

DISCOURSE

BY

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REPORTED BY JOHN IRVINE.

Man to be judged by law—A law given to all things—The law of gravitation—How it varies by distance—Law of projection—Angles of projection—Law of Elliptic forms, having the same length of year—Law of orbital velocity—Its variations depending on distance—Wise adaptations—Intelligent selections of Law—Laws of nature counteracted.

WHAT we have heard from this stand, this afternoon, as well as on former occasions, we must meet again in the great judgment day. We have quite a number of scribes at the table, who are writing down anything that is said. These are not, however, the only scribes. There are others behind the veil, who take down the discourses of the servants of God; they are recorded there; and the books will be opened at some future time. All the warnings that have been given to the Latter-day Saints, and to the world, will again come up, in the own due time of the Lord, in judgment; and it will be required of us to render an account, whether we have been obedient to those warnings, or whether we have been disobedient. The Lord is a consistent Being in all his doings. He will not condemn the children of men, for not receiving something that they were ignorant of; but, if they are condemned at all, it will be for rejecting something that they have understood, or something that they might have understood, had they improved the opportunity. They will be judged according to law, according to testimony, and according to that which is written in the sacred books. The records of heaven will be opened. The records, kept by divine authority on the earth, will also be opened. The evidences and testimonies will be set forth; and every man and every woman, who is condemned, in the great judgment day, will be condemned according to law, according to testimony, according to evidence, according to the light that has been given, according to the deeds done in the body.

The Lord is a Being who has given laws unto all things; and he adapted these laws, according to the condition and circumstances of all things. All agents, free agents, who have light and knowledge to know how to act, how to discern good from evil, will be judged according to one law. They are not compelled to obey the law which they hear, but they can act according to their agency, either in obeying or disobeying, receiving the blessings of obedience or the fruits of disobedience. The Lord has given a great many laws, besides those which he has given to free agents, or to intelligent beings; but they differ in their nature, according to the condition and circumstances of the materials to which these laws are given. See a revelation upon the subject of these laws, which was given on the 27th day of December, 1832 (Doc. & Cov. pp. 305 to 310). This revelation was called, in those days, the "olive leaf." In this revelation, the Lord informs us that "he hath given a law unto all things by which they move in their times and their seasons." These laws which are given to the materials of nature, are generally obeyed. There does not seem to be any agency on the part of these materials, so far as we naturally comprehend it; at least, if there is an agency, it seems to be very obedient instead of disobedient. Hence, when he issues forth a law to govern the materials of creation the law seems to be obeyed; at least we do not know of any disobedience. It would almost seem as though these materials act under compulsion, and are really obliged to act as they do. Yet there are some sayings in this same revelation, which seem to indicate that there is a degree of intelligence even in these materials. We read that "the earth abideth the law of a celestial kingdom, for it filleth the measure of its creation, and transgresseth not the law." This would seem to indicate that there is something connected with the earth

itself, wherein it has an agency; and that because of the exercise of its agency, and keeping the law, it should be crowned with celestial glory. The materials out of which our earth is formed, are also governed by law. Not only the earth as an organized world, but the very materials themselves, are governed by laws. These laws were given of God; and when we search into the laws, not of nature merely, but the laws of God, and the more we comprehend the laws by which materials are governed, the more we understand the laws of God and his operations in the universe.

