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THE RISE OF MAN[1]

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WE are gathered here this morning to give some thought to the purpose and meaning of a new building associated with a great university. If this were a new building intended for the study and teaching of some branch of natural science, such as geology or chemistry or physics, we would seem to be engaged in a routine familiar to us all, for such laboratories have long been known to us at other large universities. It is an interesting fact, however, that we would find no parallel to this building in any other university, either in America or abroad. Far from mentioning this fact by way of gratifying our own vanity, I call your attention to it because it is a fact of which I am constantly conscious as laying upon us a great and unique responsibility. It is a fact which obviously raises the question "Why." When other universities have not recognized such a need, why this new building here and why the researches to be housed in it?

I have lived for more than forty years in daily realization of the need of such a building, and to me the natural question seems rather to be: "Why should science, which builds its laboratories to investigate the history of every other creature from the frog to the horse, never have created a laboratory for the investigation of early man, the most important of all creatures?" The investigations centering in this building make it a laboratory devoted to man, to his origins and the evolution of the civilization which we have inherited. The life going on in this building invites you to a new vision of the place of man in a universe out of which he has issued with new and sovereign powers to understand something of that universe and his own place in it.

[1] Address given on the occasion of the dedication of the Oriental Institute of the University of Chicago.

MAN'S PLACE IN NATURE

For ages man has seen himself against a background of nature. Gradually his own achievements have profoundly modified his ideas of his own position in the visible world about him. When Stone Age man shifted from hunting to agriculture and for the first time felt his dependence on the fruitfulness of the earth, it led him to deify the fertility of the green

fields and to take his place as a child of the god of fertility. It gave him a very simple idea of his place in the natural order. Since those primitive days the profoundest minds have struggled with the problem of man's place in nature. The self-development which was such a profound influence in the growth of Goethe's mind was conditioned by the expanding consciousness of his own kinship with nature and the belief that somehow man had come out of nature. These thoughts eventually issued in Goethe's profound conviction of his spiritual oneness with nature. A quarter of a century after Goethe died, Darwin published his "Origin of Species," and thereupon the conception of man's place in nature hardened into mechanical and largely biological aspects of the emergence of man. It was especially in the writings of such men as the Frenchman Taine that these mechanistic and biological conceptions revealed their devastating effect upon a trained mind, even though enriched by literary culture. Under the light of modern science and its terrifying revelations, man has begun to fear the tremendous idea that he is an outgrowth of the universe that holds him in its immutable grasp. To be sure, some minds like that of Tennyson have kept alive the spiritual attitude so strongly held by Goethe. We really hear an echo of Goethe as we contemplate the figure of Tennyson standing by the cradle and for the first time looking into the face of his first-born son, with the words, "Out of the deeps, my child, out of the deeps."

In an evolutionary age, however, there was little upon which this mystically spiritual attitude of Tennyson could be based.

The Gap in our Knowledge of the Human Career

Since then the natural scientists have labored on and the physical origins of man from the lower animals have become far clearer. But between the historians and the natural scientists there has been a "great gulf set," with the result that we now have on the one hand the paleontologist with his picture of the dawn-man enveloped in clouds of archaic savagery, and on the other hand the historian with his reconstruction of the career of civilized man in Europe. Between these two the paleontologist with his archaic savage on the one hand, and on the other the historian with his account of civilized Europe, stand we Orientalists endeavoring to bridge the gap. It is in that gap that man's primitive advance passed from merely physical evolution to an evolution of his soul, a social and spiritual development which divests evolution of its terrors. It is the recovery of these lost stages, the bridging of this chasm between the merely physical man and the ethical, intellectual man which is a fundamental need as man faces nature to-day. We can build this bridge only as we study the emergence and early history of the first great civilized societies in the Ancient Near East, for *there* still lies the evidence out of which we may recover the story of the origins and early advance of civilization, out of which European civilization and eventually our own came forth.

The Organization Needed for Bridging the Gap

That is the greatest task of the humanist to-day; but no group of Orientalists, however gifted or able, if organized solely as a university department, as teachers of the history and the languages of the Orient, can undertake to recover the evidence still lying scattered far across the hills and valleys of the Ancient Near East. What is required in the first place is such an organization as will permit the employment of a large group of efficient field men with practical archeological training, who can be associated with the philologists and historians of a university department of oriental languages. If sufficient funds are available the field staffs and the home department can cooperate in a far-reaching, two-fold process, first, of salvaging the vast body of evidence still surviving in the field, and second, of studying and interpreting the evidence as it is received from the field by the scientific staff at home. Thus the formerly more or less helpless university department of oriental languages becomes part of an effective organization, in which it serves as the interpretative organ. We thus link together the far-flung salvaging operations in the field and the interpretative group at home in one great cooperative organization.

