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GEORGE SUMNER HUNTINGTON, ANATOMIST[1]

TO-NIGHT there are gathered here the colleagues and friends of the late George Sumner Huntington to do honor to him whom all of us admire and respect for his works, to whom many of us are held by the strongest and closest bonds. Posterity knows a man through his accomplishments; his personality lives only in the memory of those with whom during his lifetime he was intimately associated. It would seem appropriate that in this company I should dwell more on the man, on his great and compelling personality, than was possible in the address that I recently delivered before the American Association of Anatomists.

My own acquaintance with Huntington dates back to 1890 when I was a student of his in the College of Physicians and Surgeons. It was not until the autumn of 1903, however, that I was brought into close working association with him. His associate, Dr. Churchill Carmalt, was then greatly interested in certain work going forward in my laboratory, and on one of his week-end trips to Princeton, he was accompanied by Huntington. It happened that at this time both Huntington and I were actively developing our respective collections in comparative anatomy; through our community of interest in these, there grew the close friendship and professional relationship that existed between us to the end of his life. Very soon we were deeply engaged in joint investigations on two problems of the vascular system. It is because Huntington and I worked so closely on these through a period of twenty odd years, collaborating in the publication of work carried on both together and independently, that I was so intimately acquainted with him professionally and personally, and so was asked to address you this evening on the subject of his life, character and accomplishments.

Rarely is there such a man as George Sumner Huntington. I wish I might draw a picture of him as I really knew him. He began life as a professional anatomist at the time when in this country anatomy was merely an adjunct to surgery; he died as one who had played a leading and dominant rôle in raising anatomy to the high status it now has in America—that of an independent science. We who were well acquainted with him realize that in any field of action he

[1] An address delivered before The New York Academy of Medicine, on January 20, 1928.

had chosen he would have become a leader. Marked physical and mental energy, indomitable perseverance, brilliant intellect, great power of concentration, unbounded enthusiasm—these are characteristics that we all know. Added to these were his charming, magnetic personality, his unfailing loyalty, his great capacity for deep and enduring friendship.

It is interesting to follow the early training and education of a man who, like Huntington, attains real eminence, and to observe the influence that environment may have played in forming his general character, and in moulding him for his chosen profession. While still an infant, Huntington was taken by his mother to Germany and remained there until he had completed his course in the German Gymnasium. He obtained his later education, both college and professional, in this country. The influence of the years in Germany, however, is most evident throughout his life. His thorough and methodical training in the Gymnasium accounts for the exactness and the attention to detail so characteristic of all his investigations. In Germany, too, he acquired his knowledge of the classics and his love for them—a love which he never lost even through the period of his most strenuous scientific career. In later years, when he had occasion to refer to Latin treatises on anatomy and medicine, he was able to read them with great facility. Although his research was of a most highly specialized character, the broad culture of the man was always apparent. Evidently during these early years abroad his mind was directed toward the subject that was to become his profession, for while there he began to collect books on anatomy. These anatomies, collected during his boyhood, with his name and the dates inscribed in them, still form a part of that great collection of books which he has left behind him.

On his return to this country in the autumn of 1877, Huntington was well prepared to enter Trinity College (Hartford) as a member of the class of 1881. Here, as in Germany, his general course continued to be broadly cultural; but the ever-increasing number of electives in chemistry, botany and zoology indicates that he had determined to adopt a scientific career. In his sophomore year he was awarded the Pascal-Fenelon prize for the best examination in Pascal's "Pensées"; in his senior year he received the chemical prize for an essay on explosives. He was graduated with the degree of Bachelor of Arts, *cum honore,* receiving honors in mental, moral and political philosophy, in chemistry and in the natural sciences.

The autumn after his graduation he entered the College of Physicians and Surgeons, then located at Twenty-third Street and Fourth Avenue, New York City. At his graduation from Trinity College, Huntington had ranked seventh in a class of nineteen. In 1884, at his graduation with the degree of M.D. from the College of Physicians and Surgeons, he ranked second in a class of one hundred and twenty-five. In a competitive examination, taken by the first ten men in the graduating class, he won the first prize of five hundred dollars. At the same time he won also a prize for the best clinical reports at the New York Hospital. At the time he had graduated from the College of Physicians and Surgeons, Huntington had given unmistakable indication of the extent of his great natural abilities and of the brilliance of his future career.

