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683RD ORDINARY GENERAL MEETING,

HELD IN COMMITTEE ROOM B, THE CENTRAL HALL, WESTMINSTER, S.W.1, ON MONDAY, JANUARY 25TH, 1926, AT 4.30 P.M.

LIEUT.-COLONEL F. A. MOLONY, O.B.E., IN THE CHAIR.

The Minutes of the previous Meeting were read, confirmed, and signed, and the following elections were announced:—As Associates: The Rev. Alonzo Baker; James Stanes, Esq.; and W. H. Seymour, Esq., M.D.

The CHAIRMAN announced that as the author of the paper, Lieut.-Com. Victor L. Trumper, R.N.R., was absent in Egypt, he would read the paper for him. Lieut.-Colonel Molony then read the paper entitled "Modern Science in the Book of Job."

MODERN SCIENCE IN THE BOOK OF JOB.

By LIEUT.-COM. VICTOR L. TRUMPER, R.N.R. (RETIRED), M.R.A.S.

THERE is probably no book in the Bible that has been more deeply studied by some, and more neglected by others, than that magnificent philosophical poem which is called the Book of Job.

To the poet it is a mine of the sublimest expression, thought, and imagery that the human soul can conceive; to the philosopher it probes depths, the end of which are beyond man's mental grasp; and for the Christian it spans time, from the beginning of matter to the beginning of eternity.

However, to the seeker after material learning who will take the trouble to delve into its pages, it reveals an unexpected amount of knowledge—call it science if you will—which is astonishing, considering the period at which the book was written.

Before proceeding further, I will try and define—or perhaps it would be better to say, limit—what I mean by modern science.

What I do *not* mean is the latest speculation of some dabbler in knowledge, which is often given to the world by the aforesaid dabbler through the press as the latest "conclusion" of modern science (which, by the way, often does not hold until the next "conclusion" comes along). In this connection, perhaps, you will forgive a little story.

It is said that a great preacher once received a visit from one of his congregation on Monday evening, who asked him: "How do you reconcile what you said in your sermon on Sunday evening with the latest conclusions of modern science?" "Well," replied the great preacher, "I am sorry I cannot tell you. I do not know what the latest conclusions are, the latest edition of the evening paper is not in yet!"

What I do mean are those contributions to knowledge which have been hammered out by patient experimenters and investigators, who, working on scientific lines, have made theories subservient to facts, and not facts to theories.

I used the expression just now, "the period at which the book was written," and to get the full force of my contention we must consider what is the date of the author, for, if it be modern, the wonder of its unique knowledge is somewhat dimmed. The *Encyclopædia Britannica* gives the probable date as the 4th or 5th century B.C., while the *Temple Dictionary of the Bible* gives the period of Solomon or Hezekiah as probabilities. The date in the margin of our Bibles is given as 1500 B.C., and when one goes through the arguments for a late date as to authorship, one can only say that the traditional view of Moses as the author is just as reasonable, if not more so. The article in the *Encyclopædia Britannica* has a damaging admission. Speaking of the date of Job it says: "Any conclusion can be reached only by an induction founded on matters which do not afford perfect certainty, such as the comparative development of certain moral ideas in different ages. . . ." It seems as if the dead horse of the reconstruction of Biblical chronology, according to what the modern critic thinks the ancient Hebrew ought to have thought, still gets a sound flogging now and then, to try and galvanize it into life.

There are, however, two internal evidences in the book, both of which point to about 1500 B.C. as the time of the incidents recorded, and the possibility, if not probability, of its Mosaic

authorship. The first evidence is the names, which, according to other parts of Scripture, were all possible contemporaries. In Gen. xlvi, 15, we find that a man named Job was a son of Issachar, and consequently a grandson of Jacob. Eliphaz and Teman are mentioned in Gen. xxxvi, 10, 11, as the son and grandson, respectively, of Esau. Shuah was a son of Abraham by Keturah his concubine, and Bildad the second friend is called the Shuhite. A man named Zophah (which may be the same as Zophar) is named in 1 Chron. vii, 35, as being a descendant of Asher. Elihu the younger man is called the Buzite and of the kindred of Ram; in Gen. xxii, 21, we find that Buz was the nephew of Abraham, and in Ruth iv, 19, we find that Ram was a great grandson of Judah. So we see that all these men were possible contemporaries of Moses while he was spending his forty years of exile in the land of Midian.

The other piece of evidence is more or less indirect, but is as strong in support of the traditional date of Job as any that the critics can adduce for a much later day. I refer to the passage in Job iii, 13, 14: ". . . . then had I been at rest with kings and counsellors of the earth, which built desolate places for themselves." The expression "build a desolate place" sounds rather obscure, and the Revisers of 1881 seem to have felt the difficulty, for they translated it, "built up waste places," which certainly is more intelligible, though that hardly fits in with the trend of thought in the whole passage. In the margin of the Revised Version the alternative rendering given for "waste places" is "solitary piles," and I think this gives us the key to the difficulty. Some authorities favour the rendering "pyramids," while the word used in the Arabic Bible, which is usually reckoned by scholars as a good commentary on the Hebrew, is *ahram*, a word whose actual meaning is "ruin," but which is now used to denote the Great Pyramid, the underlying thought being that it is *the ruin* par excellence, in the same way that a Londoner would speak of "The Tower," and no one would think that he meant anything other than the ancient fortress on the Thames. Now, if we read "pyramids" for "desolate places," the whole passage glows with meaning, for Job is longing for rest in the grave or anywhere else, like kings and counsellors of the earth who built the mighty Pyramids as everlasting resting-places, and expected their bodies to remain there undisturbed for eternity!