The Oriental Institute

This organization of home and field staffs, which we have called the Oriental Institute, began its work in the autumn of 1919, and is therefore twelve years old. Its resources were at first very modest, consisting of a subscription of $10,000 a year for five years, contributed by Mr. John D. Rockefeller, Jr., in the spring of 1919. This personal subscription by Mr. Rockefeller, Jr., steadily increased, and at the same time the General Education Board and the International Education Board made large appropriations for the expansion of the new institute. It was, however, not until five years ago that the Oriental Institute was able to launch a comprehensive program of research, providing for a field expedition in each of the great ancient oriental civilizations of the Near East: These are now at work in Anatolia (Hittite civilization), Syria, Palestine, Assyria, Babylonia, Persia, Egypt and Northeast Africa, making a total of twelve expeditions. They form the most far-reaching archeological organization ever projected.[2]

[2] At this point congratulatory cablegrams received by the Institute from these expeditions were read by the

Thus for the first time a single organization is now able to control and to correlate the results of research and excavation throughout the leading early civilizations in a single composite reconstruction of the course of ancient human life before the rise of Europe. A small fraction of the evidence thus far recovered is installed in the museum halls which we are about to visit.

We shall pass through these halls, five in number, in the following order: Egypt, Assyria, Babylonia, Persia and Islam, Palestine and the Hittites.

WESTERN ASIA AND THE RISE OF BUSINESS AND LAW

These names at once suggest the diversity of peoples which produced the composite civilization of Western Asia. Indeed, the history of Western Asia is made up of one brilliant eruption after another, arising from the intermingling of invaders and invaded. There is no unbroken evolution of a single society stimulated by the ferment and friction of its own internal forces. The foreign invader periodically diverts the development into new channels, and produces sudden dislocations in the evolutionary process, like the fall of Nineveh before a combination of foreign foes, or the capture of Babylon by Cyrus and the Persians. It is a vast and intricately complicated mosaic which we are endeavoring to piece together in Western Asia.

It was a still greater complex of civilization resulting from the commingling of the life of Egypt and Western Asia which eventually reached Europe and furnished the cultural basis on which European civilization arose. It was in the Near East that man developed the whole material basis of life, as grain and cattle, wool and manufactured merchandise gradually built up the earliest commercial world in the Near East at a time when Europe was still primeval forest. In the thousand years between 3000 and 2000 B. C., the merchants of Babylonia created the idea of credit which still binds together the great people of the world or leaves them helpless and disorganized when its cementing power breaks down, as it now seems to have done. You can enter our Babylonian halls and see there masses of business documents some of them reaching back to nearly 3000 B. C. The commercial and social relations which produced them built up a body of business customs which became inviolable and gradually took shape in laws, which long before 2000 B. C. were put together in a highly developed form by the great Hammurabi, whose remarkable code you may see in replica in the Babylonian Hall. Thus the work of man's hands in agriculture, cattle-breeding, manufactures and building merged into more highly developed forms of human organization. Society gained classes and men of gifts gained leisure.

speaker, including a remarkable forty-eight line inscription of Xerxes, just discovered at Persepolis.

THE RISE OF ART, LITERATURE AND SCIENCE

This situation made possible the earliest flowering of art and literature as the human mind discerned entirely new and undiscovered ranges where it might wander. In an address so brief, I can not even suggest the character and achievements of the earliest national art in Egypt and Western Asia. That until recently little was known of it, even in this university, may be observed from the fact that in his opening lecture, inaugurating the Renaissance Society, one of our own colleagues summarized the art of the Orient as "the winged bulls of Assyria and the jackal-headed Anubises of Egypt." In spite of this terrifying epigram we have since annexed one of the said winged bulls, and you can this morning decide for yourselves whether you regard it as successful art.

In literature I can make only one reference. I could show you a papyrus containing a government report embedded in which is a single statement disclosing admiration of a beautiful scene along the Syrian Coast. It was written in the twelfth century B. C., and it is the earliest surviving expression in human speech of man's love of beauty in nature—the beginning of a long development which has culminated in the poetry of Shelley and Wordsworth.

