do not find them in the generality of country schools, although much progress has undoubtedly been made in late years in this direction. I do not attempt, in the compass of a single lecture, to notice the various models which are applicable to schools, or to describe separately the mode in which they are to be used; my chief object is to urge the universal adoption of models and diagrams, as a means of instruction, and to illustrate by one or two familiar examples the manner in which very cheap and simple, and yet effective models may be brought within the reach of even the village schoolmaster.

In astronomy it is desirable that all scholars should learn something of the motions, and magnitudes, and distances of the heavenly bodies. The most rapid motion which can be readily comprehended by boys is about twenty miles an hour, or one mile in three minutes. It is about double the quickest speed they see in road vehicles, and is a usual rate on railways, but it will be brought still nearer to their comprehension within the walls of the school-room, by a white ball fastened to a string of about three feet in length, and whirled round at the rate of two revolutions—nearly forty feet in each second. By graduating the length of the string, and timing the revolutions to 120 in each minute, the length of a mile may be described by the ball in three minutes; and if this were continued an hour, we should have twenty miles of space passed over by the ball. When once the minds of children are directed to a palpable illustration of this kind, they have obtained, as it were, the seeds of knowledge—they have a foundation on which to rest future researches of a like kind, and without some such solid, distinct, clear, and palpable exhibition of the rate of motion, no definite ideas will be afforded by the most skilful and elaborate study of mere figures unapplied to some such datum as I have here endeavored to describe. Very few persons have clear conceptions about space and motion. If we ask a child the meaning of a sentence which it has read, we probably find that no solid or distinct ideas of the meaning of the sentence have been formed, and so it is with children of a larger growth—with men, and even with able and accomplished men—propositions involving large conditions of space and motion are read and stated by them as truths, without even attempting to resolve them into tangible considerations. What, for example, is so common as to hear it said of Archimedes, that if he had a fulcrum on which to base his operations, the power of a lever would enable him to move the world, and so it is taken for granted that by an enormous lever, the weight of Archimedes, exerted at the extremity of its enormous arm, would suffice to move the world. In theory this is true, but how few have an idea how far it is from all practical value. If Archimedes had machinery free from friction, and in perfect equilibrium, so that his whole power could be made available, it would require, at sixteen hours a day, and using his whole power, more than seven millions of years to move the earth. But then it may be said—what do you call motion—through what vast space would he not have moved it in that immense period, if endued with life amounting, one might almost say, to a fraction of eternity itself? I have assigned a moderate enough space, through which it would be moved, viz., the one hundred millionth part of an inch. If we consider, then, that of this $\frac{1}{100000000}$ of an inch, only about $\frac{1}{350000}$ part could be accomplished in the incessant labor of fifty years, we find that it amounts to so inconceivably small space, so very far beneath the utmost power of the microscope, that instead of confirming the notion of motion, it seems, if it were possible, to add value to the notion of actual permanency. Now, in carrying ideas of space and motion from terrestrial to celestial objects, I may mention a very simple and pleasing illustration. Suppose a white ball, of ten or twelve inches diameter, placed in the open air on a clear day, when the sun and moon are both visible. The ball may be so placed as to appear immediately under the moon, when viewed through a small aperture properly fixed. It may be so placed also in regard to distance from such aperture, as to appear about the same size of the moon. Now, if the sun's rays fall on this ball, just so much of its surface will be brightly illumined as will correspond with the light portion of the moon, and the teacher will then explain that the rays of the sun are falling on two balls or globes—the one the moon, at a great distance, the other the ball, of ten or twelve inches—and by moving the latter, the increase of apparent diameter as it is brought near, and the decrease of its magnitude when removed further away, may be fully explained. On the following day similar lessons may show the altered position of the moon, and the reason of its altered phase, and illustrations of this kind may serve as a foundation on which to convey information as to the other heavenly bodies. I recommend circles to be painted on the school ceiling, representing the earth by one inch in diameter, the moon one quarter inch at a distance of thirty inches, and an outer circle of nine feet two inches in diameter, to represent the cicumference of the sun. When these enormous magnitudes have been in some degree appreciated, the distance of the fixed stars on the same scale, amounting to much more than 10,000 miles, may afford a further and most astounding example of the greatness and glory of the works of the Creator, as exemplified in the scale of the universe.

