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HEADS OR TAILS

OR

HIGH-BROWS, LOW-BROWS AND EGG-HEADS

By John Saunders

It is interesting to note the great extension in recent times of the popular classification of the intellectual ability of mankind based upon the physical appearances of the cranium. We have long heard of "high-brows", "middle-brows", "low-brows", and "pin-heads", but now, it would seem, we must extend the system of classification to embrace "egg-heads"-- or so I would gather, on no less authority than presidential pronouncement. It is apparent that this popular system of classification is dependent upon the belief that some relationship exists between mental capacity and the morphology of the skull. It is, perhaps, appropriate to inquire into the origin of this notion and to determine, if possible, whether the system has any validity.

At the outset it should be stated that a "noble-brow" has not always been regarded as the badge of a mental giant. In early Greek and pre-Hellenic times the seat of the higher intellectual faculties was thought to lie in the general region of the diaphragm, or located variously in the heart and liver. Although Anaxagoras (c. 500-428 B.C.) has generally been credited with establishing the brain as the center of all mental and nervous processes, the great philosopher-biologist Aristotle (384-322 B.C.) continued to follow Diocles of Carystus in refusing to attach much importance to the brain. He claimed that the heart was the

center of the intelligence and especially of the emotions. To trace the origin of this view would reqire an extensive discussion. Suffice to say, the notion was probably derived from the ancient Egyptians, who regarded the cardiovascular system of such importance that they customarily enquired after its health in the manner of a greeting. Remnants of this notion still remain with us in certain everyday expressions as, for example, when we say, with anatomical absurdity, that "tears welled up from his heart". However, the ancient Egyptian physicians recognized that the brain and the spinal cord were related in some way to motion. In one of the oldest medical papyri we may read the observations that injury to both can cause paralysis.

Eventually the mind (anima) came to be regarded as being in indissolvable union. Primitively the anima (or the pneuma of the Greeks) was the equivalent of both soul and life, to be identified with the air and life (breath). However, Empedocles (c. 408 B.C.) promulgated the doctrine that the anima resided in the blood to become, in the phrase of Leviticus (17, 11), "for the life of the flesh is in the blood". However, in the Vulgatethe the word used is "anima" which has been translated by the early fathers as the "life of the flesh" to set in motion one of the great heresies known as Mortalism; a heresy which is still with us, as every physician should know who has treated a perfervid member of the Jehovah's Witness Church. To the verse or verses of Leviticus the discoverer of the circulation of the blood, William Harvey, refers in his work entitled De

Generation (Ex. 1 vii). Here Harvey says, "Life, therefore, consists in the blood, as we read in the Holy Scriptures because in it the Life and Soule do first dawn, and last set". Although this quotation is found in the last book he wrote, it had remained in his consciousness from the earliest times. It is to be found in his Lectures, an unpublished work known as the Prelectiones (written in 1616: "The soul is in the Blood" and also in his more famous work De motu cordis. For a Jacobean physician, such as Harvey, the word anima was tremendously complicated and difficult. Although many will know that the right translation of anima is "soul", he may be unaware that in ancient Greek philosophy first of all, the word is applied to no less than three aspects, namely not only to "the soul" of man, but also to animals and, as well, to vegetable life. All these connations of Harvey may be found in his works. Any discussion of the relationship of "anima" to the word "spiritus" a cognate word, would take us far afield, and in this connection is irrelevant to the subject at hand. However, it should be noted because it has been drawn into the question as to whether the statements of Harvey constitute his supporting the heresy of so-called "Mortalism." There is a great deal of contemporary evidence that support of the heresy was far from his mind and that he discussed subject in terms of philosophical belief.

Primitively the anima, for soul and life, were identified with the air and the breath, although Empedocles (c. 480 B.C.) had promulgated the notion that the anima was in the blood, nevertheless incorporated in the terms

"animated" and animal. Obviously, to any primitive, anything that "moves" is "living", a notion which still abounds today. In course of time, the term animus, of the masculine gender came to be used since it designated power of activity. So it was believed that "movement" in the control of the nervous system was thought to be due to the animal spirit and as planned activity of any kind usually involves motion animus in the masculine gender came to be applied to the rational mind or soul.

