.39 | 7.09 |
| Upwards of 80 .. | 5 | 46.25 | 39 | 37.6 | 5.6 | 43.2 | 7.71 |

B.

| Females. Age. | No. of Cases. | Maximum Weight | Minimum Weight | Average Weight. | | | Ratio of Cerebellum, Pons & Med. ³ to Encephalon |
|---------------------|---------------------|-------------------|-------------------|-----------------|---|------------------|--|
| | | | | Cerebrum. | Cerebellum, Pons & Med. ³ | Total Encephalon | |
| Under 20 years. | 9 | 46.5 | 25 | 32.08 | 4.69 | 36.77 | 1 to 7.8 |
| From 20 to 30 years | 16 | 49.75 | 32.5 | 36.92 | 5.39 | 42.31 | 7.84 |
| .. 30 .. 40 .. | 38 | 32.5 | 54 | 35.08 | 5.3 | 40.39 | 7.62 |
| .. 40 .. 50 .. | 48 | 29 | 55.75 | 36.59 | 5.4 | 42.06 | 7.97 |
| .. 50 .. 60 .. | 40 | 36.5 | 50 | 36.54 | 5.4 | 41.95 | 7.75 |
| .. 60 .. 70 .. | 60 | 26.5 | 54.25 | 36.51 | 5.3 | 41.82 | 7.89 |
| .. 70 .. 80 .. | 34 | 36 | 50.75 | 35.54 | 5.2 | 40.81 | 7.76 |
| Upwards of 80 .. | 5 | 35.75 | 43.25 | 32.2 | 5.05 | 37.25 | 7.37 |

periods, giving the maximum & minimum weights in each group to show the range of difference, & then the average weights of the Cerebrum, of the Cerebellum with the Pons & Medulla & of the total Encephalon. I have also added a column to show the ratio which the weights of the Cerebellum Pons & Medulla bear to the total Encephalon. On examining these tables we find that the highest average is found between the ages of 20 & 30. From 30 to 40 there is a remarkable drop of 2 oz. in the averages of both sexes, & this is followed by a rise of 2 oz. in the following decade. This sudden drop & succeeding rise is difficult to account for, & the fact of its occurring in both sexes would point to its being no mere coincidence. Besides, I have noticed that the same thing occurs in the cases tabulated by Thurneisen, though to a less degree. Perhaps it may

to some extent be accounted for by the fact that a considerable proportion of General Paralysis, & notably those whose brain-weights are lowest, died between these ages. There is also a large proportion of the lowest recorded weights to be found among the number, & the suggestion may be made that probably many of those cases which have a hereditary predisposition to insanity & which are likely to have congenitally small & poorly developed brains, & to be at the same time of very inferior physique succumb at this comparatively early age. We may naturally infer that such cases would be least-able to support the struggle for existence & to die before reaching middle life. These weaklings so to speak falling out in the third decade, the doctrine of the survival of the fittest comes into play & causes the average to rise again in the succeeding decade.

These tables also show very distinctly a fact noted by others, - that the average weight differs very much less at these biennial periods in the insane than it does in the sane.

This may probably be explained by the fact - that in the insane a greater or less degree of atrophy takes place at a comparatively early age, & that this only increases slowly & at a pretty uniform rate as age advances.

With regard to the duration of life we find that it is longer in the female than in the male. On calculating the mean age, I find it - to be 48.8 years for the male & 52.1 for the female. Although the average duration of female life exceeds that of the male in the general population, the ratio is not nearly so high as that here mentioned. Of the cases, - 174 males attained the age of 40 as compared with 187 females: - 117 males to 139 females

reached the age of 50; and 74 males to 99 females that of 60. It would, therefore, seem to be the case that in those suffering from brain disease death takes place at a relatively earlier age in the male than in the female.

III. Form of Mental Disorder.

This table is necessarily an incomplete one, as I have been unable to divide the cases of Mania & Melancholia into their proper subdivisions of Acute & Chronic, or to separate the cases of primary & secondary dementia. Even in its incomplete state however, it is a record of facts, and some information may be gained by analysing it.

I have given the maximum & minimum weights in each group as well as the averages, in order to show the wide range of difference between the two extremes.

