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From the New York Tribune LECTURE II.-

BY J. P. NICHOL, ed for the Tribune by O. Dyer, the

nism of these grand stellar clusters.—Our heavens replate with ac-tivity and motion.—The system of dou-ble stars.—More complex groups.— Idea of a universal mechanism.—The motion of our sun through space.—Idea of a central sun.—The instability even of our grandest forms and collections of matter.—Relation of material changes

LABIES AND GENTLEMEN—I endeavored to explain in my last fecture what lights have now reached us respecting the ar-rangement of the Stellar Universe. Upon ination we find that the brilliant orbs which compose this vast universe, are not with any apparent regularity through space, but are thrown together late single groups or clusters, a few of which have been analyzed by the telescope. The forms of some of these groups, as unfolded by the power of these mighty instruments, are certainly most strange, and, whether the inference be correct or and, whether the interese upon us the idea
that we are looking at incompleteness—
at a phonomenon whose entire completemass is not displayed in its existing form—
which, in fact, belongs to some wide scheme
and which is not intelligible except as an diate step in the course of some

I attempted, in my previous lecture, to lay before the audience those great lights which we have obtained with regard to the construction of our Stellar Heavens— to show that instead of the stars being distributed throughout all space, our heaven are but a simple cluster, a group—a limited, definite, and peculiarly shaped group.

The nearest approach to the shape of this group may be found in the diagram before you. re you. (Here the lecturer pointed to a large diagram, representing an immense spherical cluster of stars, with the sun in the centre—the stars as they recede from the sun growing more and more irregular in their distribution.]

In connection with this cluster, the tel-

escope has shown us a vast variety of others, whose forms are, likewise, so very capricious and irregular, that when we look at them, we feel the conviction that we are looking at something we are looking at something incomplete. rage of progress, and that they are no explicable as the finished product of any known law. If my idea is correct—and, certainly, as far as I have exposed it there is nothing in favor of it except a probabil-ity—we shall find, by an examination of our own Stellar Heavens, proof on every side and in every appreciable form, that their characteristic is action and not repose. That portion of the subject which conducted to the most satisfactory results, was lead in by an ingenious Englishman named Mitchell, during the last century, while making observations on the group of the Pleiades. On taking a survey of the heavens, his attention was much at-tracted by this peculiar cluster, and after bestowing upon it a most searching examination, he said, "It is impossible that this group of so many stars, occupying so small a space, can be accidental. It must indi-cate system." He cam went so far as to throw out what, at that time, was a most hold conjecture, viz:—that these orbs would manifest their connection in a systematic manner, by developing internal motion. Unfortunately, however, in his motion. Unfortunately, however, in his time astronomical instruments had not been brought to such a state of perfection as would enable this conjecture to be verified. His ideas did not lead to any definite result, nor could they, as science then existed. But they were subsequently revived with great energy by Herschel, under auspices much more favorable. Hersder auspices much more favorable. Hers-chel, however, did not know that Mitchell plex and extraordinary must be the me-had preceded him in this department. His chanism that sustains a system like this. attention was directed to certain peculiar bodies found in the heavens, which we now call double stars, and which, to the naked eye appear just like single stars. But when the telescopic power is applied But when the telescopic power is applied to them, they are found to be two stars placed so near together that the naked eye cannot appreciate the interval between them. Previous to Herschel's time it was known that these stars existed in the heavens, but they had never been subjected to an examination sufficiently accurate to o an examination sufficiently accurate to enable astronomers to determine their constitution and the laws which guide their motions. It was not supposed that they were so near each other as they have since been ascertained to be. I will illustrate this point in the following manner:—Suppose I look at these two lights from such a direction that they shall nearly be in the same line of vision. If I did not know that this large space existed between in the same line of vision. If I did not know that this large space existed between them, I would suppose, from their appearance, that they lay in the same immediate insightorhood. Here you will observe was the difficulty attending the solution previous to Herechel's time, of the problem of the double stars. But he discovered that they were in immediate proximity, and not apparent merely, as had formerly been supposed.