After graduation from the medical school, Huntington chose surgery as a profession and entered the Roosevelt Hospital as a member of the House Staff, where he remained until 1886, when he was made an assistant demonstrator of anatomy in the College of Physicians and Surgeons. Between 1886 and 1889, he continued as demonstrator in anatomy; and, for part of this time, assisted Dr. Henry B. Sands in his private practice. He acted also as visiting surgeon to the Bellevue Hospital, as junior assisting surgeon to the Roosevelt Hospital and as chief of clinic of the surgical department of the Vanderbilt Clinic.

In May, 1889, Huntington was appointed to a full-time professorship of anatomy in the College of Physicians and Surgeons. So far as I have been able to determine, no medical school in this country had ever before appointed a man whose full time was given to the teaching of anatomy and to the investigation of anatomical problems. It had been the custom to appoint to the chair of anatomy a man whose time was divided between the practice of surgery and the teaching of anatomy, but whose interest lay chiefly in surgery. As a result the teaching of anatomy had been wholly perfunctory, and no attempt had been made to interpret the structure of the human body in a scientific manner. In America anatomy had not at this time attained that development, that preeminence as a separate science, which already it held in Europe; it was too often presented as a mass of unrelated detail which medical students learned in the hope that at some future time the information might be of practical service. At the time Huntington was called to the chair of anatomy at the College of Physicians and Surgeons, anatomy was entirely subordinate to surgery.

During the three years that he served as demonstrator, Huntington must have been dissatisfied with the prevailing method of teaching anatomy; for in 1889, the year that he was made professor, he abandoned the system then in vogue in all American medical schools—that of giving didactic instruction by lec-

turing to large sections—and substituted teaching by demonstration of the actual objects to small sections of the class. This plan, inaugurated by Huntington, prevails at the present time throughout the country; he was the pioneer in effecting the change. It would have taken a man of no less ability and personal force than Huntington so quickly to revolutionize current methods of teaching. Soon, however, he was to exert a still greater influence by his recognition and application of the fact that anatomy is not an offshoot of surgery, but is a science by itself, and should be regarded and taught as such.

Having reorganized the method of teaching anatomy in the college, he soon recognized the inadequacy of the system in which the subject was presented to the students. Being a close student of evolution and having been deeply influenced by Darwin, Huxley, Owen and Gegenbaur, he now adopted morphology as a means of interpreting the structure of the human body. In doing this he was instrumental in influencing the whole of anatomical study in the medical schools in America; he gave importance to comparative anatomy, and so vitalized the whole subject. There had been other comparative anatomists in this country; Huntington was the first man in America, however, with the vision to see the importance of emphasizing the comparative method in the study of human anatomy, and to make clear the fact that the multitudinous detail which the structure of man offers can be interpreted from the standpoint of the morphology of the different organ systems, and in relation to the application of structure to function. The significance and importance of the structural peculiarities of man he accentuated and illustrated by comparison with the morphology of corresponding structures in the lower vertebrates. In his own words: "There is no region or part of the human body, which is not more readily and permanently comprehended through the comparison with the corresponding structures in the lower vertebrates." With the adoption of the laboratory method of teaching, Huntington radically changed the character and significance of his lectures. The old-fashioned recital of unrelated detail was replaced by a lecture on a much higher plane. Such, in brief, were the new methods of teaching and the general conceptions of anatomy which were initiated by Huntington in 1889, and were consistently followed by him during the thirty-five years that he was professor of anatomy in the College of Physicians and Surgeons.

I have emphasized the methods employed by Huntington in presenting to his students the subject of anatomy. At the time of his appointment as professor, he already had the practical acquaintance with the cadaver and the detailed knowledge of all its parts which were essential to the old-time teacher. When he made comparative anatomy the basis of his new course, however, he was confronted with the necessity of acquiring a first-hand, detailed knowledge of the structure of vertebrates in general; throughout our acquaintance he again and again emphasized his opinion that it is only through observation and practical experience, not through books, that an understanding of anatomy, both human and comparative, is to be gained. He at once began an intensive study of the comparative anatomy of vertebrates, and this work he carried over a period of thirty-five years. The number of vertebrates that he personally examined, dissected and prepared is almost unbelievable; to his associates it has always been a source of wonder how, in addition to attending to numerous other duties, he was able to do work so thorough and detailed on the many animals that came into his possession.