Now for the dating. If the Book of Job were written at the

close of the age of the Pyramid-builders, when the Pyramids in all their glory and perfection must have been the talk of the whole earth, then this allusion is pregnant with meaning. However, a few hundred years later, the Pyramids had been rifled, they were by no means secure resting-places, and the kings and counsellors of the earth had devised other means (such as the rock-hewn chamber with concealed entrance and booby-traps, as at Thebes) to secure their eternal rest. Consequently, the clause under consideration would have been meaningless, if written at the date that many critics assign for the book.

Some of the passages which I shall quote are direct statements of fact, others are merely allusions which imply knowledge of scientific data, but to whatever category they belong, they carry the impression that they were commonplace to the author, in the same way that two educated men, in course of conversation with each other, might refer to facts, which would be considered as marvellous statements, not to be mentioned incidentally, by one who did not know them at all, or to whom science was just opening up her vistas of knowledge. To illustrate what I mean—whereas in one of his early poems, Tennyson referred to the then newly discovered gas (for lighting purposes) as something marvellous, yet, in a few years, gas-light became such a commonplace of life, that in a later edition of his works he deleted this reference to gas as being unworthy of the range of a poet's thought. So, in all the wide range of scientific fact touched on in the Book of Job, we find nothing that would indicate any newly acquired knowledge, but all is the spontaneous welling-up of profound Wisdom.

In Job v, 23, we get the remark: "Thou shalt be in league with the stones of the field." These are the words of the candid friend, Eliphaz, who is telling Job that, if he were only righteous according to his own particular pattern of 'doxy, all would be well with him. The statement is rather extraordinary, for stones in the field are apt to be more of a nuisance than a help to the cultivator. However, the modern science of chemical manures has made us realize the profound significance of this remark by Eliphaz. The stones of the field, in Palestine and adjacent lands, are mostly limestone, and lime is a necessary constituent of a fertile soil; so, at every former and latter rain, a certain proportion of lime was washed out of the stones and transferred to the surrounding soil, thereby ensuring great and continued fertility.

From chemical manures, we go to the forces which have altered the face of the earth. Job ix, 5, 6: "Which removeth the mountains and they know not: which overturneth them in His anger. Which shaketh the earth out of her place, and the pillars thereof tremble." The last three sentences obviously refer to earthquake and those cosmic forces which in all ages have altered the contour of the land surfaces of the earth. The first sentence, however, has a subtler meaning, for I think it refers to those other forces at work which are unobtrusive, but in the end none the less potent. Frost and cold have a great deal to do with the gradual degradation on mountain ranges; it is not generally known that the agency of frost is utilized in the splitting and making of the paving stones that are used on our pathways. Intense heat will also do its part in the disintegration of a mountain. But all these forces, though as potent as the earthquake, are so gradual, that in the poetic thought the mountains themselves do not know that they are being removed.

From cosmic and natural forces we turn to Physiology, and find a terse allusion to the absolutely complete protection of the vital parts of the body in Job x, 11: "Thou hast clothed me with skin and flesh, and hast fenced me with bones and sinews." Few other than medical men realize the perfection of this description. Every one knows how our flesh covers and keeps warm all the vital parts and communications of artery, vein, and nerve; but how many think of the wonder of the skin, which consists of millions of non-return valves, whose efficiency would make the fortune of any engineer who could imitate them mechanically? These valves allow the sweat and waste products of the body to pass freely outwards, but form an impenetrable barrier to anything attempting to get the other way. The surgeon performing an operation knows that he is immune from danger of infection, as long as the skin of his hands is perfect. We all know how we are fenced with bones, the brain protected by the skull, and the lungs and heart by the ribs; but how many realize that in a physically perfect man the sinews can play an equally important and efficient part? I knew a man, many years ago, who went in for physical culture, who would allow a person with both his hands to try and throttle him—which no one ever succeeded in doing; he had trained the sinews of his neck, so that they were an adequate protection to the gullet, arteries, and veins.

Some may remember, near the end of the last century, the great prize-fight between Fitzsimmons and Corbett for the world's

championship. The former was training in San Francisco while I was there, and he was known as "the man with the marble stomach." Somebody whom I met, a short, thick-set, powerful man, used to go to his training rooms, and he told me that one day Fitzsimmons offered to let him hit him in the stomach with his bare fist; the man accepted the offer, with the proviso that Fitzsimmons would not hit back! Then he punched him "in the wind," until he strained his wrist, and Fitzsimmons just stood with his arms hanging by his side, smiling; the pit of his stomach—usually considered the most vulnerable and unprotected part of the whole body—was adequately "fenced with sinews."

One of the most beautiful passages in the whole book is that in chap. xii, 7–9: "But ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee: or speak to the earth, and it shall teach thee; and the fishes of the sea shall declare unto thee. Who knoweth not in all these that the hand of the Lord hath wrought this?" Here we have the whole creation, including the earth itself, called to witness to their Maker.

I have touched in other places on the marvellous geological formation of the earth, which the science of Geology is but dimly scratching; but who can think of the beasts of the earth and not be lost in wonder at their comprehensive perfection?

Some years ago a well-known journal offered a substantial money prize for a drawing with a brief description of a new animal, the only regulations were, that it was not to resemble any known living creature, and that it was to be anatomically possible. There were many thousand entries, but the judges confessed themselves disappointed, for out of all the attempts which conformed to the second rule, viz., that it must be physiologically practicable, there was not one which was radically different from some already known animal. So we see that it may be considered impossible for man to conceive a real addition to the animal creation.

The fowls of the air still hold the Divine secret of flight, in spite of all the marvellous advances in the knowledge of aeronautics, and our airmen would be glad to be able to do what the sparrow does, to say nothing of sea-birds and hawks. We do not yet know really how birds fly; there is still something that eludes our grasp. And the fishes—there is, if possible,

more Divine wisdom and contrivance exhibited in them, and we know less about them. How men have striven to know what the humble herring does all its life! It comes from somewhere and goes somewhere, but its life-history is only known to its Maker. And what shall we say of the whale—that paradox of paradoxes in the animal creation, with, amongst other things, its, to us, unknown solution of the problem of resistance to pressure?