Galen (c. 130-200 B.C.), physician to the Emperor Marcus Aurelius, carried out a series of remarkable investigations on the physiology of the nervous system. He attempted to apply, with modifications, the pneumatic theory of Empedocles, and thus reached an eclectic position. He taught that the anima (pneuma or spirit), which he identified with the world soul of the Stoics, was drawn into the body by the lungs in the act of respiration. Thence it passed to the heart, and the blood was thought to be transformed by filtration through vessels at the base of the brain into a more subtle substance, known as the "animal spirit". The "animal spirit" (in the sense of the spirit or soul of motion and the mind) is distributed by means of the nerves to all of the organs, and especially to the muscles. This concept was taken over by medieval scholars. By misconception this idea gave rise to a highly materialistic psychology in which the nervous force was identified with the cerebro-spinal fluid contained in the ventricles of the brain. Nevertheless, the "soul" or nervous function was, in

general, related to the brain as a whole, and through it, to the body in its entirety. Such "holistic" concepts provided, or rather precluded, the idea of relating external cranial morphology to localized functions of the nervous system.

However, from the earliest times attention had been drawn to the supposed resemblances in form and function between certain plants and animals. The mandrake was thought to possess human voice as well as form. The voice cried out when the root was extracted from the earth. Aconite was compared to a scorpion or lobster. Similar analogies were made between other plants, parts of plants, or of animals and man. These analogies were commented upon by learned authors, and we find such comparisons as that between the fruit of the walnut and a human foetus. A notable writer on this subject was the Neapolitan physician and naturalist, Giovanni Batista Porta (1540-1615). Porta's treatise On Human Physiognomy, Equense (editio princeps), 1586, is devoted to a consideration of the supposed analogies between human and animal life. This is based upon the assumption that external characters establish relationships not only to internal structures, but reflect the moral attitudes and even the mental qualities of mankind. This curious work proved to be very popular and passed through a score of editions since its first publication. The second part of the book, which is copiously illustrated, deals with comparative physiognomy. We are told that people with flaring nostrils, like a bull

or a lion, reflect the qualities of these animals and hence show in the human subject qualities of irrascibility, or obstinance, and of strength. A bull-necked man is likely to be quarrelsome, rough and undisciplined. Those with small ears, like those of apes, are thievish and extravagant, and have defective morals. If they possess a simian nose, they are impetuous in love making, and this character is a sure sign of excessive venery or prostitution. In Porta's system the "high-brow" has affinities with the ass, and this feature indicates a stupid and improvident man. The author agrees with the great Albertus Magnus (c. 1193-1280) that a lofty brow, especially if rounded, implies obtuseness. The psycho-physical opinion is quite the reverse of modern popular ideas and shows the superficiality of the present day judgments and of opinions based on physical characteristics.

The lineal descendants of Porta were Franz Joseph Gall (1757-1828) and Johann Casper Spurtzheim, who introduced the pseudo-science of phrenology which, regrettably, is still with us. The term phrenology was derived from the Greek word for the "mind" (φρήν). Howver, its primary meaning was for the "midriff or diaphragm" or of the region about the heart, which reminds us of the time when the latter organ was regarded as the seat of the intellect. It is only in the combination forms in Greek that it came to mean the "mind". The primary use serves to remind us that, as Aristotle said, the intellect resided in the heart since quickening the pulse rate occurs in all forms of emotion.

Gall and Spurtzheim argued that since the brain is the organ of the mind, the mind can be analyzed into a number of faculties. Each of these faculties are related to definite areas on the surface of the brain, which is in close correspondence with the outer surface of the skull. Hence examination of the skull's surface, they opined, provided a method whereby the character and mental capacity of the individual may be discerned.

The system had a tremendous vogue, and in some quarters it would be sacrilege to even suspect that the system was derived from pure speculation. Phrenology was rapidly discredited on scientific grounds that no correspondence could be found between the outer surface of the skull and the brain. But in fact what destroyed phrenology was ridicule, and ridicule is a powerful weapon. The final blow to their undoubted speculations came when Gall and Spurtzheim committed themselves by making an elaborate diagnosis on a cast which was purported to be that of a distinguished notable who had recently died. The cast was that of a very large turnip. The local wit responsible for the prank immediately published a brilliant satire in verse. Sir James Creighton Browne was the culprit. Sir James was, perhaps, the foremost neurologist of his age and a brilliant researcher on the brain. The system never survived his devastating wit and sounded the death knell of phrenology. Browne did not fail to recognize that in its primary meaning of φρήν was the phrenes or diaphragm or the area around the heart, which takes us back to Aristotle's views.