Through the obscuring veil of superstition men looked out upon a mysterious world, which they longed to understand, as we do to-day. The demand to do so was at first a social summons, the need of human suffering, which called forth efforts at alleviation. The oldest known treatise on surgery, which was written in Egypt nearly 5,000 years ago, discloses to us the thoughts of the earliest man who reveals a scientific attitude of mind. This treatise is therefore the earliest document in the history of science.

Less than a thousand years later the Egyptians were already writing mathematical treatises of astonishing penetration. The area of the circle was computed by taking eight ninths of the diameter and squaring it. The value of π thus gained was 3.1605, which differs less than two one hundredths from the value of π current at the present day. This led to a formula for computing the area of the surface of a hemisphere, a method rediscovered by the Greeks 1,300 years later. A recently deciphered papyrus at Moscow has disclosed a surprising ancient Egyptian formula for the computation of the cubical contents of a truncated pyramid, that is a pyramid cut off part way up in a plane parallel with the base. This formula, which was unknown to the Greeks, was first stated in Europe by Leonardo of Pisa in A. D. 1220,

three thousand years after it had been discovered by the Egyptians.

The supreme achievement of science in the Orient was Babylonian astronomy. As far back as the twenty-third century B. C. the Babylonian astrologers observed an eclipse of the moon which has been calculated to have occurred in 2283 B. C. But at that remote date such observations were only occasional, and they were likewise very inaccurate and unsystematic. Gradually it became customary to make more frequent observations, until 747 B. C., in the reign of the Babylonian king Nabonassar, the series of observations became continuous and a record of them was carefully kept on file. This file furnished the first long series of astronomical observations ever made by man, and therefore the first great body of astronomical knowledge. It is an extraordinary fact that modern astronomers have not yet been able to accumulate a series of observations equally long. The Babylonian series continued for over 360 years, while the longest known series of modern observations, that at Greenwich, which began in 1750, has now been going on about 181 years, or about half the length of the Babylonian series.

The use to which the Babylonian astronomers put these scientific archives is an astonishing demonstration of the scientific attitude of mind. About 500 B. C. the Chaldean astronomer Naburimannu was able to calculate the annual movements of the sun and moon with an error of less than ten seconds for the entire year. A little over a century later the Chaldean astronomer Kidinnu, whom the Greeks called Kidenas, greatly surpassed this accuracy, reducing the error in a year's revolution to one second. Indeed, one of his measures of celestial motions even exceeds in accuracy the figures that have long been in practical use by modern astronomers. This was because he had before him 360 years of lunar observations, and no modern astronomer has any such body of records at his disposal. Eventually Kidinnu discovered the slow change in the obliquity of the earth's axis which we call the precession of the equinoxes, an achievement hitherto attributed to the Greeks.

The Greeks Inherit Babylonian Astronomy

It is now obvious that Thales made his famous prediction of a solar eclipse on the basis of Babylonian observations, and we now know also that when the Greek engineer Meton was trying to introduce a scientific calendar at Athens, he took the length of his year from the Babylonian Naburimannu. These two remarkable Babylonians, Naburimannu and Kidinnu, who first revealed to men a majestic system of the celestial world and thus became the founders of astronomical science, were an imperishable scientific and intellectual bond between the early East and civilized Europe.

Undisturbed Evolution of Civilization in the Nile Valley

Such glimpses of early man's intellectual conquests, as revealed in surgery, mathematics and astronomy, disclose to us the fact that man was advancing for thousands of years at many points along a wide and imposing front. In Western Asia, as we have seen, that front was broken up by invasions and shifting movements of early populations which produced constant complications and make it increasingly difficult to follow the human advance. In the Nile valley, however, safe frontiers, while by no means impenetrable, made ancient Egypt a kind of social laboratory where we may watch almost uninterruptedly the successive stages of human evolution.

As you enter the Egyptian Hall in this building, you will find at the right a group of stone implements, all of which were found embedded in geological formations in the Nile valley. They therefore belong to known geological periods. They stretch from the earliest known stone artifacts almost down to the Late Stone Age or the Neolithic, and they form the first such geologically dated series of stone tools, covering a period of many thousands of years, ever discovered. During the period which produced them the Nile cut down its channel through a hundred vertical feet of solid rock. It was not until long after this period of probably several hundred thousand years, which we can follow only in gradually improving stone tools, that man gained cattle-breeding and agriculture. Thereupon with the development of a settled manner of life, the evolution gradually became a social process.

