

MAN—PAST, PRESENT, FUTURE.\*

By H. L. GORDON, M.D.

Truth has three major though latent enemies. They are (1) lack of courage, (2) self-interest, (3) bias . . . To these may be justly added (a) undue regard to ancient authority, (b) habit, (c) prejudice, (d) false conceit of knowledge, (e) indolence of mind . . . enthusiasm also is an enemy unless it be guided by knowledge and love of truth."—*Mr. Justice McCardie on Truth* (Maudsley Lecture to the Royal Medico-Psychological Association, 1930.)

ANTHROPOLOGY.

1. *What man used to be and do.*

Archæology  
Folklore  
History

2. *What man does now.*

Culture (ology)  
Sociology.

3. *What man is now and may become.*

Biology	Neurology	Embryology
Zoology	Psychology	Eugenics
Anatomy	Psychiatry	Euthenics
Physiology	Endocrinology	Ethnology
Pathology	Chemistry	Philology

TABLE 1.

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Author's abstract of a popular lecture under the auspices of the Society on 15th December, 1931.

Anthropology is the optimistic answer of science to the ancient advice, Man know Thyself; it collects the facts about Man, one thing at a time (Table 1). Every group of anthropology agrees that the supreme question about Man is his future. Wise men refuse to say any longer, Let the future take care of itself; they know that would be suicide for civilisation. Our question to-night is—Can Man the type, the 1931 model, ever emerge from the factory a really better-made product, not just with new gadgets and the old exasperations? The answer is that all depends, not on education, but on the material for education, the human brain; on bringing better raw material to the factory. The germ cells of man and woman hold the intricate secret. If brain can be better made in the germ, so can human mind and behaviour from their beginnings. The future of brain is not wholly veiled, if it be true that the past proclaims the future. This century is the first to demand pre-natal care of the future lying in the womb of the present.

Man towers at the top of the animal kingdom because of his brain; his unique power to acquire, store up, and use, new knowledge. This superiority is proved by comparison. From fish to man the part called the *cerebrum* gets gradually larger both absolutely and in proportion to the other parts, until in man it occupies 87 per cent. of the whole brain; like a small colony with a whacking Government House. This striking feature makes us think that the *cerebrum* may have much to do with behaviour; so we turn to the anthropoids to see if we can detect any relation between expansion of cerebrum and expansion of behaviour. Careful observation has left no doubt about that. (Here lantern slides were exhibited showing *expansion of behaviour pari passu with expansion of cerebrum*, in baboon, chimpanzee, and gorilla; and the studies of the chimpanzee by Professor Köhler, and of Miss Alyse Cunningham's famous gorilla John Daniel, were discussed.) Like many of the brains of the late Mr. Carl Akeley's apes the brain of John Daniel passed to the service of Man in the hands of Professor Tilney of Columbia University, greatest of living neurologists; and contributed to the answer to our next question: Why does behaviour expand up the animal scale as the cerebrum expands? In 1928 Tilney published the answer in two volumes of 1,100 pages—his life-work; we can reduce it thus:

*The quantity and quality of behaviour correspond to the quantity and quality of the part of the brain concerned in that behaviour.*

It sounds obvious. It had to be proved. It is momentous for us. It provides a clue to the puzzle—Why does one man differ from another man in behaviour? One race from another? For the anthropologist it does more. It simplifies Man's efforts to know himself. It contains the seeds of revolutionary progress in medicine, law, education, and politics.

The history of Man is the history of a kind of behaviour called *neokinesis*; new movement; not instinctive but *skilled action*, exercised by will and control; such as writing and playing the violin. Man first shows this neokinesis when he balances his infant body erect and gains free use of the greatest of all implements, the hands—

So rounds he to a separate mind  
From which clear memory may begin  
As through the frame that binds him in  
His isolation grows defined.

Every achievement, every invention of man is evidence of this neokinesis made possible by liberation of the hands from attachment to earth and floor. The cerebrum is the headquarters of the power. Table 2 shows the evolutionary expansion in the anthropoids up to Man, and, in the voice of mathematics, the gulf of provision for neokinesis, between Man and Ape; an arresting rise of 500 points between Man and gorilla in the Frontal area. Certainly the *quantity* of neokinesis corresponds to the *quantity* of the part of brain concerned in neokinesis.