Herschel was attracted to this peculiar class of bodies, with reference to the problem called the problem of the parallar, and his telescope soon enabled him to dis-

stars than could be explained on the old hypothesis. It will be seen that it may be calculated

upon the hypothesis that the stars are dis-tributed in a random or average manner through the heavens, how many of such mere optical combinations might be form-ed within those spheres; and Herschel discovered that the number actually existing so immensely exceeded the number which thus might be produced that a new explanation was necessary, and, in short, that the bodies must be physically and not that the bodies must be physically and not merely optically or apparently connected. The sun is composed of a number of diner-like Mitchell, too, he ventured on the ent colors, which are blended together in prediction that the reality of this system his beam. In the case of these double would be found manifested by the fact of stars, however, we find one shining with a bodies rolling around their common red light, while the other has exclusively the case not only possible but near. The examination and determination of the periods and motions of the double stars have constituted one of the most brilliant and fertile departments of astronomy from Hers-chel's time until now. This was a phe-nomenon new in science, two grand primary orbs being found in special union

and moving through their great courses.

The periods of these double stars exhibit the greatest variety. Some are very long, while others are comparatively short. In some the revolution takes place in 14
years. The period of one in the constel-lation of the Crown is 43 years. Castor. in the constellation of the Twins, has a period of 215 years, while others extend through seven or eight hundsed years. We have not been able to follow these latter through more than a small portion of their orbits; but a small portion of an orbit being ascertamed, geometry combles us to complete the entire arbit, and by its aid we have been enabled to determine the periods of these singular leskes.

am very anxious that the authence should realize the nature of these phe-nomena. They do not at all resemble the motions of our planets round their centre. There are, in fact, two orbs or suns of the first magnitude revolving round each other, each of which may be accompanied by a cortege of planets as imposing characteristic among much more complex systems. We are now aware of numbers naked eye; of others that are quadruple, and some yet higher combinations.—The moment Herachel found that some of these bodies were triple, and discovered still.

The question that arises then is this: further combined in a four wars, he was under no ship diverse and refer the four sun in motion? Is our sid idea that under no ship diverse a correct by refer the four sun in motion? Is our side idea that ence to the interes.

certainly are plays in connected, and whole attendance of planets through some uncharged in correct courses. The motions and periods of some of these have also been ascertained. Sometimes we find the twisted was however to the illustrious Herschel to whom I have had occasion so often to the configuration of been ascertained. Sometimes we must be three stars moving round a common centre; at other times two of the stars are found moving round the third as their centre. You must recelled that these are true. You must recelled that these are which is

inferior to our own great luminary Besides these, we have other combinatinct as stars usually are. On applying the telescope, we immediately find the cause of this strange appearance; it turns out to be not one star, but four stars bound together, whose maximum and the cause of the strange appearance; it turns out to be not one star, but four stars bound together, whose maximum and the cause of the strange appearance in the same path. The only mode by which it could be deduced was this:—If the sun were moving through the heavens, the stars around him would seem to be altering their position." Suppose, for instance, to illustrate the out to be not one star, but four stars bound together, whose movements are very extraordinary. We find that each two stars me and another behind me. Now if I volve round a common centre. How complex and extraordinary must be the me-We have boasted of our mathematics, of their accuracy, of their vast and varied powers, but when we reflect that it taxes them to the utmost to follow the compara-tively simple movements that take place within our own tolar system, how useless to attempt to apply them to unwind the mechanism of systems like these, every one of which is probably surrounded by its own system of planets.!—(Great Applause.) I should mention with respect to this fourfold system in the constellation of the Lyre, that the periods occupied by one of these systems cannot be less than a thousand years, and the other is about twice that, and the period before the whole

venture to apply the same conjecture to Suppose for instance that I was moving still greater masses; but before entering through this room. All the objects in it, upon that grander subject, there are a few on either side of me, would appear to be points to which I would invite your after moving backward. So has it been found tion. One grand fact that has been elici-ted by our observations on these double stars is, that the law sustaining these were derful mechanisms is the same that are tains our own system—the law of gravitation discovered by Newton. Those far oil and his conjecture has been most tho-suns are moving around in their mighty roughly confirmed. There cannot, then,

orbits in obelience to that simple law be a doubt which causes the apple to fall to the ground; they wheel around their common mighty eye centres of gravity in precisely the same

centre of gravity in mighty orbits; and a blue light. How extraordinary the fortunately the verification was in this condition of planets, if there be such attached to these variegated suns, now bask-ing under the blended light of both which would constitute a white light, at other times, having only a red sun above the horizon, and at others being illumined by the blue one. If one considers how much of a characters of the living famili lies on the earth is dependent on the action of the sun, it will be difficult to conceive the endless varieties which must prevail among bodies subjected to so singular in-