In chap. xiv, 18, 19, we have: "And surely the mountain falling cometh to nought, and the rock is removed out of his place. The waters wear the stones: thou washest away the things which grow out of the dust of the earth." The poet seems to recur again and again to the wonderful forces which change the surface of the earth, and these verses are peculiarly brought home to one living in Egypt. The whole of the cultivated land in the Delta and far up the Nile Valley was once an arm of the sea, but it is now dry land and supports a population of about thirteen millions. This alluvial soil was once the dust of the earth in the mountains of Abyssinia, washed away by the agency of the River Nile.

From Geology we now turn to Astronomy, and there find the same remarkable knowledge. In chap. xxvi, 7: "He stretcheth out the north over the empty space, and hangeth the earth upon nothing." It must have been noticed from earliest times that there was a singular paucity of stars between the Great Bear and the celestial Pole, which has been confirmed in modern times by telescopic observation. But what of the succeeding sentence? What were the ideas of men regarding the foundations of the earth, about the time the Book of Job was written? I quote from the *Encyclopædia Britannica*: "To primitive man the earth was a flat disk. . . . In many cosmogonies this disk was encircled by waters . . . the disk stood as an island rising up through the waters from the floor of the universe . . . much speculation was associated about that which supported the earth. Tunnels in the foundation to permit the passage of the sun and stars were suggested; the Greeks considered twelve columns to support the heaven, and in their mythology the god Atlas appears condemned to support the columns, while the Egyptians (? Hindoos, V.L.T.) had the earth supported by four elephants, which themselves stood on a tortoise swimming on a sea. Earthquakes were due to a movement of these foundations. In Japan this was

considered to be due to the motion of a great spider, an animal subsequently replaced by a cat-fish ; in Mongolia it is a hog ; in India a mole ; in some parts of South America a whale ; and among some North American Indians a giant tortoise." Such was the state of knowledge and imagination of the most cultured as well as the savage nations of antiquity. The author of the Book of Job will have none of it. In these five sublime words, "hangeth the earth upon nothing," he cuts across all the puerilities and often bestialities of ancient beliefs, and reaches down to the present day, when even the idea of the invisible pull of gravitation is being called in question by the theory of Relativity. Whence did he get his knowledge ?

Chapter xxviii of this remarkable book is wonderful, not only for majestic and forceful imagery and striking allusions to mining, with its difficulties and dangers, but amongst other things it touches on three scientific facts. The first that I shall mention is in the realm of Ornithology. When I was a boy, we were taught that the carrion-eating birds found their food by a keen sense of smell, and I believe in the works of one of our well-known poets the line occurs, "The vulture scents the carrion from afar." This seemed quite a rational explanation, as dead carcases are apt to advertise themselves fairly unmistakably within a wide range. However, later research and experiment have proved that (perhaps happily for them) the carrion birds have a poor, or possibly non-existent, sense of smell. An experiment was made in India to test this by a well-known naturalist. A carcase, pretty far gone, was placed in a field at night, and covered with an opaque cloth. Small pieces of the flesh were placed on top. At dawn kites and other carrion birds came and greedily devoured the small pieces, and, although actually standing on it, were entirely oblivious of the carcase underneath, though its presence was very obvious to the noses of watchers a few hundred yards away !

Another recent announcement by a naturalist is, that owls and other birds of prey have a contrivance by which the lens of the eye is altered in shape, so that when the bird is making a swoop after its victim it can keep the object accurately focussed all the time on the retina. In Job xxviii, 7, we have : "There is a path . . . which the vulture's eye hath not seen," and in chap. xxxix, 27, 28 : "The eagle . . . makes her nest on high. . . . From thence she seeketh the prey, and her eyes behold afar off." In both these passages, the thought of the keen sight

of the vulture and eagle when seeking their prey is alluded to, a fact to which recent ornithology bears full testimony.

This, however, is something that might have been guessed by a keen observer; but what are we to say to a remarkable fact in physics? Not many generations ago, air was considered to have no weight; it was the zero of matter. The idea still lingers in our expression "light as air." Galileo suspected that air had weight, but it was reserved for Torricelli, who invented the barometer in the 17th century A.D., to demonstrate beyond shadow of doubt that the air had a weight which was definite and measurable. Now it is such a commonplace of knowledge that we are apt to forget how recent it is. The fact enters into our calculations in meteorology, submarining, deep-sea sounding, torpedo running, diving, aeroplaning, airships, bridge-building, and hosts of other things. Yet two or three millenniums previously the author of this book declared, in chap. xxviii, 23, 25: "God understandeth the way thereof . . . to make the weight for the winds."

In verse 26 of the same chapter there is a terse allusion to definite meteorological and electrical facts, "When he made a decree for the rain, and a way for the lightning of the thunder," for recent discovery has proved the intimate connection between the particles of water suspended in the atmosphere, which form the nucleus for the positive and negative discharges of electricity, and results in the precipitation of the moisture in the form of rain.

The whole of chaps. xxxvi and xxxvii constitute a panegyric of the earth and its wonders, in relation to the creative and governing powers of the Deity, and many a sentence indicates an accurate and observant knowledge of natural phenomena. Two verses must suffice to show what I mean, chap. xxxvii, 15, 16: "Dost thou know when God disposed them, and caused the light of His cloud to shine? Dost thou know the balancings of the clouds, the wondrous works of Him which is perfect in knowledge?" "The balancings of the clouds"; what a picture is therein conjured up of the gigantic cumulus rising or falling, governed by a minute difference of temperature or an infinitesimal up-current of air, caused by an inequality on the surface of the earth—it may be a mile below—but all governed by Him "who is perfect in knowledge!"