The importance of the Frontal area is forced upon us. The T.P.O. area is the seat of the senses, collecting messages from the outside world by ear, feeling, and eye, and sending them forward to the Frontal area; there they are censored, concentrated, coded, and relayed to the parts of the body which perform the skilled, neokinetic, act. The Frontal area is the Government House of Behaviour where knowledge comes from every department, from abroad and from above, and wisdom may sit plagued for ever by folly; it gives Man "the seeing eye, the understanding ear, the skilful hands, to shape his own destiny" (Elliot Smith); the "limit of further expansion of Behaviour of Man, appears to be set only by the degree to which his cerebrum can expand" (Tilney). There we have the optimism of the highest branch of anthropology. The cerebrum of Man the type, the 1931 model, is only an intermediate cerebrum; the future is in his own hands, if he will. "Yet I doubt not through the ages one increasing purpose runs"; science has glimpsed that, while Lloyd Morgan has propounded the doctrine of "emergent" evolution and Eddington and Jeans are at loggerheads as to whether the Deity is or is not a mathematician—so inveterate is the tendency of imaginative specialists to plunge into speculation when facts fail them. Meanwhile the science of facts, oblivious to speculators in watertight compartments, goes steadily on to ascertain whether also the *quality* of behaviour depends upon the *quality* of the part of brain (cerebrum) concerned in that behaviour. "The brain of prehistoric man," says Tilney, "has a positive bearing on the future" of Man the type. We are on the fringe of the greatest question of modern times without our statesmen having yet perceived it. "In an age when nearly all

PLANIMETRIC EXPRESSIONS OF PROPORTION.

RONTAL AREA.

T.P.O. AREA.

176.00

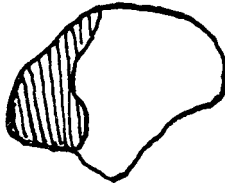
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Baboon.

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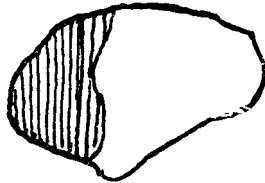
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Chimpanzee.

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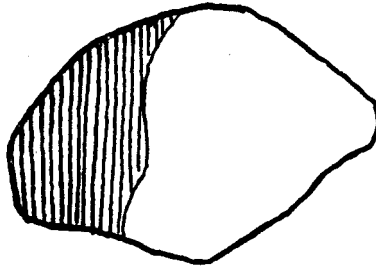
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Gorilla

832.60

965.30



European Man.

TABLE 2. (After Tilney.)

the problems of administration and development involve scientific factors, civilization cannot afford to leave administrative control in the hands of those without first hand knowledge of science . . . . scientific workers must accept responsibility for control of the forces released by their work; without their help efficient administration and a high degree of statesmanship are virtually impossible" (*Nature*, leading article, Sept., 1930). "Few will deny that the world is in a state to provoke the laughter of the gods," says McDougall in his recent *World Chaos*. Pessimistically he asks—What place has thought or reason in guiding Man's social behaviour? That is the psychologist's question. The neurologist's question is this—What is the basis of social behaviour in the brain and can we improve it for the State?

(The lecturer here discussed, with the use of lantern slides, the evidence of graded expansion of cerebrum from Pithecanthropus (Java Man) to Cromagnon, and of graded expansion of behaviour from the doubtful eoliths to the polychrome frescoes of Upper Palaeolithic times; and summarized the evidence adduced by Tilney that prehistoric expansion of cerebrum took place in the Frontal area, justifying conclusion that *racial expansion of frontal area and expansion of behaviour go together in slow age-long steps*. Expansion of behaviour came further to Neolithic Man with the new idea of agriculture and domestication of animals, to Bronze Man with the new idea of writing; and history dawned.)

From Rameses to King George is but a day in evolution, from Galileo to Darwin a few minutes. The foreground of written history is crowded with conflict between brains more elevated socially than frontally. Not to political ups and downs, not to so-called decisive battles, must we look for evidence of the plasticity of our caucasoid brain. Evolution projects its shadow in the emergence of *exceptional men*. Lack of exceptional men is a matter of brain, and a factor in the causation of racial backwardness. What nation has become a nation without its own exceptional men? The caucasoid race in East Africa has attained its to-day through the efforts of a galaxy of exceptional men; explorers, and men like Bishop Harrington, Mackinnon, Coryndon, and Delamere. Exceptional men are born, not made. In our great historic movements we find ample proof of that. The Renaissance and Leonardo; the 1870 Education Act and W. E. Forster; the white man in Africa and Van Riebeeck, Livingstone, Rhodes; the emancipation of woman and Joan of Arc, Mary Woolstencraft, and Florence Nightingale who faced hostile society with these words: "I have done with being amiable; it is the mother of all mischief." But we cannot lay on the table for comparison the dominating cerebrums of succeeding ages; Croesus with Rockefeller; Caesar with Lenin and Ghandi; Socrates, Plato, Aristotle, with Pavlov, Freud, Tilney. We have to be content that exceptional men disperse for a moment the futile foreground of written history, that