Returning, however, to the principal abject, we find it to be the character of the minor groups within our galaxy to exhibit a systematic independence of their constituents and a consequent mechanism and motions. And now raising our thoughts somewhat higher, and looking over the whole Stellar Universe, what are those mighty firmaments, those gorgeous systems lying apart in space except special groups in regard of the great all. Is it not likely, then, that what we have learn ed of the minor forms may also character. ize the larger ones! That just as the four fold group in Lyre or as proudly in the Pleiades, even the multitudes of spherical clusters or those more irregular ones are also united into separate schemes internally consistent by their own self contained activities. The question is far too wide to admit of a decisive answer, but as those at ached to our sun. Neither the previous reasoning nor the observation which followed it was confined to mere Binery groups. The illustrious discoverer went far beyond these, and traced the same characteristic aware much more consider. prevailing also among the single suns f triple stars which appear single to the know best, this will probably be easies

The question that arises then is this :the whole plus stary as tem is simply lying appear in the make of space, dorrect; or, on combinations of suns, not one of which is simple: He said. "If our sun is in motion how shall we ascertain the fact ? We can tions of four stars. There is a very beau-tiful one of this kind in the constellation tion, would not have it in our power to of the Lyre. When we look at a bright star in that constellation, it has a very peculiar aspect. It is not so round and dismode by which it could be deduced was constitute a double star-a system of were to move from one toward the other, in. Now, Herschel upon comparing the positions of the stars with their positions as laid down in the old catalogues, disco-vered that just exactly such changes were going on among them. In the direction of the constellation Hercules the stars appeared to be opening out, while the stars in the opposite part of the heavens seemed to be getting closer to each other. Now, said he, " is not this all I could expect to

said no, "is not this all? could expect to see if the sun was actually moving through the heavens?" Accordingly he was da-ring enough to infer that this was the case and he said our great sun is moving on with all his statellites toward the constelwith all his statellites toward the constellation thereules. Again he said, "If it be system returns to its original state is not less than a million of years. But that period is small indeed, compared with some that I shall bring under your notice.

The grand fact then is established beyond a doubt, that in so far as we find minor groups within our gallaxy, we discern mechanism and change, and we may venture to apply the same conjecture to Suppose for instance that I was moving.

mighty cycle throughause.)
These general conhave reference only centres of gravity in precisely the same curves in which our planets move.

There is a curious physical fact also connected with these double stars. Generally speaking, we find that the two stars exhibit different colors. We find them exhibiting the colors of the two extremes of the spectrum commonly called the complementary colors.

The audience must be aware that the ray of white light which we receive from the sun is composed of a number of different colors, which are blended together in his beam. In the case of these double stars, however, we find one shining with a red light, while the other has exclusively a blue light. How extraordinary the condition of planets, if there be such attached to these variegated suns, now bask. ascertained. It is 679,000 times farther removed from us than the sun, and our distance from the sun is, speaking in round numbers, 100,000,000 millions of miles. This distance is so great that light, which moves at the rate of 300,000 miles per second, would take ten years to travel there beyond a size from that remote orb to the earth.

from that remote orb to the earth.