Huntington spent a lifetime in the study of comparative anatomy; in this field no one in America has ever equalled him either in practical experience or in the extent of information. With his experience and his profundity of knowledge, and with his great variety of preparations, Huntington was able to teach and illuminate the subject of human anatomy as before him no one had done in this country. As an inspired and inspiring teacher his name will long remain a tradition in the College of Physicians and Surgeons.

The development of his extensive human and comparative anatomical collection was a natural necessity of Huntington's method of teaching; and, as the collection gradually grew in size and importance, Huntington saw that in its future development he must adopt some definite plan leading to the establishment of what he hoped would be a permanent museum of comparative anatomy. Such a plan was formulated by him and was published in SCIENCE in 1901, under the title: "The Morphological Museum as an Educational Factor in the University System."

The Huntington collection now consists of nearly 6,000 mounted exhibits, practically all of which were prepared and mounted by Huntington himself. In addition to this there is in storage a large amount of material which is classified and catalogued, but remains still to be prepared. The collection is the most extensive and complete of its kind in this country and the technique displayed in the dissection and mounting of the exhibits is unexcelled by any in existence. It was Huntington's intention that in its complete state the collection should constitute a kind of general morphological reference library for the organs and organ systems of vertebrates; for, he says, "In this sense the museum fulfills its highest

functions, stimulating and directly promoting investigation and rendering such investigations fruitful and effective by contributing the series necessary for comparison and reference."

The plan adopted by Dr. Huntington was very comprehensive; it serves to emphasize the thoroughness and attention to detail he invariably displayed in all matters in which he was professionally interested. The facilities for exhibiting the collection in accordance with his plan were notoriously inadequate in the College of Physicians and Surgeons, so that during his lifetime he was unable to organize it along the lines projected. This accounts for his unwillingness to open the collection to the general public, for which in the past he was sometimes unjustly criticized. He had hopes, however, that the foundation laid by him might be built upon by his successors, so that in time and under more favorable conditions, the museum would rank in prestige and in importance to the medical community, as does the Hunterian Museum of Comparative and Human Anatomy in the Royal College of Surgeons in London, now under the directorship of Sir Arthur Keith, the eminent British anatomist. This great Hunterian collection, illustrating both human and comparative anatomy, had its origin in much the same manner as did that of Huntington, and the greater part of the dissections were prepared by the founder, John Hunter. Following this tradition, the Federal Government of Australia has recently founded a National Museum which is to be a center for the advancement of comparative anatomy in its application to modern medical practice. This and the fact that the Hunterian Museum continues to be a growing and active institution, indicates the attitude of British anatomists toward the value of comparative anatomy as a means of elucidating man's structure.

It is to be hoped that the temporary reaction against morphology will not prevent the College of Physicians and Surgeons or some other institution of like standing from carrying out the plan formulated by Huntington and from making the Huntington Museum of Comparative Vertebrate Morphology, like the Hunterian Museum in London, a Mecca for American anatomists.

During the more recent years of his life, Dr. Huntington had observed the rôle played by experiment in influencing the methods of teaching anatomy and the investigation of its problems. It was always fixed firmly in his mind, however, that the experimental aspect of anatomy and of development can not precede the comparative aspect; otherwise, one would have to build and to elaborate theories based on materials he neither knew nor understood. Comparative morphology and experimental morphology are not opposing branches of science, but are complementary methods of attacking one and the same subject. A thorough knowledge of comparative anatomy and of comparative embryology he always maintained is a necessary prerequisite for the experimentalist.

Dr. Huntington has left forty-five publications which were written between 1892 and 1920. In addition to these there are several unfinished manuscripts; and there is one other, completed in 1923, but still unpublished, on the history of anatomy and medicine. These publications cover a wide range in the field of vertebrate morphology, and include investigations on the comparative anatomy and development of the digestive, genito-urinary, respiratory, nervous, muscular, lymphatic and cardio-vascular systems. Seven papers on the development of the vena cava posterior and of the lymphatic system were published jointly with me, between 1903 and 1920.

Between 1892 and 1903, when Huntington was especially interested in developing his teaching and in preparing his museum collections to be used in his course in anatomy, his papers were largely anatomical in character. After 1903, however, his interest was centered primarily on the embryology of the organ systems. His extensive collection of wax reconstructions gives evidence of the vast amount of work he accomplished in this direction.