for a moment we see the forces in the background—moving—when “The Spinner of the Years says ‘now’.” The weaknesses, the imperfections of our great leader, our own distance from such men and women, betray the frailty, the instability, of the human Frontal area. We are not content

That grace can smooth no waters yet  
But breathing threats and slaughters yet  
Ye grieve earth’s sons and daughters yet  
As long ago.

Is faith for the future in such a Frontal area, justifiable? From further knowledge neurology answers yes. Quantity (size) of brain is not everything; it may be nothing, or worse. In competent hands size—and even more so, weight—of brain, affords valuable information; but the golden criterion of brain worth, and therefore of mind worth, is texture, *quality*, as revealed by the microscope.

(Slides were now shown to explain that the cerebrum is covered by a layer called the *cortex* (grey matter) which breaks the surface by folds, and that these folds dip inwards and so increase the amount of cortex. Man’s cerebrum is rich in folds, that of the apes is poor. *The cortex of the frontal area is known to account for all intelligent behaviour; mind.*)

Measurements under the microscope reveal that some men have more, some less, cortex, thickness and depth of its folds. Differences of quantity and quality of behaviour are related intimately to differences of quantity and quality of cortex. Professor Shaw Bolton of Leeds published exhaustive researches on this subject at an unfortunate date—July, 1914. Since the war these have been confirmed and extended by (the late) Sir Frederick Mott, Watson, Berry, Von Economo, and other exceptional men in this the most intricate and important of all human studies.

(Slides were now shown to explain the character of the brain cells called *neurons*, their pyramid shape, and the fact that they are not fully developed until after birth. The development is the *work of nature, not of scholastic education*. The neurons in the frontal cortex are prophetic; they proclaim mind or no mind. The average number of neurons in the whole cortex of a normal adult European is fourteen millions (Von Economo).)

Table 3 displays again the gulf between man and animal. The behaviour of animals is on the level of the *infra* layer of the Frontal cortex. Animals obey the two laws of nature, self-preservation and reproduction; normally they have no other occupation; no trainer can give an animal a *supra* layer. Man also must obey the two laws of nature, so he also has the *infra* layer; but the marvellous mass of interwoven neurons in the *supra* layer brought him the power of choice;

## FRONTAL CORTEX.

Structure	Layers	Function.
In Man— Rich.	<b>Supra</b>	<i>Control.</i> Intellect. Thought.
In Animal— Negligible.		Imagination. <i>Educability.</i>
In Man— Rich.	<b>Granular</b>	<i>Reception and Storage.</i> Experience. Memory.
In Animal— Very Poor.		
In Man and Animal— Much the same.	<b>Infra</b>	<i>Animal Instincts</i> of Eating Drinking Sex etc.

TABLE 3. (After Berry.)

offers him scope for behaviour on a higher level, through early training and education. Yet no man by taking thought can add a single neuron to his mental stature. This *supra* layer is the most recent work of evolution and therefore is unstable; in some of us readily breaks down under stress, in others lacks durability. Further evolution, every fraction of a millimetre added to this layer, may make possible a higher level of behaviour, greater stability, more all-round "intelligence." What is "intelligence?" While psychology flounders in a sea of opinion about "intelligence," neurology has taken the first step to knowledge by confessing ignorance and looking for facts. This error of psychology is the error of Government—opinion, opinion! Better add to confusion than confess ignorance! Compromise, "find a

formula"—these are the administrator's substitutes for knowledge and truth. The words "I don't know" are worth more than all the reports, files, and minutes, of bureaucracy.