It is quite possible that the ancients empirically knew a good deal about sound, but it is only of recent years that its origin and

means of propagation has been satisfactorily and scientifically explained. In chap. xxxviii, 7, we have as a culmination of creation : " When the morning stars sang together, and all the sons of God shouted for joy." This is generally looked upon as a poetic description of the rejoicing of the heavenly hosts. It is that—and more. The lowest sound perceptible to the human ear has about 30 vibrations to the second, and the highest note has about 40,000 vibrations to the second. Higher than that there is silence, until, after an immense gap, vibrations are again perceptible to the human faculties, but this time as light. It is, however, essentially vibrations or waves, and whether we perceive them as sound or light is only a matter of degree. Now let us think of the Deity and the " sons of God " with faculties that can take in as sound what we call light, and then think of the stellar heavens and the unplumbed depths of the Milky Way, the wonderful binary stars whirling round each other at incredible speeds, the revolving spiral nebulæ, the star clusters, the comets with luminous tails millions of miles long, appearing for a moment and then going off no one knows where, yet keeping time to the hour a hundred years later—all this, and yet the nearest fixed star is four and a-half light-years away ! As we think of all this as sound, the limitless orchestra of Heaven, the " song of the morning stars " will have a new meaning for us.

Opinion is divided as to whether the ancients knew anything about refraction caused by the atmosphere, though the apparent bending of a stick when placed partly in water must have been observed by primitive man, as also the seeming displacement of objects in water when such primitive man was engaged in shooting or spearing fish with arrows or javelins. It is thought by some that the builders of the Great Pyramid wished to place it in exactly lat. 30° north, but that, being ignorant of refraction, and using northerly stars to get their position, the site is about one minute twenty seconds out (1′ 20″), just the error caused by neglect to reckon with the displacement produced by the refraction of the atmosphere. However, it is difficult to think that the author of Job was unacquainted with refraction, when he could pen such a commentary as is found in chap. xxxviii, 12, 13 : " Hast Thou commanded the morning since Thy days, and caused the dayspring to know his place ; *that it might take hold of the ends of the earth ?* " These words, although couched in poetic language and imagery, accurately state a truth which would be self-evident to every eye, could we but take a journey to the moon for this

purpose ; for then we should see the rays of light from the sun striking the earth and being bent round the outer edge, so that parts of the earth out of direct sunlight are still illumined by the atmospherically refracted rays, and the " dayspring " literally grasps or " takes hold of the ends of the earth." I challenge anyone to find a more beautiful, or a description more scientifically accurate of the natural phenomenon of refraction, by which we have dawn before sunrise and twilight after sunset.

In verse 36 of the same marvellous chapter we have another reference to the unsolved problems of Physiology, for, although no special fact is stated, the words : " Who hath put wisdom in the inward parts ? or who hath given understanding to the heart ? " betoken an appreciation of things of which no physiologist yet would undertake to give a full and satisfactory explanation. Why does the heart beat faster in times of work, stress, or emotion, so as to send increased supplies of blood to brain or muscle ? Or what wisdom do the stomach and intestines have when, amongst all the varied ingredients that they receive, they sort out and send to its proper destination what is necessary for blood, bone, muscle, nerve, or brain, and pass on that which is useless ? " Who hath put wisdom in the inward parts ? "

One of the outstanding advances of science in the last century is the knowledge of the fact that sound, electricity and light are all conveyed from their source of origin in undulations or waves. We are now quite familiar with the phrase, " such and such a metre wave-length," as applied to the various wireless broadcasting stations. But there is a property inherent in wave-motion, which is, that it must progress ; a stationary wave is an unthinkable proposition. We can test this for ourselves in a pond or a basin of water. A wave can be created which travels onward to the edge, and there it either ceases to exist as a wave, or is reflected back and continues in its new direction. The same holds good with regard to light. It is conveyed to our senses by waves in a substance which, for want of a better name, is called ether ; and such waves travel at the incredible speed of about 186,000 miles per second. Supposing we were able to stop these waves, what we should immediately get would be darkness ; because, as I said before, a stationary wave is an impossible condition. A laboratory experiment can be made with two beams of light intersecting each other, which at the point of meeting cause a patch of darkness, because the two sets of waves interfere with each other, and practically eliminate each other.

Now progression implies a pathway or direction, and quiescence implies a place; therefore, if waves bearing light get to a place and are stopped there, they cease to bring light, and darkness results. I hope I have made my meaning plain to the audience. This, as I said before, is one of the triumphs of the nineteenth-century science; but is it not accurately foreshadowed in Job xxxviii, 19, where we have, "Where is the way where light dwelleth? and as for darkness where is the place thereof?"? You will observe that the writer speaks of a "way" for the light, and a "place" for the darkness, terms which, though in poetic language and thought, are in perfect accord with modern knowledge.

It has been my aim to bring to notice some, but by no means all, of the wonderful scientific statements, allusions, and implications contained in a truly wonderful book. My contention is, that whatever date we admit for the writing of Job, whether it be 500 or 1500 B.C., yet the state of human learning and science was such that no one could have had the knowledge to write, unaided, such profound truths as we find scattered throughout the book. I submit that the only rational explanation of these wonders is to assume that the writer was divinely inspired by Him who knows the end from the beginning, who is mighty in strength and wisdom, and "who teacheth us more than the beasts of the earth, and maketh us wiser than the fowls of heaven" (Job xxxv, 11).

Discussion.

The Chairman (Lieut.-Colonel F. A. Molony) said: I need hardly say that, as an Army man, it gives me sincere pleasure to preside here and to read a lecture written by a Naval officer. With the gist of it I heartily agree.