Now this star 61 Cygni has a very remarkable proper motion, moving through a very considerable space in the heavest every year. Now, since we know the actual distance of this star from us, and the quantity it is moving through the sky every year, we can convert that motion miles, and can thus ascertain how many miles it moves in a year. Now the question is, to what is this motion due, to the motion of the star or to the motion of power or force, and the feeling that this center is appearent that the universe itsell to stables. We appear that the universe itsell to stables, we we obtain our tides of point of the feeling that this center is appearent that the universe itsell to stables, we were obtain our tides of the star in the convergence of the feeling that this center is appearent that the universe itsell the star is appearent that the universe itsell the star is appearent that the universe itsell the star is appearent that the universe itsell the s motion 7 We find the star is moving exactly in the direction it would appear to move if its motion were owing to the motion of the sun. We are inclined, therefore, to infer that the motion does not belong to the star, but to the sun; and on this hypothesis we can compute the sun's rate of motion, which is six times greater than that of the earth in its motion round the sun. If this, then, is at all characteristic of the amount of activity prevading the whole of our Stellar Universe, although the skies will remain fixed so long as the human race will endure, this motion will be sufficient, within the endless cycles of and around human race will endure, this motion will be aufficient, within the endless cycles of time, completely to change the aspect of our heavens. One can go forward, in imagination, to the time when the cancellations that now, chiese so brightly o'er us shall be rolled away to some remote confine of space, and their places be cocupied by other suns as bright and beautiful as they.

If we are relies

If we are going towards this star 61 Cygni at the rate of 400,000 miles per hour, we will reach the extremity of our RELIGIOUS.

Stellar Cluster in about 200,000,000 of years! These periods may seem incomprehensible. They indeed seem vast compared with human annals, but they are brief when laid beside the annals of our globe. If geology is not the sheerest fable—if we are not to return to the old conceptions, that the rocks with their entempted creatures have been laid down there purposely as the most mocking of enigmas—enigmas that seem to have meaning and yet have none—then during the vastest of the periods of which we have been speaking, our chief existing mountains were in being, rearing their peaks towards different constellations and surviving in their littleness and fragility even where the stability of our heavens! Because those very stars which shine on us, also albose over the Chaldeans; we speke of their changeless rest, of their arrangements as being eternal. Alas! no, neither space nor time are theatres of repear, and and even our most stable existences we the seats and subjects of activities and ever revolving change, whose ultimate object is known to God alone.

It seems, then, ladice and gentlemen, Stellar Cluster in about 200,000,000 of

object is known to God alone.

It seems, then, ladics and gentlemen, as far as we can judge from the aspect of the bodies around us, that we may consider our great clusters as being in cease-less activity; and that, therefore, those other clusters whose character I intend to bring before yon, are subject to something of the same destiny. If this is the case, how little wonderful is it that their shapes seem so capricious. There is nothing relative to them that is entitled to the name of stability, and we can view them only as exhibiting to us the phases of the successive steps of an immense progression. The kind of knowledge that we can alone have with respect to them, even should they be watched during the entire existence of the human race, is sensething like what we would learn concerning the terthey be watched during the entire exist-ence of the human race, is samething like what we would learn concerning the ter-restrial arrangement around us, if our knowledge were gained from a single glance of the eye, which was then shut again for ever. (Appleuse) No more, probably, than so passing a glance wi'll men ever attain concerning the destiny of these nebulse.

through this room. All the objects in it, on either side of me, would appear to be maked to be meaning backward. So has it been found to be with regard to the whole mass of the stars. They all present the phenomena as if they were being passed by the sum. Some Herschel's time these motions have been scanned with the utmost precision, and his conjecture has been most thoroughly confirmed. There cannot, then,

RELIGIOUS.

and that which fed on comparitively gross food, sips the dew that revels in the pastures—an emblem of that paradice where flows the river of life, and grows the tree of life. Could the enterpillar have been diverted from its proper element and mode of life, it had never attained the butterfly's splendid form and hue, it had perished a worthless werm. Consider her ways and he wise. Let it not be said ye are more negligent than worms, and that your reason is less available than their instinct. As often as the butterfly flits across your path, remember that it wispers in its flight—"Live for the Future."

With this the preacher closed his discourse; but to deepen the impression, a butterfly, directed by the Hand which guides alike the sun and an atom in its course; fluttered through the church, as if commissioned by Heaven to repeat the exhortation. There was neither epocch nor language, but its voice was heard anying to the grains audience." Live

WAS