The present facts about "intelligence" are these. The whole of the pyramid neurons a child is to possess are present at birth. To make mind appear in the infant the neurons require a sheath called *myelin*; it is not there at birth. In the first few years of life myelin comes rapidly, bringing movement and speech. It creeps further along the filaments connecting neuron with neuron, bringing thought, reasoning, memory. If this myelin fails to appear the precious pyramids are useless in proportion to the failure; they may remain as they

YEAR	GIRLS		BOYS		SEX PHASE		
	BRAIN	INCREASE	BRAIN	INCREASE			
Birth	333C.C.		371C.C.				
1	849	↓	945	↓	<i>Pre-pubescent</i>		
2	966						
3	1035						
4	1066						
5	1096						
6	1121						
7	1146						
8	1162						
9	1173						
10	1199						
11	1217		91'3%			1307	88'8%
12	1226	0'6	1326	0'6	<i>Rest</i>		
13	1257	3'4	1351	2'2	<i>Pubescent</i>		
14	1271						
15	1279	↓	1378	↓	<i>Post-pubescent</i>		
16	1304						
17	1305						
18	1307						
19	1324						
20-30	1338		4'7			1483	8'4

TABLE 4. (After Berry.)



were at birth—round, pear shaped; or become stunted; and in proportion to this failure of neurons “intelligence” fails, teachers receive their crosses and the world its human waste. Neurons with their myelin are the raw material for education; neurons without myelin—well, we cannot make a silk purse out of a sow’s ear. Nature’s contribution to “intelligence” is developed neurons, with ample inter-communications. Nurture also contributes.

Table 4 shows that one-quarter of the total growth of brain takes place before birth. In the first year of life the brain increases by  $2\frac{1}{2}$  times. By the eleventh year it has attained 90 per cent. of its total growth; all myelin, largely in the *supra layer*. The period from birth to the age of eleven is the period of education by the senses. The contribution of nurture to “intelligence” is the number and kind of messages received in the granular layer from ear, touch, and eye, through movement, imitation, suggestion and environment. There are all kinds of environment—the best is a wise mother. One of the worst is a strapped perambulator and a dusky attendant of low neuronic value, in a road-side circle of similar victims and attendants, cultivating nothing better than the degradation of thumb-sucking. The short rest about the 12th year prepares for the storm and stress of puberty. In the rapid development of sex at puberty mind may be marred either by careless or by over-zealous parents or independently by scholastic education’s introduction of the examination deluge.

After puberty the addition of myelin is small but critical; it represents the addition of ability to rise out of response only to reward and punishment on to the higher plane of striving after a self-made ideal of character; it provides fuller basis for the change from mere acquisition of knowledge (scholastic education) to independent exercise of the higher processes of mind. In a considerable proportion of the white race this last growth of myelin does not take place; an evidence of incomplete race evolution. It is said that a greater cessation of cortex growth at puberty is a marked feature of backward races. In exceptional men and women of our race the addition of myelin may go on to 40, but after 30 most of us get along with the result of our nature and early nurture, up to the uncertain age when the neurons begin to decay. We are as old as our neurons. The best way to see if they are durable is to keep on using them, and not talk nonsense about the climate. The protest of the aged *supra* layer has been neatly expressed by Thomas Hardy:—

Tis not that we have unfortold  
   The drop behind,  
 We feel the young must oust the old  
   In every kind,  
 But yet we think, must we, must we,  
   Too, drop behind.

We should not exalt too much these few facts of nature over the facts of nurture, nor regard the two sets of facts as rivals. We are pleading for greater harmony between them. The racial cortex can expand through further ages; human behaviour can reach higher levels. But that instinct can ever be crushed, that man or woman can ever be guided only by their heads, is a "biological improbability." Therefore, let age approve of youth, and help him to his heritage.

(Slides of the human frontal cortex were now shown, to make clear that the superstition which says all men are born equal, is unworthy of our intelligence and knowledge.

- (1) Cortex of an average adult European of normal intelligence,
- (2) Of a murderer,
- (3) Of a pronounced imbecile,
- (4) Of a feeble-minded youth.