The earth seems to take one continued course. It has an orbit. It does not deviate from this orbit, unless acted upon by some other force, which may cause some fluctuations or deviations from its apparently destined path. Some, in reflecting upon this might say, that the earth is obliged to follow this course. I do not know about this. I am not so sure. I think if we could see a little further, we would understand that, connected with the materials of the earth is a living principle, a principle too, that acts according to certain laws, intelligently, not blindly; and that our earth, in performing its course, following the track marked out, does so according to law, as much as we do when we go forth and are buried in the waters of baptism. We go according to law, and obtain a blessing, so does the earth, when following the course marked out for it. "God hath given a law unto all things, by which they move in their times and their seasons." We know that all of these great movements, which we observe taking place in the universe around us, are conducted according to certain laws, which mankind have, in a few instances, been able to search out themselves, through the intelligence that God has given them. For instance, we see a force in exercise, when we lift up a stone from the ground, and hold it in our hands; the moment we let go this stone, it falls to the earth. What causes it to fall? Philosophers tell you that "it falls according to a law of nature." But who is this nature that gave this law? Why do material bodies fall? Why do they not remain stationary suspended in the air, or in a vacuum? Why do they have a tendency to approach the centre of the earth? It is because there is a force which draws them towards such centre. What is this force? Scientists have called it gravitation; but the name does not explain the force. We are certain that a central force exists; and that such force is something that acts according to a certain law. Now, if you were to take a material body, as for instance, a stone, 4,000 miles above the surface of the earth and let go of it; it would only fall one-fourth part of the distance, in a second, that it will fall here, near the surface of the earth. Why will it not fall with the same velocity up yonder as here? Because the law which God has given in relation to these materials, varies in its intensity of force, according to some law of the distance from the central force. A body will fall, near the earth's surface, about 16 feet and one inch, in one second of time. You take it up 4,000 miles, and it will fall only about four feet in one second of time. This has been demonstrated by the action of the earth upon the moon which is nearly 60 times further from the earth's centre than we are. The moon only falls toward the earth about the eighteenth part of one inch in a second, which is about 3,600 times slower than a stone or other bodies would fall at the earth's surface. Thus, it will be perceived, that this gravitating force diminishes in its intensity according to a fixed law, depending on the distance from the centre of the earth. This law was discovered by Newton. It is known beyond all controversy, that if we go twice the distance which we are from our earth's centre, bodies will weigh two times two less than they weigh here. If we recede thrice our present distance, bodies will weigh three times three, or nine times less than if weighed here. At ten times the distance, the weight would be ten times ten less than here. At sixty times our distance from the earth's centre (which is the distance of our satellite) bodies would weigh toward the earth, sixty times sixty less than they weigh here; but sixty times sixty are thirty-six hundred; that is, a pound would weigh thirty-six hundred times less if carried to the moon's orbit, than here.

In the language of mathematicians, "the intensity of the gravitat-

ing force varies inversely as the square of the distance between gravitating centres." This law is undoubtedly universal in its operations, extending to all the visible universe.

This law, combined with orbital movements, is necessary to the stability of worlds revolving in space. Without it, systems on systems would soon rush to ruin. If any other law of intensity than the one which now exists were assumed, irretrievable ruin would soon follow. Out of the infinity of laws of variable intensities depending on distances, the only one has been selected which alone can impart stability to all systems in space. Who made this all-wise selection? Did blind matter select its own laws? Or did an all-wise and an all-powerful Being impart these laws,—selecting out of an infinity of force intensities, the only law of variable intensity, which would render stable the grand machinery of the universe?

This curious law some will tell us is merely a law of materials, that God has nothing to do with it. But I dispute it. I say that God is the Author of this law; and were it not for this infinitely wise provision, there would not be such a thing as one particle of matter being drawn to another; and a stone, when loosened from the hand, would still remain where it is set free.

Again we see our world here—the earth on which we are permitted to live and have our being,—sweeping around the great centre of the solar system, once in 365 days and a fraction of a day; it has continued in this path, not only through a few centuries, but for thousands of years; or, in other words, it has followed this course according to some undeviating law. Whatever this law may be God has ordained it, for he has ordained "the law which is given to all things, by which they move in their times and their seasons."

This earth does not revolve around the sun, once a year, in a circular orbit, but in an oblong, elliptical orbit. Now, it is just as easy to cause a body to revolve around the sun, in an ellipse, as in a circle. For instance, if our Earth, when at its mean distance from the sun, should be projected, with its present mean velocity, in a line at right angles to the line joining the Earth and sun—it would describe a perfect circle around that luminary. But let the projections deviate from a right angle, a little less than one degree, and it will take the very form of orbit it now has, provided it is projected with the same mean velocity that it now has. Again, let this same Earth be projected, at its mean distance from the sun, in a line making an angle of 70 degrees, 31 minutes and 44 seconds of an arc, instead of 90 degrees, as in the instance just named, and the form of the orbit would be greatly changed; the distance from the sun, when nearest, would be only sixty-one millions of miles; and in six months after, the distance would be doubled, that is, one hundred and twenty-two millions of miles. Under these circumstances, the sun, when nearest, would appear four times larger than at its aphelion distance.