Only in its combination form (gen. φρένος) does it mean the mind. Spurtzheim left Europe and settled in Boston, where he died on November 10, 1932, and his brain and skull passed to the Warren Anatomical Museum at Harvard. The terms "high-brow" and "low-brow" are of U.S. origin and are perhaps a popular legacy of Spurtzeim's influence.

Gall and Spurtzheim left posterity something more than a fictitious science, in that they stimulated their opponents to greater efforts in clinical, experimental and comparative studies on the human brain. From the middle of the last century onwards, steady progress was made on the cerebral localization principle, on which the erroneous thesis of Gall and Spurtzheim so largely rested. Of enormous importance were the discoveries relating speech and then the motor functions to some specific areas of the brain which resulted in attempts to found a psychology on the anatomy of the brain. The cerebral hemispheres were divided up into as many organs as there were presumed functions. The frontal region was designated as the factory of thought or, in their own words, "the majesty of the human brain", largely on intuitive and introspective grounds, for obviously there is a feeling of tension in the frontal region when thought is intense. The findings of comparative anatomy would seem to support this view, since it was only in man that the frontal lobes reached such magnitude. The dissemination of these views intensified the belief that "high-brows" obviously exhibited the outward signs of superior intelligence. However, there still remained a few

feeble voices, regarded as prejudiced, who favoured the doctrine of the unity of thought, and who asked of what assistance could these several brains be to one another. How could the brain of the eye come to the assistance of the brain of the ear? Gradually these small but insistent voices came to be heard. Hence today we have returned to a more "holistic" concept. Therefore it is recognized that the mechanism of intelligence, of thinking and of reasoning, is intimately related to the totality of cerebral function, in spite of the experimental fact that the two hemispheres often contain areas of differing function, and are tied together by a massive projection system known as the "corpus callosum". This great projection system, the "corpus callosum", is divided into "the right hand knoweth not what the left hand doeth." Around 1926 or so, Norman Dott, a brilliant neurosurgeon, assisted by myself, severed the corpus callosum to get at a brain tumor. We were surprised that the patient seemed to be unaffected. At first we were at a loss to explain the curious phenomenon, for we had both been taught that the corpus callosum was such a significant pathway. Much later we discovered how and in what manner we had caused the patient a serious disability. We consoled ourselves by the recognition that there was no other way to remove the tumor. It soon became apparent that we had partially affected the memory for words. I believe that this was the first case in which the two hemispheres had been separated from one another. Those brought up with knowledge of the disputes begun in the early 19th century

around Gratiolet and Paul Broca will well appreciate our confusion. Circumstances had forced us into the aphasia and speech problem, then rampant. But this subject, because of its difficulty, must be left to another time. With changing conceptions, scientific or otherwise, the expressions "low-brow" and "high-brow" have lost their meaning.

The matter of "squirrel-heads" or "pin-heads" brings up the question of the size or weight of the human brain as a measure of intelligence. Although comparative anatomy teaches us that intelligence is obviously related to the degree of cerebral development and its complexity, nonetheless the absolute weight of the brain is not in itself a reliable index of intelligence. The average weight of the brain in the adult white male is usually given as 1360 grams (nearly 3 pounds), and that of the adult white female as 1230 grams, or about 10% less than the male but in accordance with the difference in body size. However, individual variation is very great. It has been noted that in individuals of high intelligence the brain weight on the average is high, but high brain-weight in itself does not necessarily imply high intelligence, nor does a low brain-weight necessarily bespeak of low mentality. There is a continuing debate on the problem of drawing conclusions on the size of the skull and that of the brain, a relationship of great practical difficulty because of the difficulty of measuring accurately the size of the cranial capacity. For example, the size of the skull in a very primitive Indian