Man's Earliest Triumph over Material Forces

From that time to this, man's life has been periodically involved in a struggle between the tremendous impression received from the natural world and the humaner impulses that are engendered by social experience and social struggle. In the Nile valley we can watch the first of these periodic struggles, and with sympathetic understanding we can follow the first great age of spiritual disillusionment. We watch the triumphant conquest of material forces, at first slow and then moving with astounding rapidity as these ancient Nile dwellers came completely under the spell of their material triumphs.

In the Cairo Museum you may stand in the presence of the massive granite sarcophagus which once contained the body of Khufu-onekh, the architect who built the Great Pyramid of Gizeh. His name means "Khufu lives," or in its Greek form "Cheops lives"—certainly a significant name for the builder of a pyramid which is still the greatest of all masonry buildings. Who does not know the "Pyramid of Cheops"? Let us in imagination follow this early architect to the desert plateau behind the village of

Gizeh. It was then bare desert surface, dotted only with the ruins of a few small tombs of remote ancestors. The oldest stone masonry construction at that time had been erected by Khufu-onekh's great grandfather. Only three generations of architects in stone had preceded him. We can easily imagine Khufu-onekh's grandfather saying to him, "My father put up the first stone building ever erected in Egypt." There probably were not many stone masons, nor many men who understood the technique of building in stone as Khufu-onekh took his first walk on the bare Gizeh plateau, and staked out the ground plan of the Great Pyramid. Conceive, then, the dauntless courage of the man who told his surveyors to lay out the square base 755 feet on each side! When that was done Khufu-onekh was looking out over a square of naked desert containing thirteen acres. He must have looked across the Nile at the quarries some thirty miles distant, and perhaps he made a quick calculation: "It will take nearly two and a half million blocks each weighing 2½ tons to cover this square of thirteen acres with a mountain of masonry 481 feet high; but I will do it!" This is the first time in the history of man that we are thus able to put our yardstick athwart a human mind and take the measure of its courage in terms of cubic feet of masonry and colossal achievement in engineering never again to be equalled. The Great Pyramid of Gizeh is thus a document in the history of the human mind. It clearly discloses man's sense of sovereign power in his triumph over material forces. For himself and for his sovereign the Pharaoh's engineer was achieving the conquest of immortality by sheer command of material forces—an immortality that consisted in survival of the king's body sheathed in an imperishable husk of masonry.

The Egyptians, The Discoverers of Character; Man Discovers the Inner Values, The Dawn of Conscience

Here then was a man still under the tremendous impression of the physical world, the world about him, but not yet aware of the world within him. When five or six hundred years of desert storms had buffeted the Great Pyramid of Gizeh and its companions on the Sahara plateau, a thoughtful Egyptian looked up at the pyramids and sang of the colossal futility of merely physical survival of the body. The human soul had entered the first great age of disillusionment. We begin to hear remote voices that proclaim the utter futility of material conquest. As if, through the dust and tumult of an engrossing conflict, man for the first time caught something of the veiled splendor of the moral vision. He began to hear the voices within himself and out of the conflict of social forces, he gradually became conscious of the inner values. Thus the Egyptians were the discoverers of character. Not projected from the outside into a world of unworthy men by some mystic process which our old school theologians called inspiration or revelation, but springing out of man's own life, illumining the darkness of social disillusionment and inner conflict, a glorious vindication of the worth of man, the dawn of the age of conscience and character broke upon the world, a historically datable event, about 2000 B. C. It was the outgrowth of man's own social experience. It sprang out of his own soul, and no outworn theological doctrine of inspiration, no conception of a spotlight of Divine Providence shining exclusively on Palestine, shall despoil man of this crowning glory of his life on earth, the discovery of character.

Earliest Materialism Defeated by Man's Discovery of Character

In our museum halls we can actually look upon the evidence of the transition from the age of materialism to the age of conscience and character. You will find in our Egyptian Hall a group of twenty-seven statuettes with which a cemetery official who served under the shadow of the Great Pyramid nearly 5,000 years ago equipped his tomb. These painted limestone figures represent his household, his children and his servants engaged in grinding flour, mixing and baking bread, brewing beer, slaughtering cattle and poultry and cooking them; making pottery, casting metal, carrying their master's message, or with three harps and a drum, making music while he ate. Thus in the Pyramid Age, the first half of the third millennimum before Christ, the Egyptian conceived his needs in the hereafter as being purely physical gratification. Alongside the case containing these statuettes is a cedar coffin with raised lid, bearing on the inside pictures of the food and drink which carry on the old ideas of the needs of man beyond the grave. But on the inside of the lid is a long writing containing the earliest intimations that happiness in the next world will be dependent on worthy moral conduct in this world. There was a lapse of perhaps five hundred years between the cemetery official who wanted merely food and drink in the next world and the dead man who had his coffin so painted that as he lay in it and looked up at the lid, he would have staring him in the face the new fact that he might expect felicity beyond only as he had lived a worthy life here. To-day you may walk between these two cases in the museum and standing there contemplate the original evidences, the actual tokens of this supreme transition in the life of man in its rise from savagery to civilization: the first defeat of materialism—the earliest dawn of conscience, the discovery of character—the emergence of social idealism. This tremendous transition went