You see, then, how easy the Lord, by deviating the angle of projection, could cause a great difference, in the eccentricity of an elliptic orbit, without altering the mean distance, or without shortening or lengthening the year. The year would remain the same, without any deviation in its length, if the Earth revolved in an ellipse of the kind that I have just named. Again, if you wanted the Earth to go so near the sun that it would almost graze its edge, and still retain the length of our year unchanged, it would not take our advanced university students long to determine the angle of projection the Earth should have, so as to just graze the edge of the sun, at the perihelion distance, and come back again in an ellipse, which would be almost equivalent to a straight line, provided it was projected at the mean distance that we now have, with its present mean velocity; and the year would be exactly the same as now. I mention these things to show you how the Lord, by a little deviation, can design a great variety of orbits, in which worlds may revolve, according to law; for all these things are done according to law; and if actually projected, as we would propel a cannon ball, then all the Lord has to do is to decree the form of the elliptic orbit, having one year for its description, and the projecting angle will be, at once, known.

This is a law, and the Lord is the Author of it. It is not a law of nature. It is not a law of blind ma-

terials which have no knowledge or life connected with them, or in them or round about them.

I have been speaking of bodies projected at different angles, and at the mean distance of our earth from the sun. But let us next go still further off into space. We can go away to the orbit of Jupiter, about four times our distance from the sun. Is there any law for projection or a law of velocity that would cause bodies to revolve in orbits, at four times our distance from the sun? Yes. What is the law? It must not have the same velocity that we have. It must, at four times that distance, have only one-half of the mean orbital velocity of our earth; and, if you gave it more than one half of such velocity, it would decrease the mean distance of the orbit below four; if you gave it less, it would increase that mean distance above four; but if you gave it exactly one-half of the velocity our earth has, then it would preserve its orbit in a circle, or in any kind of an ellipse at that mean distance. Is there any law to govern this velocity depending on the distance from the sun? Yes. What is this law? According to mathematical expressions, "the velocity varies inversely as the square root of the distance." Well, says one, that is no information to us. We don't know what you mean by *inversely* and don't know what you mean by the *square root*; for all of us have not sufficiently studied arithmetic so as to understand the roots and powers of numbers. In reply, I will say, that it is something very simple to all advanced arithmetical students. Let me say a few more words, in regard to this law; for this is also a law of God. For instance, we will say, that the earth travels a certain distance in one second, which we will call a unit distance or 18 miles in a second, in its orbit—we will call this distance one. We go four times further off than our earth is from the sun, and take the square root of four. But, inquires one, how do you get the square root of four? A number that will multiply into itself, say two into two, makes four; two then, is the square root of four, that is, it is the *direct* square root, not the *inverse*. But now you put this figure 2 underneath a line, and place the figure 1 above it (thus $\sqrt{4}$) and such a fraction is the inverse square root of four. Hence, one-half the velocity that our earth has, must be given to bodies which are four times further from the sun than we are. When nine times further off from the sun than we are the orbital velocity will be only one-third of ours; because one-third is the inverse square root of nine. In like manner, when sixteen times further off, the orbital velocity is one fourth of ours. When twenty-five times more distant, the orbital velocity will be one-fifth, and so on to any distance.

Here, then, is a regular law of velocity; and you may extend this to any distance, in the solar system, that you please.

Now, who ordained this velocity? Did the unconscious materials of nature come together, and undertake to consider this matter? Here are laws that are conducted with great intelligence, — intelligence that was not understood for several thousand years preceding the period of Newton. We have no account that the most civilized nations of the earth had any idea of the law of velocity depending on the inverse square root of the distance. Yet this law existed, whether understood by man or not; it made no difference whether the nations were ignorant in regard to this matter or not, the law existed, and operated for ages unperceived by mortals.

