it is to Theory we must look for an explanation. But let us approach him with all due respect, for otherwise he might get on his high horse and tell us that he was evolved by the best human thought from very facts that are now set up against him, and that if we are too ignorant or too stupid or too lazy to think out for ourselves the connection between him and the facts, we had better make an act of faith and accept him without question. He won't storm thus if interviewed in a respectful way, and if assured that we are anxious not to find fault with him but to learn from him. He has often helped such enquirers before now, and here follows what he said on one occasion to a number of them. In speaking of himself he usually imitates Cæsar, but sometimes lets a 'me' or a 'my' slip from his lips.

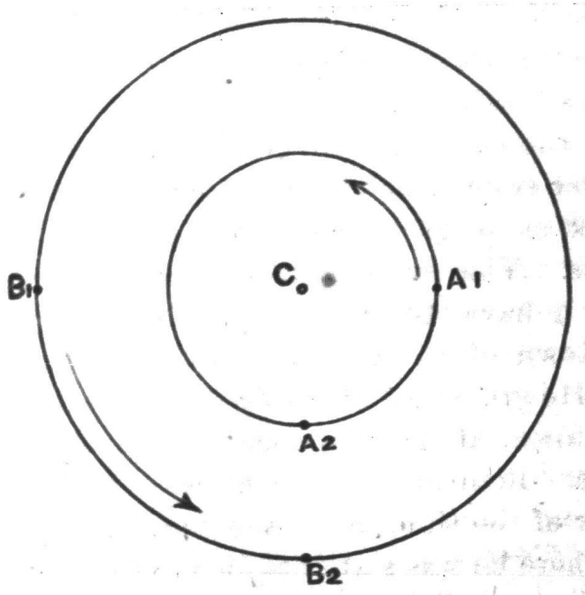
"When you say that Theory says the planets all move in one direction you ought to remember that Theory is speaking of their motions *as you would see them if you were looking at them from the sun*, which, according to Theory, is the fixed centre about which these planetary motions are described. Now, you are not on the sun, but on the earth, and, according to Theory, *this earth of yours is itself one of the moving planets.* If you will be good enough to give due consideration to these points, you will see that it is unreasonable to expect that the motions of the other planets as seen from the moving earth should look exactly the same as if you were viewing them from the sun."

He was proceeding to enlarge upon this, and to illustrate it by references to a circus and a skating rink; but his interviewers begged him not to take any more trouble with that part of the subject Some of them said they had not been guilty of that particular bit of unreasonableness. Others admitted they had, but wished to be allowed to work out the illustration for themselves without further help. He seemed much pleased at this and continued,—

"Well then, it only remains for me to try to say something that will help you to see that the motion of the earth changes the continuously forward motion of the planets as seen from the sun into the alternately forward and backward motion that you see from the earth.

"Take a sheet of paper and make two concentric circles on it. Let them represent the orbits of two planets, and let the common centre represent the sun Call the planet on the inner circle A, the other B. If the radius of the outer circle is made a very little more than two times the other, then B will take just three times as long to complete a revolution as A does. This is a consequence of one of the laws of the solar system, a law which was first discovered for me by my friend Kepler. There is no real need to put your A and B under Kepler's law. They would help you out of your difficulty if A was moving faster than B under any other law. The chief thing to note is that an inner planet always moves faster in its orbit than an outer one. There are some conveniences connected with making the one move three times as fast as the other, and that is why these rates are recommended for the planets on your diagram. Of course, from what has been already said, you will understand that these rates are rates of angular motion, that A moves over an arc of 30 degrees while B is moving over one of 10 degrees.

"Now you are to suppose that A and B are moving round their circles at these relative rates, and in the *forward* direction. You are aware that when Theory speaks of the *forward* direction he means from right to left as seen from his stand-point, the sun. If a fly were to alight on the centre of a clock dial and to set himself to watch the outer end of one of the hands he would see it move slowly round from left to right. That is *forward* for your clocks, but it is *backward* for the planets. Some of you look as if you would like some explanation of this use of 'forward' and 'backward,' but as one of your own writers says 'that's another story.' You don't need any explanation of this for your present purpose, and that purpose will be best served by attending to it only.




"You have been watching—with the eyes of your mind—A and B moving round their circles. Sometimes they are both on the same side of the centre and sometimes they are on opposite sides. Let them halt for an instant when A is at the point A1 and B is on the other side of the centre at B1. Suppose an observer placed on each, with instructions to watch the other. Start them again, and let the motion be so smooth that each observer is quite unconscious that his own planet is moving at all. To a third observer at C, as he looks first at one and then turns round to look at the other, both A and B are seen moving forward from right to left. Just at first C will hide each of them from the other, but A's swifter motion will soon remedy that. How will each of these then be moving as seen by the observer on the other?

"Since the rates of A and B are as 3 to 1, A will move from A1 round to A2 in the same time that B takes to move from B1 to B2. Now they are both on the same side of the centre and again in line with it. Seen from C, they are both of course still moving forward. For an instant the nearer one will hide the farther from a spectator at C, but the next instant A's swifter motion will have carried it out of line with B. Now, how will each of the planets seem to be moving to an observer on the other who is unconscious of the motion of his own?"

And then Theory bowed his interviewers out with a few parting words to the effect that, if they studied their two circles well, they would get light on many other planetary puzzles besides the single one they had consulted him about.

A. CAMERON.

Yarmouth, N. S., May, 1894.