The slides showed that whereas (1) is made up of many healthy pyramid neurons, the others, in varying degree, are made up of few pyramid neurons and many stunted or primitive useless cells. This demonstrated that *deficiency of intelligence, social inefficiency, delinquency and crime, may have a physical basis in the supra layer of the frontal cortex.*)

An average of fourteen millions of cortical neurons gives unlimited scope for variety in behaviour between that of the genius and the average man on the one hand, and between the average man and the profound idiot on the other hand. Instead of being a complacent token of past rapine and wealth, the family crest may yet be the family cortex, a token of mental worth to be lived up to. Indeed, *capital in the cortex* was the new idea which emerged with the exceptional men of the 19th century. Other social values are affected. Recognition of individual differences in children, says Dewey, is the perception of educative capital. And we have a new inspiration to good intentions for a backward race. There is also a legal aspect. When a deficient cortex leads its sub-normal owner into anti-social behaviour, our law everywhere behaves much after Mr. Bumble's definition of it. We draw a veil over that to-night, but this must be said: it has been ascertained beyond question that mental deficiency, deficiency of cortex, exists as a social danger amongst our native fellow-subjects. That fact has not yet been recognised officially by either the law or education. It must be. Possibly it is the chief cause of native backwardness, certainly it is a grave obstacle to rise out of backwardness. How grave can be ascertained when reliance upon opinion gives way to desire for the truth. Altruism need not be distressed if sociology has ceased to be a mass of moralizing and has become a science, ready to be a willing servant of altruism, if altruism would only sign her on. Politics on the other hand may well be distressed on the plane of economics by these new

facts. England, alone, long neglectful of mental abnormality, now spends £93 per head per annum on her 300,000 known sub-normals; the number of the unknown must be greater. She spends only £12 per head per annum on the education and care of her normal children. The normal English restrict their breeding; the sub-normal at large is a prolific being.

Our hypothesis (the quantity and quality of behaviour correspond to the quantity and quality of the part of brain concerned in that behaviour) applies to the race as it applies to the individual. Races of men, like individuals, are not born equal. In every scientific centre—from Melbourne to Moscow and Honolulu, the United States, Vienna, Berlin (where the cortex of Lenin came to the microscope), to London, Leeds, Bristol, and Edinburgh, the fraternity of science has been in liaison since 1918 to ascertain the nature of the neurological and psychological differences between races; all reasonable men desire to know the cause of the world-madness called war.

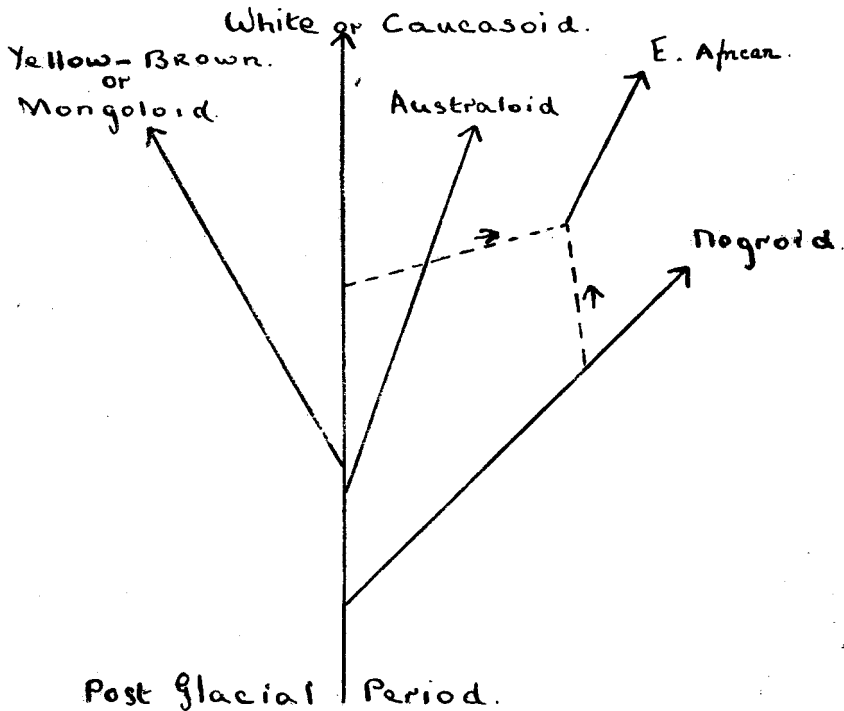


TABLE 5. (After Ales Hrdlička.)