Commander Trumper gives two arguments for believing that Job was written about 1500 B.C. (the date of Moses). Critics allow that "numerous and consistent marks of extreme antiquity pervade the book," but they ascribe these to "consummate art in the author"; and urge that the chief positive argument for a late date of the book is its religious standpoint. Job believes in the resurrection of the righteous, whereas Moses says very little about it. This, however, does not prove the late date of Job, because the Egyptian Book of the Dead, which was certainly in existence in

Moses' day, plainly teaches the resurrection and just judgment of the righteous.

Professor A. S. Peake writes: "But the phenomena of the book hardly permit us to place it earlier than the time of Jeremiah. The *decisive* argument in favour of this view is the stage of religious reflection represented by it. It was not till the age of Jeremiah, when the state was breaking up under the assault of Babylon, that the old belief in the association of prosperity and righteousness *began to give way* before the facts which disproved it."

Now, most of us have noticed that Almighty God does not always prosper the worldly affairs of individuals, though they be righteous. We clearly understand that this is so, in order that an answer may be found to Satan's taunt: "*Doth Job fear God for nought?*" So the fact is not inscrutable, although that term is often applied to it.

Here, then, is a fact which many of us have noticed, and which must have been a fact before Moses' day, for it was very strikingly illustrated by the ancient story of Joseph. Yet Professor Peake asks us to believe that it *could not* have struck any individual author before Jeremiah, because he says that only about that Prophet's day did the contrary belief begin to give way. Could any argument be weaker? Is this a fair specimen of the reasons for which we are asked to assign a late date to the Biblical books? Surely this author can hardly be surprised if we regard him as prejudiced!

As we are now dealing with what the advocates of a late date for the book of Job call their *decisive argument*, the point is important, and I may perhaps be allowed to illustrate it. There is the well-known fact that high-water occurs at a different hour every day for a fortnight. But there is also the less-known fact that high-water of *highest spring-tides* occurs at about the *same hour* for centuries —that is at any one place. Now, suppose that a number of fifteenth-century writers mentioned the well-known fact about the ordinary tides, that would not prove that no fifteenth-century writer could have observed the less-known fact about spring-tides.

Just so, we have the well-known fact that the worldly affairs of the righteous generally prosper—a fact often alluded to in the earlier Biblical books. But that is no proof that some gifted author did not notice the less obvious fact that the worldly affairs of the righteous do not *always* prosper, especially as the latter fact was

strikingly illustrated by the story of Joseph, which *is* a case in point, because his afflictions were very severe, and lasted longer than the afflictions of Job.

A document has been found which contains the passages, " When night comes, he allows me no breathing-space," and " Upon my bed I rolled like an ox," and other passages which are very like parts of the Book of Job. This document is called the Babylonian Job, and dates from about 2000 B.C. Of course, it does not prove the early date of Job, but *its evidence* tends that way.

To the cases of scientific accuracy cited by Commander Trumper, I would add the following :—Job xxxvii, 9, " Out of the south cometh the whirlwind." We know now that all cyclones are great whirlwinds, and that, in our hemisphere, they almost always progress from south to north.

One cannot but be struck by the wonderful way in which the author of Job was preserved from making mistakes like those who have supposed that the earth rested on some gigantic animal. The cumulative force of the argument presented by Commander Trumper is very great.

The Rev. J. J. B. COLES took it for granted that all present had a great deal to say about the Book of Job. In the case, however, of the excellent paper before us, it is right to bear in mind that it is the allusions to scientific matters in this very wonderful book that should influence any comments we may make.

Astronomy. The reference to the twelve signs of the zodiac in chap. xxxviii, 32, was very remarkable. The wisdom locked up in these, the oldest, symbols of the human race was scientific and esoteric, as well as exoteric. Why had one of these signs been tampered with when early corruptions of the Truth of God in Egypt and Assyria took place ? Why had Libra the Balance been substituted for the Atonement sign of Ara the Altar ?

Again, the Preface, giving the dramatis personæ of this, the " porch " to the Holy Scriptures, was scientifically remarkable. What deep knowledge of the Spirit World, which Job and his friends had not yet learnt !

Up-to-date science can give no information as to Origins as this author does.

Mr. SIDNEY COLLETT said he had only three remarks to make, all of which were in keeping with the admirable lecture to which they had just listened.

First, the empty space. In Job xxvi, 7, we read: "He stretcheth out the north over the empty space," referred to on p. 69. It was an interesting fact that, only a few years ago, Professor Barnard, of the Yorks Observatory, discovered that precisely in the northern heavens there was a vast expanse without a solitary star in it. In exact accord with the statement of this ancient Book of Job.

Secondly, the sound of light. In Job xxxviii, 7, we read: "The morning stars sang together," referred to on p. 72. We have the same thing spoken of in Ps. lxv, 8, the correct rendering of which is, "Thou makest the *radiations* of the morning and evening to *sing*." Also in Ps. xix, 2: "Day unto day (when there *is light*) uttereth speech: night unto night (when there is *no light*) showeth knowledge." Now, although these statements have stood in the Bible all these centuries, it has only recently been discovered that light actually has *sound!* Indeed, at an exhibition, recently held at Surbiton, this fact was demonstrated to such a remarkable extent that a person, stone blind, is now enabled, by the aid of an instrument which catches the sound of light, to read, after a little practice, an *ordinary printed page* at the rate of sixty words a minute!

Thirdly, in Job xxviii, 26, we read: "He made a decree for the rain, and a way for the lightning of the thunder," referred to on p. 71. There is also a similar expression in Ps. cxxxv, 7: "He maketh *lightnings for rain*." Now, the connection between lightning and rain, incidentally referred to in these Scriptures, was remarkably confirmed by the late Lord Kelvin, when, addressing some students at University College some years ago, he suddenly paused and said: "Gentlemen, I believe there is never any rain without lightning!"

