



A SPONTANEOUS TETRAPLOID SNAPDRAGON

Frontispiece

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The right half of this plate shows details of a tetraploid snapdragon which appeared spontaneously in the progeny of a cross between two commercial varieties. The tetraploid structures ($A'-D'$) are larger than the corresponding diploid structures ($A-D$). No treatment was given the plants, so the mechanism whereby the doubling of the chromosomes took place is not known. Magnification: Plants ($A-A'$) $\times .5$; Pollen ($B-B'$) $\times 165$; Stomata ($C-C'$) $\times 600$; chromosomes ($D-D'$) $\times 1600$.

THE CONCEPT OF RACE IN THE HUMAN SPECIES IN THE LIGHT OF GENETICS*

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IT is said that when the theory of evolution was first announced it was received by the wife of the Canon of Worcester Cathedral with the remark, "Descended from the apes! My dear, we will hope it is not true. But if it is, let us pray that it may not become generally known."

I rather feel that the attempt to deprive the anthropologist of his belief in race is a piece of cruelty akin to that which sought to deprive the Canon's wife of her belief in special creation. Indeed, the anthropological conception of race and the belief in special creation have much in common. The prevailing attitude of mind is illustrated by the remark of a colleague who, when I gave him an account of the paper I proposed to present at this meeting replied, somewhat like the Canon's wife, "My dear, I always thought that there was such a thing as race." I believe he had spoken more correctly had he said that he had always taken the idea for granted. Certainly, I had always taken the idea for granted, and I think all of us have done so. Indeed, the idea of race is one of the most fundamental, if not *the* most fundamental of the concepts with which the anthropologist has habitually worked. To question the validity of this fundamental concept upon which we were intellectually brought up as if it were an axiom, was something which simply never occurred to one. One doesn't question the axioms upon which one's science, and one's activity in it, are based,—at least, not usually. One simply takes them for granted.

But in science, as in life, it is a good practice, from time to time, to hang a question mark on the things one takes

most for granted. In science such questioning is important because without it there is a very real danger that certain erroneous or arbitrary ideas which may originally have been used merely as a convenience, may become so fortified by technicality and so dignified by time that their original infirmities may be wholly concealed.

Early Views

Blumenbach, in 1775 and in later years, foresaw this danger with respect to the usage of the term "race," and warned that it was merely to be used as a convenience helpful to the memory and no more. Herder, who was the first philosopher to make extensive use of Blumenbach's work wrote, in 1784 in his *Ideen zur Philosophie Der Geschichte der Menschheit*, "I could wish the distinctions between the human species, that have been made from a laudable zeal for discriminating science, not carried beyond the due bounds. Some for instance have thought fit, to employ the term *races* for four or five divisions, originally made in consequence of country or complexion: but I see no reason for this appellation. Race refers to a difference of origin, which in this case does not exist, or in each of these countries, and under each of these complexions, comprises the most different races. . . . In short, there are neither four or five races, nor exclusive varieties, on this Earth. Complexions run into each other: forms follow the genetic character: and upon the whole, all are at last but shades of the same great picture, extending through all ages, and over all parts of the Earth. They belong not, therefore, so properly to systematic natural history, as to the physico-

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geographical history of man." When the last word has come to be said upon this subject it will, I am convinced, be very much in the words of Blumenbach and Herder. Meanwhile I propose to make a step in this direction here by showing that the concept of race is nothing but a whitened sepulchre, a conception which in the light of modern experimental genetics is utterly erroneous and meaningless, and that it should therefore be dropped from the vocabulary of the anthropologist, for it has done an infinite amount of harm and no good at all.

The development of the idea of race may be clearly traced from the scholastic naturalization of Aristotle's doctrine of the Predicables of Genus, Species, Difference, Property and Accident. From thence it may be directly traced to the early days of the Age of Enlightenment when Linnaeus, in 1735, took over the concepts of Class, Species and Genus from the theologians to serve him as systematic tools. The term race was actually first introduced into the literature of Natural History by Buffon who, in the year 1749, used it to describe six groups of man.