The Latter-day Saints say, that the Lord of Hosts who has given us laws, adapted to our condition as free agents, has also given laws to these material worlds, by which they act and by which they are preserved, for a great, and wise and good purpose, to sustain unnumbered myriads of animated beings, who are by numerous other laws adapted to these worlds, and enjoy life therein. We now have been speaking of the infinitely wise law of the velocity of planets. But this law would not preserve our universe in its present beautiful order, if the law of gravitation was not exactly what it is. We say that the law of gravitation acts *inversely* as the square of the distance. Now, why don't it vary as the cube of the distance? Why don't it vary *inversely* as the distance itself? Why don't it vary *inversely* as the fourth power of the distance, or some other law of distance? Because all these other laws would throw the system into destruction at once; it could not be sus-

tained. There is only one law among an infinite number that might be chosen, that would preserve the system in its present beautiful order, and that is the law of the inverse square of the distance. Who gave this law to materials that they should have this attractive force? The Book of Covenants tells us that "God hath given a law unto all things by which they move in their times and their seasons;" but if he had given a different law than this I have named, in regard to gravitation, the whole system, in a very short period, would be reduced to a chaotic mass, lifeless and inanimate, existing for no purpose, accomplishing no design or end. All this infinite wreck of worlds would be the necessary result of selecting an unwise law, varying from the one which now obtains among gravitating materials.

The law of velocity must be exactly adapted to the law of the inverse square of the attractive power. What was it that made this adaptation? Did the materials endow themselves with both of these laws? Did they perceive that no other laws would render the universe stable or lasting? Or, otherwise, is there an all-wise and all-powerful Governor, who brings all things under the dominion of laws, wise in their action, powerful in their nature, and preserving the grand machinery of the universe, in the most perfect harmony in the working of all its parts?

There must, then, have been some great supreme intelligence who organized these worlds and gave them laws of attractive force and adjusted velocities and thus produced the harmonious orbits which we have, and which will preserve themselves, unless interfered with by some extraneous force, for thousands of years to come.

We might go on and speak of a great many other principles connected with these laws, but let us now come to the laws given to intelligent beings. God has given laws to what might be termed intelligent nature; but let me say, that what is termed intelligent nature is something called in this same revelation from which I have been reading, a spirit, or rather, a power that "is in all things, through all things, round about all things, and the law by which all things are governed." It is, then, an intelligent power that encircles itself through, or over, or round about every particle or every atom, and these atoms act in accordance with the law that is ordained, and do not deviate from it unless commanded by the same authority that gave the law. The same Being who gave the law to materials by which they act, can counteract the law. He did so in the instance when Elisha caused iron to swim. We read, that as one was felling a beam, the axe head fell into the water. The man was much concerned, because it was a borrowed axe. "And the man of God said, Where fell it?" And he showed him the place. And he cut down a stick and cast it in thither; and the iron did swim." Now what was it that caused the axe to rise in the water? The same Being who gave the law of gravitation, which caused the axe to sink, counteracted that law, and caused the axe to swim. The same Being who gave the law of universal gravitation, can counteract this law. He did it, in many instances, in ancient times. He divided the Red Sea to allow the Israelites to pass. The water stood up like walls, in a great heap, not for a few seconds, or minutes, but stood there sufficiently long to allow the Israelites to get to the other side of the sea. Now, what was it that counteracted this law of nature? What was it that caused this watery element, which has a tendency to spread out and sink to its own level, to stand up in a heap, almost like a solid body? The same Being who gave the law, which governs the yielding liquid properties of water, can counteract the law, so as to make the water stand in heaps. God is the great author of all law, and is just as able to counteract a law, as he is to continue a law. Let him withdraw the command that materials shall attract all other materials; let him say to matter, "I no longer require you to act, according to that law," and you would not find the earth going in an orbit round the sun. There would be no bond of union to keep things in their proper place; everything would be left to itself. Let God withdraw his law, or let him command adversely, and he will be obeyed; because he has the power thus to direct; and the intelligence which surround these materials, the spirit that is in and through all these things,