His earlier investigations dealt largely with the morphology of the digestive system, and between 1892 and 1898 he published a number of papers on this topic. These earlier investigations on the digestive system finally led to the publication of an extensive comparative treatise on the subject, which appeared in 1903 under the title of "Anatomy of the Human Peritoneum and Abdominal Cavity." This book is profusely illustrated by 582 figures, the greater number of which are drawn or photographed from his own dissections. The book well represents Huntington's conception of the value of comparative anatomy and embryology "in elucidating the difficult and often complicated morphological problems encountered in the study of human adult anatomy."

Variations in anatomical configuration as observed especially in different mammals of the same species were always of great interest to Huntington. In this connection a series of five papers were published by him between 1895 and 1904, on variations of the muscular system in the lower primates and in man, with reference to their classification and morphological significance. In his Harvey lecture in 1907, on "The Genetic Interpretation and Surgical Significance of some Variations of the Genito-Urinary Tract," he described such variations of the genito-urinary tract in man as would probably be encountered by surgeons. Here he shows that all such variations can

be interpreted by certain definite and recognized modifications possible in the embryonic ground plan of the genito-urinary tract of mammals.

Among his earlier publications was one appearing in 1898 on "The Eparterial Bronchial System of the Mammalia." It was written in refutation of a theory advanced by Aeby in explanation of the asymmetry which exists in mammals between the right and the left pulmonary arteries and the most proximal branches of the stem bronchi. This paper was the forerunner of a series of others published between 1916 and 1920 on the comparative anatomy and development of the mammalian respiratory organs.

In one of these papers published in 1917 on "The Morphological Basis for the Dominant Pulmonary Asymmetry in the Mammalia" he demonstrates by an embryological study the incorrectness of Aeby's view. He shows that the asymmetry which in the adult exists between the right and the left pulmonary arteries and the bronchial tree, has been brought about in the embryo by a rotation of the gut and the heart in opposite directions. As the result of this rotation the left pulmonary artery is shifted dorsad so that the most proximal branch of the left stem bronchus must necessarily grow out into the interval caudal to or below the left pulmonary artery.

At the time of his death Huntington had almost completed an extensive investigation on the morphology of the lungs of vertebrates, with special reference to mammals. This investigation, which extended over a long period, consists of a comparative study of the development of the lungs of vertebrates. For this he made nearly 500 wax corrosions of the lungs of mammals and of other vertebrates. A large portion of the manuscript, including the plates for figures, is ready for the press and it is to be hoped that funds will be forthcoming to insure its publication, even though the investigation is still uncompleted. Still another important series of investigations made by Huntington deals with the morphology of the salivary glands of mammals. In collaboration with Doctors Churchill Carmalt and Herman Von W. Schulte he published in 1913 a monograph on this subject. His personal contribution to the monograph deals with the development of the salivary glands in the lower primates and gives an interpretation of the primate alveolingual salivary area. This monograph is the most extensive and complete exposition of the subject in existence and must long remain a standard authority.

The above brief outline of some of Huntington's investigations gives a general idea of the character of his work and of the attitude held by him toward the investigation of anatomical problems.

It was in 1903, when his interests were becoming largely centered on embryological problems, that I became associated with Huntington as a collaborator and joined with him, as I have stated above, in making two extensive investigations. At the time of his first visit to Princeton, I was engaged in work on the development of the veins, and especially on the atypical conditions presented by the mammalian posterior vena cava. On account of the interest Huntington showed in my investigation it was suggested that we undertake a joint study. We decided that the development of the veins in the cat furnished material on which to establish an ontogenetic plan that would interpret these atypical conditions. On the basis of this investigation we have been able to classify under 17 main types the variant conditions of the vena cava posterior which in the adult cat are potential; also, we found that all caval variations thus far observed in man could be classed under these same types. This investigation led us directly to one still more important, on the development of the lymphatic system, which occupied us for over 15 years.

In the course of our work on the development of the veins, we observed that the formation of the jugular lymph sacs and thoracic ducts in the cat did not bear out a view advanced in 1902 by Florence Sabin regarding the development of lymphatics in the pig. Accordingly, postponing further work on the veins, we at once transferred our attention to the development of the lymphatic system; and our paper on the development of the veins in the cat did not appear in complete form until 1920.