What is a race? In science the term refers to anthropological rather than to language differences. Table 5 shows the four chief main stocks of Man. The East African native is not regarded as wholly negroid but as descended also, in varying degree, from an ancient caucasoid offshoot; probably the Hamites. Many substantial physical differences between these four main stocks are well known and have been catalogued by anthropology. Behavioural differences are well known, represented in civilization and social organization. It is reasonable to expect also differences in the quantity and quality of cerebrum and its frontal cortex. Mixture of subraces of the same main stock is believed to favour (cerebral) race progress. The English are a mixture of neolithic, bronze, Mediterranean, Teutonic, Norman, Gallic, and other subraces of caucasoid stock—and appear to be satisfied. Mixture of one mainstock with another mainstock produces a hybrid generally superior to the lower, inferior to the higher mainstock of origin. If the East African is such a hybrid anthropology expects to find that the average East African frontal cortex and behaviour are superior to the average negroid, inferior to the average caucasoid. Other technical considerations suggest that the East African average should be generally nearer to the negroid than to the caucasoid; that however, is an assumption based as yet on insufficient facts.

Recent research in Nairobi has revealed a few facts concerning the East African which will be published shortly in scientific form.

1. BRAIN CAPACITY (physical).—Marked deviation from the normal in brain size tends to be associated with deviation from the normal in behaviour. This leads us to expect deficiency in the *supra* layer of the cerebral cortex in races markedly backward in behaviour (civilization and social organization). Research into this point (brain capacity) in East Africa is not complete. The average brain capacity of European man is said to be 1480 c.c. Estimated by the same method the East African average stands at present at 1310 c.c.; actually lower than negroid and australoid. This result is of doubtful value and cannot be relied upon. Further research is required and is now in progress.

2. BRAIN WEIGHT.—The relation of the average East African brain weight to the brain weights of the mainstocks is shown in Table 6. The graph shows the East Africa weight (E.A.) to be nearer to negroid (B) than to caucasoid (W). This is a significant but not a conclusive fact unless we know much more.

3. AVERAGE DEPTH OF FRONTAL CORTEX.—Here we are dealing with minute measurements under the microscope; a fraction may be of importance in regard to behaviour. It has been found that the total average depth in the East African is 2.2% less than in the European. This fact also is not conclusive without further information.

Average Weight of Brain (grammes)

White	1380
Yellow-Brown	1300
<b>East African</b>	<b>1287</b>
Black	1240
Australoid	1180
Gorilla	420
Chimpanzee	350

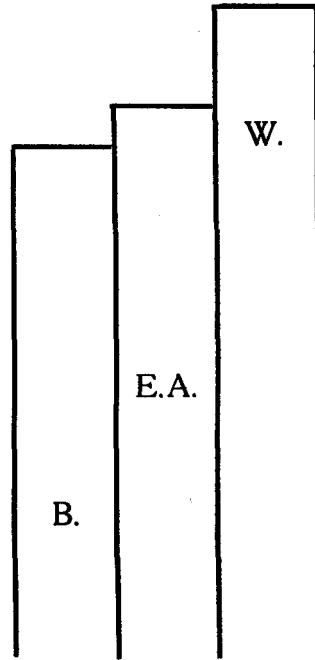


TABLE 6.

4. DEPTH OF EACH OF THE THREE LAYERS OF THE FRONTAL CORTEX. Significant differences have been found. Putting the facts together the average East African cortex has been found to be provided for the exercise of animal instinct 26.8% better than the European; for the exercise of mind (control, intellect), and for capacity to profit by education, 18.8% worse than the average normal European. Here lies a field for further research in the interests of the East African; we continue to find such fields.

5. NEURONS IN THE SUPRA LAYER—the critical question of quality.—If in the average East African the number of pyramids in his *supra* layer equals or exceeds the number in the *supra* layer of the average European, then there can only be one conclusion—that the average mind and behaviour of the East African may eventually equal or excel the average mind and behaviour of the European, provided they receive suitable sensory and scholastic educa-

tion. If that desirable quality in the *supra* layer is not present, we are faced with very different, very complex, but not hopeless problems, and with great need for more knowledge. It is enough to say that in the average of the native brains so far submitted to expert examination under the microscope the outstanding feature is the comparative scarcity of the essential pyramid neurons and the comparative excess of primitive, useless cells.

6. SUMMARY.—In this first series examined of so-called normal native brains, only 6 per cent. or one in 16, approached in quality the average so-called normal European brain. Not one excelled that average.