known as the Totonac, a tribe from the Gulf of Mexico, is surprisingly much bigger than that of the average German. Apparently it is not size but the high complexity of the frontal lobes of the brain which measures the intellectual capacity of the individual. The lowest brain-weight compatible with normal intellectual faculties is said to be 1000 grams in the male and 900 grams for a female. The brain of Anatole France was almost at this lower limit, weighing only 1,017 grams. The great chemist Leibig scarcely reached the average, and the brain of Dante was only a little above the average. On the other hand, Lord Byron and Turgenev possessed enormous brains, of 1807 and 2012 grams, respectively, weights which were many times equalled by individuals of mediocre ability. And so it is not by the size of the head but "by their works ye shall know them".

Now we come to the "egg-head", which in scientific parlance is known as oxycephaly or acrocephaly. The oldest recorded member of this family was Thersites, described by Homer in the Iliad. In Buckley's translation Thersites was "the ugliest man who came to Ilium. He was bandy-legged, and lame of one foot, and his head was peaked towards the top, and thin wooly hair was scattered over it." But in Chinese mythology we have another example in Shau Lao, the god of long life, who is traditionally shown with a towering and pointed head. True oxycephaly is a pathological condition due to a failure in the development of the base of the skull and associated with mental defect and deformities

of the extremities. There can be little doubt that, from the description in the Iliad, Thersites was a true oxycephalic.

However, there is another type with turret-like head due to premature closure of the sagittal suture, which courses along the top of the skull. Early fusion of this suture causes the head to become elongated and pointed, but in no way interferes with the growth and development of the brain. Examples of this type, false oxycephaly, were the great German naturalist Alexander von Humboldt, whose name is incidentally scattered so prolifically across the geography of California, by Sir Thomas Browne, the great 17th century author of the "Religio Medici", and by Sir Walter Scott. They all presented elongated skulls. Indeed, the cranium of Sir Walter Scott was so exaggerated an example of false oxycephaly that his friends jokingly referred to him as "Peveril of the Peak". A distinguished American surgeon, Harvey Cushing, on seeing Sir Thomas Browne's skull for the first time, was so misled by its abnormal shape that he believed it to be that of an ancient Peruvian, a race in which it was the custom to deform the skull by means of bandages and splints applied to the head in infancy. Thus, to be classified among the "egg-heads" is to be placed in distinguished company, for this is a shape of cranium found in many men who were famous for their intellectual ability.

It is evident that neither the shape or size of the cranium, certain limitations being granted, is a measure of mental ability. It is the quality, not the quantity, of the

cranial contents which distinguishes the intellectual giant. It is true that the pattern of the brain's convolutions may be more complex in the lettered than in the unlettered, although no distinction can be made from their respective cellular construction. I am well aware that there are those who contend that there is some difference in the cellular structure of the brain from type to type, but there is, in my opinion, very little that is known on the structural changes of the cells and much is suspect. We must look to other reasons for the development of genius: heredity, environmental factors, opportunity, and, at times, mental conflict, and even mental instability. However, there is one thing positive, namely the presence of a substantial blood supply to the brain. In every skull examined of those who in life had superior mental ability, we have found a significant enlargement of the carotid foramen through the base of the skull. This foramen conducts the vessel notably to the frontal lobes of the brain. We also know that the great historian and philosopher David Hume (1711-1776) who, among other works, wrote a treatise "On Human Understanding", found that he could think better by establishing a method to increase venous drainage from the brain.

For great activity of the brain, a copious and rich supply of blood is of paramount importance. Not only must there be capacious arteries to supply healthy blood for the nourishment of the brain, but also an efficient venous evacuation of the blood to remove the degraded products of

cerebral metabolism. Indeed, the human cranium is unique in the number of accessory, or as they are called, "emessary", venous channels which pass through the bony walls of the skull, supplementing the main vessels. Such emissary veins are entirely absent in lower animals. Under conditions of stress or great cerebral activity, the effect of these accessory channels can be easily observed by the congestion of the veins of the face and forehead. In anger or in other periods of great mental excitement the engorgement of these accessory channels is obvious. Thus the term "hot-head" has full material justification.