An examination of any one of the current textbooks on embryology published prior to 1902 will show that up to that time no exact knowledge existed regarding the development of the lymphatic system. It was in 1902 that Florence Sabin advanced the view that the lymphatic system of the pig embryo begins as four blind ducts which in the neck and inguinal regions bud off from the endothelium of the veins and then grow continuously in a centrifugal direction, without discontinuity, throughout the body of the embryo to form the endothelium of the lymphatic system. In other words, she claimed that the endothelium of the lymphatics is invariably derived from the endothelium of the veins.

This view of Sabin's accorded with the angioblast theory of His, who maintained that all intraembryonic endothelium is derived from a unit vascular anlage situated, in the chick embryo, on the yolk sac, from which the endothelium grows continuously, without discontinuity, into and through the body of the embryo. In both these views the idea of the specificity of intraembryonic endothelium is especially involved, since both claim that it comes from a unit vascular anlage and is incapable of arising from any other source or in any other manner.

In 1906 Huntington and I read a joint paper before the American Association of Anatomists in which we maintained that the main lymphatic vessels of the embryonic cat do not develop from the endothelium of the veins, as claimed by Sabin, but develop *in loco*, independently of venous endothelium, from embryonic mesenchyme.

The appearance of this paper marked the beginning of an active controversy which lasted for about fifteen years. Following Sabin's first paper in 1902, nearly 100 others have appeared in substantiation of one or the other view and, with very few exceptions, they have all been written by American anatomists. The living embryo was studied and both the morphological and the experimental methods of investigation were employed.

In the heat of debate one is likely to lose sight of the broader aspects of a question. During the early years the problem was approached chiefly from the standpoint of a unit vascular anlage and of the specificity of lymphatic endothelium alone. Later on, however, as it became apparent that the lymphatic system is merely a part of the general vascular system the problem developed into the broader question of the genesis of endothelium in general, including that of the lymphatics, arteries and veins.

Without entering further into details, it can be stated that as a result of this long controversy, the morphological evidence favoring the local genesis of intraembryonic endothelium from mesenchyme has been completely confirmed by experiment and that the Angioblast Theory of His no longer holds. Furthermore, it is a matter of record that the principle of the local genesis of intraembryonic endothelium from mesenchyme is now generally accepted by anatomists, even by those who at one time most strenuously opposed this view.

Huntington's own personal contributions toward the solution of this problem will continue to be important as long as such pioneer work is of interest to anatomists. The great influence he exerted in stimulating his coworkers and in directing the endothelial problem toward its final solution will not soon be forgotten. He was instrumental in initiating two important experimental investigations by his own associates, McWhorter, Miller and Whipple, in the College of Physicians and Surgeons; these were outstanding contributions in our effort to establish the local genesis view.

The conclusions reached in the investigations which this controversy provoked will ever form a firm foundation on which future investigators may base their work dealing with the genesis of vascular tissues.

Huntington's unusual and striking personality was a dominant factor in his power as a teacher and contributed greatly to his professional success. His sense of humor and his gracious manner endeared him to all who came in contact with him. His innate fineness, his ready sympathy, his keen insight and his broad culture won him friends wherever he went. Every one who saw him was impressed with his vitality, with his indomitable strength—when he was roused in argument, with his alertness and pugnacity and power. Combined with these, he had a charm of virile manhood that is entirely indescribable to any one who did not know and feel it at first hand. All Huntington's activities were characterized by enormous vigor. When a young man, his daily exercise was taken with a professional wrestler. He was an incomparable woodsman and hunter. On his extensive camping trips in Canada, he went without guides, preferring to do all the hard work himself.

In his laboratory, he showed the same indomitable qualities. He loved his work, could never get enough of it. From the time he reached the college in the morning until he left for home at night, he worked incessantly. He was oblivious, insensitive to everything but the idea he was pursuing. In the height of our investigations, he would often in the evening call me over the long distance telephone to compare with me the results that the day's work had brought. It was a joy to collaborate with a man who never failed in eagerness and enthusiasm to share the results of his toil and mine.

At home his hospitality had the charm that characterized his every activity. When sometimes I would accompany him there after long hours of work, he showed no fatigue; his active mind would then often play over ideas that had been occupying us in the laboratory but it was from a new angle. He would comment on the broad aspects of our task, he would laugh over humorous incidents of the day, would sketch plans for the future. The evenings I spent with him by the fireside were among the most delightful of my life.