on as a process entirely independent of religion. It transformed religion, however, for it brought forth for the first time a god of brotherly kindness. While men lived as tillers of the soil they discerned only a god of fertility; when the state arose and men caught their first vision of a supreme personality they called their god a king. Then when society developed and the friction and ferment of social struggle had taught men kindness and forbearance, they saw a god of character and of brotherly kindness whom they called "the good shepherd," two thousand years before the Good Shepherd of Christian faith. It was thus from the richly colored palette of human life itself that man drew the colors with which he glorified his picture of his god. That splendid vision arose out of the earliest spiritual revolution. It was caught up and exalted by the Hebrew prophets and through them has brought into our lives a light which still shines from the East.

I have given you some rapid glimpses at a few of the new materials by which we have begun to bridge the gap between the emergence of physical man and the rise of Europe. It is by these researches that we are slowly creating what I have called the New Past. They form a task which must go on for centuries, and as it proceeds now and later, its results will disclose to us and to our posterity an ever clearer vision of the highest process in the universe, as far as we know it today—the unfolding life of man. It is to these purposes that we dedicate this building.

THE NATIONAL ACADEMY OF SCIENCES

AWARD OF GOLD MEDALS TO DR. ANNIE J. CANNON AND PROFESSOR HENRY B. BIGELOW

AT this year's autumn meeting of the National Academy of Sciences, held at Yale University from November 16 to 18, two gold medals were awarded. Introductory remarks by President William Wallace Campbell were as follows:

The National Academy of Sciences is fortunate in possessing financial foundations for the awarding of nine gold medals and one prize, at appropriate intervals of time. Two of the medals are to be presented to their recipients this evening.

The Henry Draper Medal, bearing the honored name of a deceased member of the academy, was established by the widow, Mrs. Henry Draper, in 1883. The committee charged with the duty of administering the Draper Foundation recently recommended to the academy, and the academy decreed, that the Henry Draper Medal be awarded to Dr. Annie J. Cannon, member of the staff of the Harvard College Observatory. The reasons for the selection of Miss Cannon as this year's recipient are as recorded in the committee's report to the academy. In the absence of Professor Henry Norris Russell, chairman of the committee, the report will be presented by his fellow member, Director Harlow Shapley.

The report was as follows:

The Henry Draper Medal is awarded by the academy "for notable investigations in astronomical physics." This provision has wisely been broadly interpreted. Among the twenty investigators to whom it has been given during the last forty-five years, the majority have naturally achieved distinction through their work in the observatory—for example, Pickering and Campbell. Others, like Rowland, Zeeman and the lamented Michelson, made their contributions in the laboratory, and a few, of whom Eddington is the chief, have worked in the theoretical field. Yet one characteristic is common to almost all. There are not more than three of the twenty who have not, at one time or another in their scientific careers, been actively engaged with spectroscopic matters.

To-day the academy, while departing, with excellent reason, from one precedent, confirms another. For the first time the Draper Medal—and indeed any medal of the academy—is awarded to a woman; and the notable investigations in astronomical physics which abundantly justify the decision have been *par excellence* in the field of spectroscopy.

When Pickering—the second Draper Medallist—was appointed director of the Harvard College Observatory fifty years ago, he aroused the criticism of the conservatives of that day by devoting his remarkable energy and enthusiasm, and the resources of the observatory, to investigations in the physical side of astronomy.

Far from the least among these was the systematic observation and classification of stellar spectra. With a telescope affording a wide field of good definition, and having a prism placed before its objective, the spectra of hundreds of stars can be photographed simultaneously on one plate, so that there was no difficulty in securing observational material. But to record the results of investigation adequately for thousands of stars, and yet in a form not too bulky for publication, was no small problem. If stellar spectra presented the vast variety which is exhibited by living organisms the situation would be almost hopeless; but fortunately they are much less diverse. Hundreds of stars show spectra which are practically indistinguishable from one another under any ordinary dispersion, so that a relatively small number of symbols suffices for the description of the vast majority of spectra.