With the expansion of education during the last fifty years good intentions and wishful thinking rationalized into over-confidence in *nurture*, the hand of Man, have tended to disdain *nature*, the finger of God. The potency of the contributions of nature on the one hand, nurture on the other hand, to "intelligence" and anthropomorphic qualities, has been said by scientific authority to be as five to one. Can we afford to neglect this five-fold power of nature in our efforts to help the East African upwards? Improvement of environment (education, sanitation, and the rest) by itself is surely no more valuable than a half-measure. With these new facts before us, with many more to come, there is a need for earnest thought and co-operation to determine "which of these lowly peas of the human family are really dwarfs, which are dwarfed simply because the stick of opportunity on which to climb, is lacking" (Guyer). Our new facts are not advanced as exact truth. The scientist knows better than the layman that science progresses only by approximations to the truth. Exact truth may never be attained, greater accuracy comes daily. East Africa stands in urgent need of greater accuracy concerning her native population; her future depends upon efforts in this direction. The need for vastly more knowledge is clear. A co-operative inquiry by all anthropology's pertinent groups should secure safeguards for Imperial policy otherwise sought in vain on a basis of ignorant opinion and at risk to the future.

The cortex is not everything. There is also the physical, the psychological, the biochemical, the endocrinological, approach; there is the moulding influence of physical and social environment to assess. Yet in the last analysis Frontal cortex makes the race as it makes the man. Better for Kenya and the Empire a few illuminating facts about the native than another pluvial period of opinion from prejudiced political Commissions. We may further epitomize this question. Shall we set to work to raise the backward races under our care on the safe basis of scientific lines, or shall we continue the obsolescent lines laid down in days of darkness and which have led everywhere and always to pathetic failure and even to disaster?

(Here the lecturer recalled how Australia had at last, after generations of failure to "civilize" her aborigines, asked science to investigate the question. The Stone Age culture and the deficient heads of these people were shown on the screen. Professor Porteous of the Race Research Institute attached to the University of Hawaii, has made an exhaustive examination of their psychology. In his book just published, he states this conclusion: "The aborigine is not unintelligent, but is certainly not adaptable to our kind of civilization, although excellently adjusted socially and psychologically to his own environment." Professor Woollard of Adelaide University has examined the frontal cortex of the aborigine; it shows few pyramids, masses of primitive cells in the *supra* layer. We must not deduce from this that the problem in East Africa is the same as the problem now facing Australia. The East African is not the Australoid in cortex or in culture.)

Seventy years have come and gone since Darwin inspired our race to begin knowing itself in earnest. His only answer to his many assailants was: "Great is the power of steady misrepresentation, but fortunately the power does not long endure." Since Darwin truth has triumphed as he anticipated; but only for a new battle to begin. It is agreed that many elements of civilization threaten its existence; that only a people capable of a "deliberate and international policy" can survive (R. A. Fisher). The years have taught us the cruelty of evolution; how it scatters suffering and slays. We have learnt that it can and must be taken in hand, be directed consciously; that the first step must be "to bring the instinct of reproduction before the tribunal of reason" (Keith).

At home science is educating democracy on this subject; in Kenya we are faced by the difficulty that, as Bagehot long ago pointed out, bureaucracy is inherently unprogressive and fetters the energies of the governed. Yet in Kenya we have a special problem soluble only by a wisdom free from pigeon holes—the danger that we may destroy a backward race as thoroughly as with the sword, by ignorant efforts to raise it. It cannot be too widely known that to depend upon nurture alone is to pave the way to grave and insoluble problems.

Science is service. Her results may be used for good or evil. Men are ready enough to use them for the evil of war; to use them for the service of humanity is a proposal which sometimes meets with opposition; even the professed altruist may have a vested interest in the sufferings of mankind. Bertrand Russell, in his latest work, points out an imminent danger—that science may be wholly captured by leaders in government, publicity, and industry, who are drunk with the craving for power over their fellowmen. In their hands—they are many and everywhere—science can never minister as she desires to minister, to human happiness. Russell indicates another danger—that the importance of knowledge may be unduly exalted. "Even more

important than knowledge is the life of the emotions." A world without delight, without beauty, without love, is a world destitute of values. Science must minister to those; they are the most insistent of all economic facts. Man has understood and subdued nature on earth, water and in air; he has achieved a curious belief that rapidity of locomotion is noble progress. He has never subdued his own nature—every cenotaph whispers that—he has never until to-day, tried to know himself. We end with no fact greater than our first fact. In the words of Goethe, *Das erste und letzte ist Wahrheitsleibe*—the first and last thing for us is love of Truth.