Although Huntington was that type of intensive individual investigator whose mind is strongly focussed on his own work, I know of no teacher who has been more solicitous for the success of his students, or who has done more to further their interests. He was always ready to discuss their problems and to aid them in their work. During the years that I collaborated with him he was surrounded by a brilliant group of young men; and between the years 1895 and 1919 thirty-nine investigations were published from his laboratory, not including those that he himself wrote. No one could be long with him without being fired by the enthusiasm that he had for his work. Some of the most prominent medical men in this country worked in his laboratory and owe to George Huntington much

of the impulse and ambition that has brought them their professional success. It was always a great pleasure to me to accompany him here and abroad to meetings of the Anatomical Association, where he invariably played a leading rôle. He almost always took part in every discussion; and in debate no one could surpass him when he was discussing his own specialty or other subjects where he was convinced that his opinions were correct. His early experience as a surgeon made him a consultant peculiarly valuable to the medical profession at large; he was alert to the practical significance of his anatomical work, and was always ready to give advice to those who sought it. As an anatomist, as an investigator in fields far removed from surgery, he never lost sight of the fact that the training of surgeons was one of his chief aims. The combination of a professional anatomist of highest standing, with a surgeon of rare skill is unique; in these days of high specialization, it is not likely to occur soon again.

Those of us who were Huntington's intimate friends will always regard him as highly for what he was, as for what he accomplished. His charm of manner, his humor, his deep loyalty to friendships, his masterful energy, his whole dominant personality we shall not forget. He was a rare man, a remarkable friend.

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IDEALS OF THE ENGINEER[1]

IN receiving this great honor, I do so with feelings of deep gratitude and not without a sense of humility, for I realize that the brain of the individual has its limits as a storehouse, and that with knowledge continually increasing, any one mind can take in only a small portion of the rapidly accumulating body of engineering information. In these days, intellectual specialization is absolutely necessary, and whatever I have been able to accomplish is the result of specialization and the cooperation of many individuals.

In order to be of use to society, the ideas of the engineer in every department, in transportation, communication, and architecture, must first be embodied in physical form, and because of this he has achieved such a mastery over material things that he is regarded as preeminently the exponent of a material age. The great utility and economy resulting from his activities are so sensational as to conceal from view the ideals which form the basis of his creative work.

If seeking the truth and applying the truth to the affairs of man is a spiritual thing, then the engineer must be absolved from the charge of materialism. He is an advocate for truth. His works must be tried in the inexorable court of Nature, where no errors are committed and no exceptions granted. The work of the engineer is dedicated to the use of mankind, and the pecuniary compensation which he himself obtains is slight compared with the great benefits received by society. He finds inspiration and reward in achievement, and his real compensation is the good which others derive from what he has done.

Let us consider briefly the ideals of the engineer and the nature of his functions in the light of modern theories of evolution.

We are told that man has come from a lowly origin, and that during ages of time incalculably long he has advanced to his present position at the head of the animal kingdom. It has been supposed that in man himself this evolutionary process is still at work, and that, therefore, in the course of the ages he will evolve into a superlative type, and then perhaps all will go well.

Inasmuch as this evolutionary process in man himself is said to have taken vast periods of time, it is not unreasonable to expect that further ages must elapse before salvation by this form of evolution could be achieved.

Such a view does not afford much comfort nor does it provide any basis for a practical program to guide us. Even speaking in terms of the life of a nation, such a process is too slow. We must reckon with man as he now is. Our problems must be solved by working upon him and through him, and can not wait for the arrival of the hypothetical superman. Indeed, it is stated by an eminent authority that there are no indications that future man will be more perfect in body than the most perfect individuals of the present, or than the most perfect men and women in the days of Phidias and Praxiteles. There seems to be no general agreement as to whether this process in man himself has actually ceased; but I believe it is safe to say, in any event, that it is too slow in its operation to afford a solution of any of the problems that now confront us.

But this is not all that evolution has to offer. For, even if this one pathway should be closed to further great progress during our age, we are assured by that eminent authority, Professor Edwin Grant Conklin,[2] that there are two others which are open to us.

The first of these to be considered is one which is preeminently under the control of the engineer. Conklin tells us that the evolution of man, the individual, is no longer limited to his body or mind;

[1] Address of John J. Carty upon receiving the John Fritz Gold Medal, February 15, 1928.

[2] "The Direction of Human Evolution," Edwin Grant Conklin.