Table V. A. Males.

| | Mania. | Melancholia | Dementia | Gen. Paralysis | Idiocy. |
|---------------|---------|-------------|-----------|----------------|-----------|
| No. of Cases. | 34 | 34 | 98 | 69 | 15 |
| Maximum Wt. | 54 oz. | 55.75 oz. | 55.75 oz. | 53.75 oz. | 45.75 oz. |
| Minimum .. | 41.5 .. | 36.75 oz. | 18 .. | 33.5 .. | 30 .. |
| Average .. | 46.8 .. | 46.8 .. | 44.9 .. | 43.7 .. | 37.8 .. |

B. Females.

| | Mania. | Melancholia. | Dementia. | Gen. Paralysis. | Idiocy. |
|---------------|-----------|--------------|-----------|-----------------|-----------|
| No. of Cases. | 58 | 35 | 127 | 22 | 8 |
| Maximum Wt. | 51.75 oz. | 50.25 oz. | 55.25 oz. | 45.75 oz. | 41.25 oz. |
| Minimum .. | 26.5 .. | 34.75 .. | 30.75 .. | 29 .. | 25 .. |
| Average .. | 41.4 .. | 41.7 .. | 41.5 .. | 38.2 .. | 36.7 .. |

We here find that in the male sex the averages in the classes of Mania and Melancholia are a good deal higher than in the others & considerably exceed the general average; that there is a marked falling off in the

cases of Dementia, - that the same thing is noticeable, altho' to a less extent - in the next class. that of General Paralysis. & that it takes place in a much greater degree in the cases of Idiocy.

In the female sex this gradual deterioration does not appear to take place. The averages in the first three classes are very nearly equal & they also show a considerable increase as compared with the general average; then in the cases of General Paralysis, we get a sudden falling off which is more marked than the difference between the corresponding classes in the male. If, however, we compare the average in General Paralysis in the male with the higher averages in the first two classes, we find that the average loss is very nearly the same in both sexes, being a little over 30%.

In the female the drop between

General Paralysis & Idiocy is much less marked than in the male.

It is thus indicated that General Paralysis & Idiocy are very important factors in bringing about the lowering of the general average - as if these two classes be left out of consideration, we find that the general average rises to about 46 oz. in the male and $4\frac{1}{2}$ oz. in the female.

When these figures are compared with those of Dr. Boyd for the average sane brain - viz. - 47.8 oz. in the male & 43.1 oz. in the female we find that the average loss in the great majority of the insane is not nearly so great as would at first sight appear to be the case.

These figures of Dr. Boyd's are deduced from a large series of examinations made on the brains of a class of persons whose social status

and intellectual development are pretty nearly on a level with the same in the class which furnished my cases.

My averages may therefore, I think, with more justice be compared with Dr. Boyd's than with those higher ones which represent the average European brain weight in all classes combined.

Thus, leaving General Paralysis & I diving out of the question, we find that:-

| | | | | |
|-----------------|---|-------------------|---|-------------|
| Male Sane Brain | } | Male Insane Brain | } | ∴ 100:96.3, |
| (Boyd) 47.8 | | 46 | | |

or a loss of 3.7 p. cent. in the Insane

| | | | | |
|-------------------|---|---------------------|---|-----------|
| Female Sane Brain | } | Female Insane Brain | } | ∴ 100:96, |
| (Boyd) 43.1 | | 41.5 | | |

or a loss of 4 p. cent. in the Insane.

This is in striking contrast to the percentages noted in the first part of this paper; but then we must bear in mind that this is a comparison of a lower standard

of brain weight in the sane with a higher one in the insane, viz. - with the cases of Mania Melancholica & Dementia, & these classes, although greatly in the majority, have less influence than the other two on the average brain weight.

Finally if we compare the general average of these five hundred cases with Dr. Boyd's averages we obtain a result that is probably a nearer approach to the true relation which the weight of the brain in the sane bears to that in the insane (in all classes of the community) than that mentioned in the former part of this paper.

Thus: -

| | | | | |
|-----------------|---|-------------------|---|---------------|
| Male Sane Brain | } | Male Insane Brain | } | :: 100 : 94.5 |
| (Boyd) 47.8 | | 44.5 | | |

or a loss of 5.5 p. cent. in the Insane.

| | | | | |
|-------------------|---|---------------------|---|---------------|
| Female Sane Brain | } | Female Insane Brain | } | :: 100 : 94.6 |
| (Boyd) 43.1 | | 40.7 | | |

or a loss of 5.4 p. cent. in the Insane.

Kent County Virginia,
Maidstone, 29th April, 1885.

I hereby certify that this
Thesis has been composed by
myself.

Wm. Murdoch, M.B.C.M.