Mr. THEODORE ROBERTS said: Although the composition of the Book of Job is by so devout a commentator as Dr. Samuel Cox (1894) placed in the age of Solomon, I agree with Commander Trumper that it must have been written before the giving of the law at Sinai, though for different reasons. Seeing the book is a Hebrew poem, it cannot be a translation of an earlier work, and must therefore have a Hebrew author who could not have failed to have mentioned either the nation of Israel, or the Mosaic law, if that

nation had ceased to be slaves in Egypt, or that law had been given from Mount Sinai.

I am quite in sympathy with Commander Trumper's general argument, but think he has attached too much importance to the instances which he suggests imply knowledge of a scientific nature. All I think they show is that the ancients were better acquainted with the laws of Nature than we in our pride are apt to imagine.

But I think Commander Trumper has overlooked the distinctive feature of the Book of Job. Literature is man's highest work, and two of the very greatest writers, Shakespeare and Goethe, chose the drama to convey their thoughts. I venture to describe the Book of Job as drama of a higher order than either Hamlet or Faust. This does not affect its historical truth. Was it not the great Duke of Marlborough who said he learned all the history of England that he knew from Shakespeare's plays ?

I do not see how we can regard Job and his friends as directly inspired by God in their speeches as recorded in this book, for they each view Job's sufferings from a different standpoint and are all found to be mistaken, as the subsequent speeches of Elihu and the Almighty Himself show. Indeed, Job's friends are afterwards specifically condemned for having spoken amiss concerning God.

If, as we believe, the Bible is not intended to teach us anything which we could discover by our own natural faculties, still less should we expect to find God making any revelation of Nature's secrets through Job or his friends. Even in His own speeches the Almighty confines Himself to such natural history as was then known to men, and specially points out Job's ignorance of the secrets of Nature.

All I think we can say is, that it is inconceivable that a merely human composition of such ancient date, dealing with so much natural history, could possibly have escaped falling into numerous statements of current belief, which science has since shown to be false. But if, as we believe, the record of these speeches is divinely given, we should expect to find nothing in that record inconsistent with any true facts of science. It is here that Commander Trumper's paper is of value as a brick in the great fortress of our faith, for it shows the Book of Job, being inspired of God, is in agreement with modern discovery.

Mr. W. E. LESLIE said: The author fails to give any objective definition of "Modern Science." Whether any particular theory is a "contribution to knowledge," or a "speculation" (p. 64) may be a matter of personal opinion. I suggest "Those doctrines contained in the scientific text-books in use in the University of London."

The author's argument requires Job to be dated in pre-scientific times. As this is admitted, the discussion of the exact date introduces irrelevant matter and obscures the issue. The suggestion that the writer must have lived when the Pyramids stood "in all their glory and perfection," because he refers to them as a "ruin," is an extraordinary oversight.

Some of the examples by which Lieut.-Com. Trumper supports his argument might be stronger. Surely strong men have developed their sinews in Biblical times (p. 67). The "hand of the Lord" has long been recognized in His works (p. 68), so also surely the keen vision of the eagle (p. 70). The interpretation of the "league with the stones of the field" (p. 66) and the "way" of light and "place" of darkness appear somewhat dubious.

The argument would have had more apologetic value if the author had concentrated upon three or four strong points, and discussed any alternative interpretations that may have been put forward.

Mr. WILLIAM C. EDWARDS said: I do not think it needful to follow many of the subjects so ably dealt with in the paper. I consider it a piece of arrogant conceit for so many of our so-called modern critics to regard the ages of the past as being so pitiably ignorant. My reading of the works of antiquity leads me to the opposite conclusions. I imagine that some much-boasted inventions were possibly discovered ages ago and forgotten, and the cycles will go on, and much that we have discovered will be forgotten and rediscovered over and over again if the world lasts long enough.

What I consider so wonderful is, that here is a work dealing with so-called scientific subjects, and yet no cardinal error can be found in it—indeed, quite the contrary, our lecturer finds it in harmony with, and anticipatory of, many of our latest and much-boasted discoveries in the realms of physics.

I propose to deal with a few other points that are lightly touched upon in the paper or are in harmony with the subject.

Let me premise that I presume that all here present believe that Job was a real historical personage. Of course he was, and united testimony and traditions point even to the places where he reigned and ruled as a kinglet or mighty chieftain.

About sixteen hours south of Damascus is a place where the Arabs show the site of the house of Job, his viñeyards, etc. The place is in the centre of a rich and fertile district called El-Hauran. There they show a stone and call it Job's stone. It is covered with hieroglyphics and bears a cartouche of Rameses II. The district was one of the strategic centres of the ancient world. Through it passed the caravan routes that led from Babylon, Nineveh, Tadmor (Palmyra), and Damascus to Tyre, Sidon, as well as Egypt. Job must have seen thousands of such caravans passing through his city. It was a cosmopolitan sort of place—there you could find Copts from Egypt and Nubians and people from many other parts in Africa. It must have been a babel of languages, a paradise for a philologist. No place on God's earth at that time could have been kept so well informed as Job's city. The latest news of Egypt or Tyre; the newest fashions or politics of Nineveh or Babylonia were to be seen and heard of there.

Now all this fits in with the Book of Job. Take the description of the horse (xxxix, 19–25). Many a time must Job have seen the horsemen of Pharaoh in this outpost of the Egyptian Empire, but what wonderful word-painting! Surely literary art here reached its climax and can never be excelled—perhaps never equalled. We can see the prancing horses of Pharaoh's chariots, hear the shouts of the captains and the trumpets sounding the irresistible charge that is once more to scatter the armed men and bring victory again to the armies of Egypt.