The term merely represented an extension of the Aristotelian conception of Species, that is to say, it was a subdivision of a species. Buffon recognized that all human beings belonged to a single species, as did Linnaeus, and he considered it merely *convenient*, and I emphasize the word *convenient*, as did Blumenbach after him, to distinguish between certain geographic groups of man. Thus, at the very outset the term was understood to be purely arbitrary and a simple convenience.

The Aristotelian conception of Species, the theological doctrine of special creation and the Natural History of the Age of Enlightenment, as represented particularly by Cuvier's brilliant conception of Unity of Type, namely the idea that animals can be grouped and classified upon the basis of assemblages of structural characters which, more or less, they have in common, these three conceptions fitted together extremely well and together yielded the idea of the Fix-

ity of Species. An idea which, in spite of every indication to the contrary in the years which followed, was gradually extended to the concept of race.

The Darwinian contribution was to show that species were not as fixed as was formerly believed, and that under the action of Natural Selection one species might give rise to another, that all animal forms might change in this way. It is, however, important to remember that Darwin conceived of evolution as a process involving continuous materials which, without the operation of Natural Selection, would remain unchanged. Hence under the Darwinian conception of species it was still possible to think of species as relatively fixed and immutable, with the modification that under the slow action of Natural Selection they were capable of change. For the nineteenth century anthropologist, therefore, it was possible to think of race, not as Buffon or Blumenbach did in the eighteenth century as an arbitrary convenience in classification, but as Cuvier at the beginning of the nineteenth century had done for all animals, as groups which could be classified upon the basis of the fact that they possessed an aggregate of common physical characters, and as Darwin later postulated, as groups which varied only under the conditions of Natural Selection, but which otherwise remained unchanged.

This is essentially a scholastic conception of species with the one additive fundamental difference that a species is considered to be no longer fixed and immutable. As far as the anthropological conception of race is concerned, the anthropologist who can afford to pass by the findings of experimental genetics, still thinks of race as the scholastics thought of species, as a knowable fixed whole the essence of which could be defined *per genus, propria et differentia*.

In fact, what the anthropologist has done has been to take a very crude eighteenth century notion which was originally offered as no more than an arbitrary convenience, and having erected a tremendous terminology and methodology about it, has deceived him-

self in the belief that he was dealing with an objective reality.

Reality of Race Differences

For nearly two centuries anthropologists have been directing their attention principally towards the task of establishing criteria by whose means races of mankind might be defined. All have taken completely for granted the one thing which required to be proven, namely, that the concept of race corresponded with a reality which could actually be measured and verified and descriptively set out so that it could be seen to be a fact. In short, that the anthropological conception of race is true which states that there exist in nature groups of human beings comprised of individuals each of whom possesses a certain aggregate of characters which individually and collectively serve to distinguish them from the individuals in all other groups.

Stated in plain English this is the conception of race which most anthropologists have held and which practically everyone else, except the geneticist, accepts. When, as in recent years, some anthropologists have admitted that the concept cannot be strictly applied in any systematic sense, they have thought to escape the consequences of that fact by calling the term a "general" one, and have proceeded to play the old game of blind man's bluff with a sublimity which is almost enviable. For it is not vouchsafed to everybody to appreciate in its full grandeur the doctrine here implied. The feeling of dissatisfaction with which most anthropologists have viewed the many laborious attempts at classification of human races has not, on the whole, succeeded in generating the unloyal suspicion that something was probably wrong somewhere. If there was a fault, it was generally supposed, it lay not with the anthropologist but with the material, with the human beings themselves who were the subject of classification and who always varied so much that it was difficult to put them into the group where they were conceived to belong, and this was definitely a nuisance, but happily one

which could be overcome by the simple expedient of "averaging,"—the principal task of the student of "race."