I now offer as an example of geological models, one which admits of being easily constructed, namely, by cutting sheets of variously colored paper so as to show the relative position and area of the geological formations of Great Britain. In this manner also, models of local districts may be easily made, by adopting the course of rivers as a base of operations, and then moulding the hills according to a scale of altitudes. Models of school-rooms, in card-board, might be made by active and ingenious scholars; and the great beauty of neatly-made paste-board models is such as to render them peculiarly fitted for exercises at school.

The lectures of the late Richard Dalton were an example of the great utility of models. He possessed a very large collection, illustrating mechanics, hydraulics, hydrostatics, optics, and astronomy. Among them were Attwood's machine for explaining accelerated motion, a printing press, a machine or portable mint for striking medals, a stocking-making machine, a working model of a locomotive engine and of various other steam engines, optical models, telescopes, microscopes, &c. It is much to be wished that similar collections of models could be found in every large town, and if moderate sums were appropriated by government to be given as premiums for such models, it would develop a large amount of practical merit, and be the means of furnishing an ample supply for schools.

The restorations of extinct animals now in progress at the Crystal Palace, by Mr. Waterhouse Hawkins, bid fair to create a laudable interest in such studies; and I am glad to have an opportunity of showing, by the small models now on the table, the clear and satisfactory manner in which Mr. Hawkins proposes to shew, not only the external form, but also the anatomical structure of the bones,—one side of the model being open for this purpose, whilst the other gives a complete view of the exterior.

Great animation is excited in the minds of children by any exercises which involve manipulation. If furnished with pieces of paste-board, they will soon learn to construct a rough model showing the walls of the school, and so proceed to represent hills by fixing wooden pins at intervals of the requisite height. In like manner they may cut out in paper, or in cardboard, areas representing the comparative magnitude of kingdoms, and thus arrive at some tangible notions of the dimensions of the globe on which we live, and of the planets and stars which adorn the heavens by night. The great value of all such instruction is the right direction of the mind and understanding, so as not only to know the condition of matter, but to feel that all nature pictures forth images of the greatness and glory of God.

Under the term of diagrams, almost every description of drawing may be included, inasmuch as highly-finished pictorial effects are sometimes required to illustrate architectural and geological, as well as historical and other subjects. The numerous and interesting specimens shown in this exhibition render it unnecessary either to describe them or to speak in general terms of their great beauty and value. My object is to draw attention to the means by which they may be more extensively used in ordinary schools, and to this end we must consider more especially—

The principles of construction;
The objects capable of illustration;
The materials to be employed; and
The special advantages they afford in promoting education.

There are certain guiding principles which regulate the correct practice of all arts of design, and a knowledge of these is essential to the teacher.

A diagram is the representation of one or more objects on a plane surface.

If we suppose a cylinder to be the object of which a diagram is to be made, it is evident that if the end alone is represented we have a circle, and a projection of it may be made on a plane parallel to the axis of the cylinder, so that the outline will be a square or a parallelogram. If lines only are employed, such a diagram will give no correct idea of the true form of the object; hence it becomes necessary in representing a diagram of a cylinder, as of every other object, that due regard is to be had to the exhibition of it in such a form as to convey a clear idea to the mind.

An uninstructed person who, for the first time, attempts to make such a diagram, is disposed to make a circle for the top, and then continue lines to represent the length of the cylinder; and, under certain conditions, this may be done by a principle to which I shall shortly advert; I notice this because it has frequently happened, in the course of my experience, that I have seen a pit shaft represented in this manner—a method so fallacious, as to give the most erroneous impressions.

To explain this, I will suppose the shaft of a mine, ten feet in diameter and one hundred feet deep; we have thus a cylinder of which the length is ten diameters.

I will suppose that at the top of this shaft there are two roads, each one hundred feet long—one being direct north, and the other direct east, from the top of the shaft. Suppose also, for the sake of simplicity in form and dimensions, that at the bottom of the shaft there are two drifts or galleries, each one hundred feet in length and going in two different directions, namely, south and west. Let us suppose that the