When Job speaks of the black water that came from the white snow, he spoke of what he had often seen; but when he speaks of the leviathan (xli) or behemoth (xl) in his soliloquy with God, he is speaking of what he has only heard from others, and such things which must have been difficult to describe or things that were much exaggerated by the narrators.

The leviathan was, I think, a whale, of which he had heard tales from the merchants of Tyre, for, before the steamers frightened away these monsters of the deep, the Mediterranean was one of the happy homes of hundreds of schools of whales. Mark well verses

7 and 29–32 of chap. xli, and you will see how truly in many ways he describes a whale, although probably he had never seen one.

When one reads regarding the behemoth one feels uncertain at times whether he means a hippopotamus or a crocodile. I fancy verse 15 of chap. xl makes us think of the former, but verses 17 and 21–24 seem to refer to a crocodile. At any rate, I have in the East watched with interest the mighty sweep of their tails, and I visualize a crocodile from the words.

Again, as regards chap. xxviii, which is a miner's chapter, those who know anything about mines will, I think, agree that he is referring to mining that he has been told about, and not a mine which he has seen working. He says that one mine is for silver, and other places for other metals; he gets on to iron and copper (brass in our version), and slides into a tale about sapphires and gold ore (? gold washings). I fancy that I can see the good man listening to the merchants' stories of the gold of Ophir; corals and pearls, rubies and topazes from Ethiopia; and asking searching questions that the men themselves cannot answer.

Finally, as regards the suggested references to the Pyramids.

I was one day standing besides the Great Pyramid, and I said to my dragoman: "Suleiman, do you know that this is referred to in our Holy Book?"—"No, no," he said, decidedly.—"Well, to-morrow you shall see," I replied.

I tried to get a missionary to meet him, but the man refused, and said that the passages I referred to had never been pointed out to him before.

However, the salesman in the Bible shop was as polite as the missionary was brusque. I said to him: "Please give me an Arabic Bible and open at the third chapter of Job, and translate at the thirteenth verse and onward." He translated somewhat as follows:—"I should have rested and been quiet with kings and wise men that have built for themselves pyramids (Ahram)." I marked the passage, and many more, for my dragoman to read. You should have seen his face as he read the verse. "So it is," he said, "so it is." The verses are worthy of profound study. It is not one king but many kings, not one counsellor but many counsellors, and not only kings and counsellors but princes also who have

built " in" desolate places (I suggest this as the idea) great places for the quiet resting-place of their bodies. Verse 19 looks beyond the grave to a place where all are equal—the realm of Spirits.

Now, I crave your patience whilst I try and enquire how came this precious book into the Canon of Holy Scripture ?

When Noah organized the Worship of God and ordained the sacrifices he fixed places for priests. The greatest of all these kingly priests was Melchizedek, Jethro was another of the representatives of this order, Balaam another. Who can doubt that Job was not only a king but also a priest ? Probably Eliphaz, Bildad, Zophar, and possibly Elihu were priests as well as Job.

Observe the command of God to Eliphaz (xlii, 7–9) to go with the other two and let " my *servant* Job " offer up a sacrifice for their sin and folly. Note also the sacrifice : seven bullocks, seven rams. Now refer to Balaam's sacrifice for Balak (Num. xxiii, 1).

It may be interesting also to refer to Virgil : when Æneas goes to the sibyl and has to offer " seven bullocks of a herd that never felt the yoke and as many ewes duly chosen."

Now, I want to say that I believe that Job wrote this book, *i.e.* from about chap. i, 6, to perhaps chap. xlii, 9. Copies were made of this work. What can be more likely than that in the house of Jethro Moses found the book, and that it cheered the long and lonely life of the shepherd that had once lived as a prince in Pharaoh's palaces ?

When Israel had crossed the Red Sea, Moses found himself with a multitude of illiterate ignorant slaves. He must have set about trying to teach them ; indeed, four books of the Pentateuch seem to be concerned with teaching. Maybe Jethro himself helped.

Anyway, books had to be written for the ignorant to learn to read, and God Himself guided the pen of Moses to write the story of the Creation of the World, the circumstances of man's fall, and the course of events down to the death of Joseph. I verily believe that it was so.

What more likely thing to happen than that Moses should have translated the work that had been a solace to him in the dark days of his sojourn as a stranger in a strange land in Midian and Arabia ? He would have to translate many terms, write the introduction to the book as well as add the final lines of verses 10–16 of chap. xlii, telling

of the latter days of Job's happiness. This explains the rough-and-ready estimates of Job's flocks and herds and accounts for the presence of the word Jehovah, etc., in some of the passages.

Thus the book became a treasure to the children of Israel and the Church, and such it still is, and will remain till time shall be no more.

Mr. H. T. SHIRLEY writes: I consider Lieut.-Com. Trumper's paper most interesting and instructive. As a student of physics and chemistry, I was naturally very interested in the subject, and although I do not quite see the significance of the author's remarks on the subject of a "way" for the light and a "place" for the darkness, yet I think his statements are scientifically correct, with one exception.

The remarks on p. 72 with regard to vibrations seem clearly to imply that, were the human ear sensitive to vibrations having a frequency comparable with that of the vibrations which give rise to the sensation of light (*i.e.* of the order of 375 million million per second), then we should hear light. This, of course, is untrue. The author of the paper appears to have overlooked the fact that the vibrations which produce sound are of quite a different character to those which enable us to see. The first are longitudinal vibrations (in the direction of the line of travel) in a material medium, usually the air, while the latter are transverse vibrations (*i.e.* vibrations in a direction perpendicular to the line of travel) in a non-material medium, the ether of space. Light can cross interplanetary space, but sound (which can only travel through matter) cannot do so.