Race No Omelette

The process of averaging the characters of a given group, knocking the individuals together, giving them a good stirring, and then serving the resulting omelette as a "race" is essentially the anthropological process of race-making. It may be good cooking but it is not science, since it serves to confuse rather than to clarify. When an omelette is done it has a fairly uniform character, though the ingredients which have gone into its making may have been variable. This is what the anthropological conception of "race" is. It is an omelette which corresponds to nothing in nature. It is an indigestible dish conjured into being by an anthropological chef from a number of ingredients which are extremely variable in the characters which they present. The omelette called "race" has no existence outside the statistical frying-pan in which it has been reduced by the heat of the anthropological imagination.

It is this omelette conception of "race" which is so meaningless,—meaningless because it is inapplicable to anything real. When anthropologists begin to realize that the proper description of a group does not consist in the process of making an omelette of it, but in the description of the character of the variability of the elements comprising it, its ingredients, they will discover that the fault lies not with the materials but with the conceptual tool with which they have approached its study.

That many differences exist between different groups of human beings is obvious, but the anthropological conception of these is erroneous, and the anthropological approach to the study of their relationships is unscientific and pre-Mendelian. Taxonomic exercises in the classification of assemblages of phenotypical characters will never succeed in elucidating the relationships of different groups of mankind to one another for the simple reason that it is not assem-

blages of characters which undergo change in the formation of the individual and of the group, but single units which determine those characters. One of the great persisting errors involved in the anthropological conception of race has been due to the steady refusal to recognize this fact. The fact that it is not possible to classify the various groups of mankind by means of the characters which anthropologists customarily use, because these characters do not behave as pre-Mendelian anthropologists think that they should behave, namely, as complexes of characters which are relatively fixed and are transmitted as complexes, but behave instead in a totally different manner as the expressions of many independent units which have entered into their formation.

The materials of evolution are not represented by continuous aggregates which in turn determine particular aggregates of characters, but by discontinuous packages of chemicals, each of which is independent in its action and may be only partially responsible for the ultimate form of any character. These chemical packages are the genes, with which most anthropologists are still scarcely on terms of a bowing acquaintance. These genes retain both their independence and their individual character more or less indefinitely, although they are probably all inherently variable and, in time, capable of mutation. For these reasons any conception of race which operates as if inheritance were a matter of the transmission of gross aggregates of characters is meaningless.

The principal agencies of evolutionary change in man are primarily gene variability and gene mutation, that is to say, through the rearrangement of gene combinations in consequence of the operation of many secondary factors, physical and social, and change in the character of genes themselves. In order to appreciate the meaning of the variety presented by mankind today it is indispensably necessary to understand the manner in which these agencies work. Thus, in man, it is practically certain that some forms of hair, and skin color, are due to

mutation, while still other forms are due to various combinations of these mutant forms with one another as also with non-mutant forms. The rate of mutation for different genes in man is unknown, though it has been calculated that the gene for normal clotting mutates, for example, to the gene for haemophilia in one out of every 50,000 individuals per generation. It is highly probable, for example, that such a mutation occurred in the person of Queen Victoria, a fact which in the long run may perhaps prove her chief claim to fame. Mutation of the blood group genes is, however, known to be very slow, and it is unlikely that such mutations have occurred since the apes and man set out upon their divergent evolutionary paths. Mutation of skin color genes is also very slow, while mutation of hair form genes is relatively frequent.

If we are ever to understand how the differing groups of mankind came to possess such characters as distinguish the more geographically isolated of them, and those of the less isolated more recently mixed, and therefore less distinguishable, groups, it should be obvious that we shall never succeed in doing so if we make omelettes of the very ingredients, the genes, which it should be our purpose to isolate and map. We must study the frequencies with which such genes occur in different groups. If, roughly speaking, we assign one gene to every component of the human body it should be fairly clear that as regards the structure of man we are dealing with many thousands of genes. If we consider the newer genetic concepts which recognize that the adult individual represents the end-point in an interaction between all these genes, the complexities become even greater. The morphological characters which anthropologists have relied upon for their "racial" classifications have been very few indeed, involving a minute fraction of the great number of genes which it would actually be necessary to consider in attempting to make any real, that is to say, genetically analytic, classification of mankind.