It has been noted that the foramina for the carotid arteries supplying nourishment to the brain are unusually large in the skulls of those with outstanding intellectual attainments. Thus, it has been recorded by those who had examined the brain of Sir James Simpson, the discoverer of chloroform, that the carotid arteries and the foramina for the transmission of blood to the brain were preternaturally large. Apparently the hallmark of genius is to have capacious carotid arteries and so of the accompanying foramen. Maybe it will be possible to spot a budding genius by means of the newer technique of radiological scanning. Although I have my doubts, there is always the possibility in the case of some individuals. On the other hand, diminution of the calibre of these vessels from arterial sclerosis in old age is responsible for the waning of intellectual powers to reduce man to "second childishness, and mere oblivion....". William Lecky, the famous and

felicitous Irish historian, a tall and gangling man, found that in the erect position his cerebral circulation was unequal to the demand, and so in later life he adopted a position which would congest his brain. He wrote with his knees and elbows on the floor. There can be little doubt that a good vascular supply to the brain is essential for high intellectual achievement.

From what has been said it would be impossible to discern in mankind those who possess exceptional ability by reference to the shape or the size of the head. Even if we regard those who make a great deal of money as persons of ability and genius, or possessed of strongly developed acquisitive propensities, and follow the scheme of Gall and Spurtzheim, we would look for a well-marked protrusion of the region immediately above the ears. Or if we were to follow and accept Porta's fancies, we might expect a physiognomy reminiscent of that of a bulldog. Many have thought that geniuses and millionaires are related in sharing Cerebrus-like faces.

Although many will regard the size of the head as a sign of genius as "old hat", as it were, nonetheless it is often quoted in the literature as a sensible idea and of popular acceptance. Nevertheless, I still find ready acceptance in current journals of a cognate idea. This is to the effect that in some strange way that distinction is related to the sense of smell. It is said in a somewhat recent publication that there are people who possess wo unusual a degree of olfactory sensitivity which enables

its possessor to differentiate the nationality of a publisher, even if he be French, German, English or American. Perhaps this is not surprising in view of the macrosomatic development of Cerebrian animals and the olfactory powers of individuals of the human race (even if the word race is now forbidden). This is revealed in a periodical of the highest intellectual acceptance of October 1952. This journal has high acceptance among the "cognoscenti". So I must take it as authoritative that it is possible to smell the mortality in the books of Buston and Browne, the incense in those of St. Thomas Aquinas, and the moral restraint of Emerson!

But what, you may ask, has olfaction to do with the physical basis of high intellectual attainment? To this, I suppose, biology has a ready answer. Several studies have elicited the fact that the greater part of the cerebral hemispheres containing the higher intellectual centers have evolved from the olfactory brain of lower animals. Nature, in her building, has retained ancient foundations, and in these foundations reside the primitive psyche of emotional behaviour, so important for the evocative appeal of poet and writer. The massive frontal lobes of the brain provide projections to and from this primitive base of olfaction. From this area and primitive base, affective coloring is given to emotion in its psychomatic relationships. For nearby lies the hypothalamus, the center not only of the involuntary functions of the heart and alimentary systems, but also the physical responses of joy and anger, of heat

and cold, and of laughter and tears. Thus A.E. Housman could write in his "The Name and Nature of Poetry" that he must keep watch over his thoughts while shaving lest a line of poetry come into his memory, as his skin would bristle and a shiver pass down his spine or, on other occasions, there would be a constriction of the throat, tears to the eyes, and sensations to the pit of his stomach. Apparently, in some individuals, sensations from the old olfactory brain are powerfully evocative: perhaps a reminder that the emotive psyche has in man arisen from the olfactory brain of lower animals by the evolutionary process. Indeed, the clinician well knows that lesions of this portion of the brain produce aura characterized by the most extraordinary flight of ideas. One can ask the question if this part of the brain should not be responsible for the greater originality of the "high-brow", and not the brain as a whole. However, old ideas die hard. On June 7, 1986 there appeared in the Chronicle a report that the parliamentarian and cleric Akbar Hasemi Rafsenjani had said during prayers on Friday in Tehran that "women must be forced to wear the Islamic veil because women had smaller brains than men, differ from men, and needed the veil to protect their smaller brains". I wonder how he knows so much about neurology and the nature of mentation?