This error was unfortunately made very prominent by the remarks of Mr. Collett during the discussion. In support of Lieut.-Com. Trumper, this speaker said that by means of the optophone the blind were able to hear light and so read. This popular explanation of a very wonderful instrument is not strictly true. The succession of light and darkness as the instrument moves across the printed page is made to control the current flowing in a telephone and thus produces a sound effect. The light merely acts as a kind of trigger to release electrical energy, which is then used to produce mechanical vibrations and therefore sound. This, of course, is an entirely different thing to "hearing light" in the sense in which that expression was used at the meeting.

This criticism does not affect the Book of Job, and I have ventured to offer it only because it seemed to me a pity that such a valuable paper should be considered unreliable because of an all-too-frequent confusion of thought on the subject of light-waves and sound-waves.

Mr. LEONARD W. KERN writes: Although unable to attend the meeting, owing to Government duties here in Bolton, I have greatly enjoyed reading the proof of the paper, but regret that there is one statement to which I must take exception.

Despite the fact that both sound and light are certainly due to vibrational disturbances in an elastic medium, or what is commonly known as waves, the method of perception, that is, whether by ear or eye, is not "only a matter of degree" as Mr. Trumper would lead us to imagine (p. 72), but purely one of media, which can be easily shown by setting an electric bell ringing under an evacuated bell-jar, where, like the proverbial ideal child at the dinner-table, it will be "seen but not heard," the explanation being that sound needs matter as a vehicle of transit, a vibrating body in a vacuum producing no acoustic effects, whereas light is due to the excitation of waves in the luminiferous ether which permeates all space.

Thus, should any action (whether chemical or otherwise) occur on one of the stars or planets producing simultaneous effects of light and sound, the former might possibly reach us if sufficiently powerful, but the latter never.

What Job indeed says is, that "the morning stars *rânan*," a Hebrew word only in this one instance translated "sang," and more correctly meaning "made rejoicing" or "gave forth *vibrations like* a musical instrument," which accords with our modern knowledge of the facts.

The AUTHOR'S reply: The adverse criticism of my paper can, I think, be considered under two main headings. Firstly, my citing of Job iii, 14, as probably referring to the Pyramids; and, secondly, my statement as to light and sound both being caused by vibrations or waves, and whether we perceive them as light or sound being only a matter of degree.

With reference to the first, Mr. W. E. Leslie accuses me of an "extraordinary oversight," though I think the oversight was his, not mine. Perhaps my meaning was not quite clear owing to the

severe pruning the paper has undergone. My whole contention was that the passage referred to the Pyramids in their perfection; but with the decaying of the Pyramids we see the word remaining the same, but its meaning change, till now the same Arabic word denotes a ruin, simply because the Pyramids are now ruins compared with their former glory. In our own times we see words totally reverse their meaning, *e.g.* "let," which now means permit or allow, used to mean "hinder." Also, everyone knows the present meaning of the expression "the weakest goes to the wall," but a few hundred years ago it had just the opposite signification. In those days places of worship had no seats except a stone bench which ran round the side. The old and weak went to the wall where they could sit, while the young and strong knelt or stood on the bare floor in the centre.

I may add that the word in question is translated "pyramids" in the Russian version of the Book of Job, which was one of the earliest of any portion of Scripture to be translated into a European vernacular; it was derived from the Slavonic, A.D. 900, the Vulgate, and the Septuagint. However, this is quite an unessential point of my argument.

With regard to the other question raised, I would point out that if I err in considering the means by which light and sound are conveyed to our senses as being the same in principle—viz. vibrations or undulations, but only a difference in degree—well, I err in good company. In the article on "Light" in the *Encyclopædia Britannica*, there is a good deal on the undulations, vibrations, and wave-length of light, and two quotations must suffice: "The undulatory vibration postulated by Fresnel having been generally accepted as explaining most optical phenomena, it became necessary to determine the mechanical properties of the ether which transmits this motion"; and again, "When the speed of light is measured the result is not the wave-speed as above determined, but something less, because the result depends upon the time of the group passing through the medium. The lower speed is called the group-velocity of light. In a vacuum there is no dying out of the wave so that the group-speed and wave-speed are identical." The same words, waves, undulations, and vibrations, are used in the article on "Sound" in the same work. Mr. Shirley has mentioned that light can only be conveyed through ether, which is a non-conductor of sound. But what is ether? Lord Salisbury in his Presidential

Address to the British Association in 1894 said, " For more than two generations, the main, if not the only, function of the word ' ether ' has been to furnish a nominative case to the verb ' to undulate.' " Do we know any more about it now ?

In a paper on " The Human Colour Sense and its accordance with that of Sound, as bearing on the ' Analogy of Sound and Colour,' " by Dr. John D. Macdonald, I.H.R.N., F.R.S., read before the Victoria Institute, there is a good deal that bears out my contention, but as space forbids a lengthy dissertation, I will content myself with two quotations. Referring to the cones and rods in the retina of the eye and their functions, he says : " That fact alone seems to him sufficient to show the necessity for supposing that each cone is capable of stimulation by all visible undulations of light, and transmitting such nerve vibrations as are capable of inducing all the colour sensations." Further on he says : " Two important laws or tenets have been brought to bear in the construction of the foregoing tables, namely, first, *That the undulatory theory is applicable to both light and sound*, and second, *that the musical ratios appertain also to colour*, though comparatively low numbers in one have to be compared to billions in the other."

It only remains for me to remind my critics that I never imagined a human faculty as able to *hear* the undulations which we perceive as light, but for this I specially postulated the Deity and the " sons of God " as mentioned in Job xxxviii, 7, though I also am looking forward to the possession of the same faculties in the future.

Prior to the reading of Commander Trumper's paper, occasion was taken to hand to Professor GEORGE MCCREADY PRICE the silver medal awarded him in connection with the Langhorne-Orchard Prize Competition (1924). The presentation was made by the Chairman of Council, Dr. Thirtle, and Professor Price made acknowledgment in fitting terms.