To sum up, the indictment against the

anthropological conception of race is (1), that it is artificial; (2) that it does not agree with the facts; (3) that it leads to confusion and the perpetuation of error, and finally, that for all these reasons it is meaningless, or rather more accurately such meaning as it possesses is false. Being so weighed down with false meaning it were better that the term were dropped altogether than that any attempt should be made to give it a new meaning.

If it be agreed that the human species is one and that it consists of a group of populations which, more or less, replace each other geographically or ecologically and of which the neighboring ones intergrade or hybridize wherever they are in contact, or are potentially capable of doing so, then it should be obvious that the task of the student interested in the char-

acter of these populations must lie in the study of the frequency distribution of the genes which characterize them—and not in the study of entities which have no meaning.

In conclusion, let me say that I realize how unsatisfactory this paper is, and that I cannot expect to have convinced you, within the short space of fifteen minutes, of the meaninglessness of the anthropological concept of race. It may be that a notion so many times attacked during recent years is now passed beyond the reach both of scientific judgment and mortal malice, but in any event, may I be so bold as to hope that you will not feel as the Canon's wife felt about the threat to her belief in special creation?

Dr. Ashley Montagu's interesting history of the term race, shows certain ways it has outgrown any usefulness, even becoming a menace. Some of his views may draw fire from geneticists, for humankind differs greatly in many characteristics variously distributed. If these differences are real enough to allow objective groupings of people, such groups will differ just as much whether we call them "races" as to invent a new term. If Dr. Montagu's idol smashing helps to clear the air it has served a very useful purpose.

The laboratory scientist shuns the market place and the politicians' rostrum. Unfortunately folks accustomed to reach for a microphone refuse to stay out of the laboratory if they see a chance to gain even reluctant support for their pet nostrum. Because "race" is a word which inflames the emotions, much fanatical nonsense has been spoken and written about it. "Class" is another word called upon to carry an impossible genetic load, as the history of the eugenics movement testifies. Strange perversions, allegedly sanctioned by careful laboratory research, perplex and enslave millions of people.

Research workers in those sciences which may become social dynamite through perversion or prostitution of conclusions, may have to defend the integrity of their science whether they like it or not. This is emphasized in the depths of biological absurdity recently reached by the champions of "racism" (a derivative word with very ugly connotations). Even the Norwegians have been read out of the Aryan fold by the dark-moustached "protector" of the destiny-freighted blonds. The color of Norwegian hair and eyes has not changed. Rugged Norse individualism has made it impossible for the most "nordic" group in the world to accept the Procrustean savagery of the "new order".

With racism thus divorced by its leading proponent from shape of head and color of hair, eyes, and skin, it is essential that anthropologists and biologists clarify their own minds and inform lay people what actually are the differences between the human races. The study of human relationships through an analysis of gene distribution is as yet limited mainly to the blood groups and to P.T.C. taste reaction. The technique offers a hopeful approach which needs to be further explored.

As far as research and observation have been able to prove, the chromosome number of all the human races is the same, and all of the five, seven, or ten races (depending on whom we follow) are inter-fertile. The blood of all races is built of the same pattern of agglutinins and antigens, and the appropriate blood type from one race can be transfused into any of the others without untoward effects. Thus in spite of the unquestionable physical differences (and less measurable mental and emotional difference) between groups of people, an imposing substrate of similarity underlies these differences. This must serve as a foundation for a world order willing to accept the differences as a challenge to developing useful specializations and not as a fatuous excuse for the enslavement or exploitation of one "race", class or nation by another.—EDITOR.