

“By the Law of Periodical Repetition, everything which has happened once must happen again and again and again—and not capriciously, but at regular periods, and each thing in its own period, not another’s, and each obeying its own law . . . the same Nature which delights in periodical repetition in the skies is the Nature which orders the affairs of the earth. Let us not underrate the value of that hint.”

—Mark Twain

1 *The Mystery—and the Stage*

For over a million years man has been trying to predict his future.

He has always failed—and his failures are buried in the dust of history. Legendary fortune tellers, prophets, oracles, medicine men, astrologers, numerologists, mystics, charlatans, and seers, all claimed possession of supernatural and occult powers that enabled them to see into the future. Wars were fought, kingdoms fell, and civilizations were altered as a result of their pronouncements and predictions.

We are not without their counterparts today. They invade our homes through the media of television, radio, and the press, claiming hidden and mysterious powers that enable them to solve murders, foretell earthquakes, and blueprint our days in advance. They play on latent superstitions within all of us, piously predicting the next political assassination, the next airline tragedy, the next Hollywood divorce.

But, working quietly behind the scenes, thousands of scientists in fields as unrelated as history, botany, anthropology, mammalogy, terrestrial magnetism, sociology, and economics—to name only a few—are accumulating facts and figures that promise to make this age-old dream of foretelling the future at least a partial

reality. A new science which deals with the behavior of events recurring at reasonably regular intervals throughout the universe may ultimately enable us to predict, scientifically and accurately, the events of tomorrow.

The consequences and responsibilities represented by this embryonic science are almost too staggering to comprehend. Try to imagine a world where we will know, in advance, the probabilities of when the next war will begin, when the next civil unrest will erupt into a riot, when the next panic will descend on the stock market, when the next flu epidemic will strike, and when the next great flood or earthquake will occur.

And what of lesser events? How would the Parisian salons operate if all of us could forecast what the fashions for milady will be next year? How would Detroit's auto makers react if they could accurately forecast that our choice in automobile colors for the next model year will lean toward a variety of blues instead of this year's popular greens? Would movie makers abandon pornography and turn to musical comedies if it could be predicted that the latter will be our preference eighteen months hence?

We are just beginning to probe one of nature's basic secrets—rhythmic repetitions of events. And when we unlock the last door to our quest we will have the answer to what may well be the greatest mystery in the world—cycles, and their cause.

What Is a Cycle?

Place your hand on the left side of your chest.

Feel your heart beat? You are feeling a rhythmic cycle—something that occurs again and again at a more or less uniform time interval, a rhythm.

Our world contains hundreds of similar cycles, occurrences that repeat with predictable regularity. Tides ebb and flow every 12½ hours. There is the twenty-four-hour alternation of day and night. The moon reappears every twenty-five hours. Woman experiences a twenty-eight-day menstrual cycle. The seasons come and go on schedule. All these cycles, and countless more, are understandable and explainable. There is no mystery.

But there are thousands of rhythmic cycles in our world for which there is no logical explanation, *no known cause*. At present we know little more about cycles than was known about chemistry in the days of Boyle, Cavendish, Priestley, and Lavoisier, the fathers of modern chemistry, who made their pioneering discoveries only a brief 175 years ago. We know little more about cycles than was known about germs before Anton van Leeuwenhoek, in 1675, looked through his famous microscope at a drop of rainwater and saw his first microbe. Until that marvelous day no living man had seen these little wriggling creatures. No man knew that *there was a whole subvisible world existing under his very fingernails!*

There is much in common between the new world discovered by Leeuwenhoek and the new world discovered by early cycle pioneers. In 1838 Dr. Hyde Clarke, of England, was the first to notice rhythmic ups and downs (cycles) in business activity; Ernest Thompson Seton, the American naturalist, was one of the first to call the public's attention to the rhythmic variation in the population of animals; and Samuel Benner, in 1875, was the first American to recognize rhythmic cycles in prices.

These men, and many others, noticed regularities caused by something, they knew not what. But they glimpsed a hint of forces abroad in the universe—forces surrounding us and influencing us—that had hitherto been as unknown as Leeuwenhoek's bacteria. Their discoveries opened up a whole new world in which to adventure. When these forces and their laws have been removed from the realm of the unknown it should be possible to throw light on the coming of epidemics, on future weather conditions, on the future abundance of wildlife, and on hundreds of other natural mysteries.

But far more important, if these unknown forces affect the behavior of human beings as they seem to, we find ourselves at the very core of the problem of wars and depressions. For if wars and depressions are not caused by generals, businessmen, or politicians, as the mass of the people believe, but are the results of—or at least are triggered by—natural physical forces in our environment, we are on the threshold of a completely different and extraordinary way of life for all mankind.

The World of Cycles

The science of cycles deals with events that recur with reasonable regularity. Such events may be in nature, business, or anything else. The important thing about regularity is that it implies predictability. And if you know an event is coming, you can often prevent it or avoid it if you wish. Or if you cannot prevent or avoid it, you can at least prepare for it so that its effect on your life is lessened.

Most people do not realize the extent to which cycles and regularities exist in the world. Here are only a few examples:

Atlantic salmon vary in abundance in a cycle that averages 9.6 years from peak to peak. Starting with the year with the heaviest salmon population, the fishing gradually gets worse and worse for four or five years. Then the fish start to increase in numbers. Fishing improves each year for four to five years, so that eight to ten years from your starting point the fishing is excellent again. These years of good fishing have come at intervals averaging 9.6 years apart for as far back as there are records.

In Illinois chinch bugs vary in population in a cycle that averages 9.6 years.

The abundance of snowshoe rabbits in Canada varies in a cycle of the same 9.6 years. So does the population of lynx, marten, fishers, owls, and hawks.

Heart disease in the northeastern United States has been found to fluctuate in a cycle of the same duration. The acreage of wheat harvested in the United States varies according to the same cycle.

After this, it would probably not surprise you to learn that grasshopper outbreaks and mouse plagues come in cycles that have a duration of 9.6 years. But they don't. Grasshopper plagues come 9.2 years apart. Mouse plagues come four years apart—in Presidential-election years. Why?

Pine cones are more plentiful in cycles. People join churches in cycles. Prices of every commodity so far studied rise and fall in cycles. Women are more amorous in cycles. Sunspots erupt in greater numbers in cycles. Poets are more creative in cycles. The

weather fluctuates in cycles, and so do the fashions in clothes. Why?

The consumption of cheese fluctuates in cycles. The number of international battles fluctuates in cycles. The number of earthquakes fluctuates in cycles. Real-estate activities fluctuate in cycles, as do the prices of common stocks. Why?

Male emotions fluctuate in cycles, as do industrial accidents. The sales of every company so far studied fluctuate in cycles, as does the incidence of many diseases. Why?

Cancer recurs in cycles, glaciers melt in cycles, and the levels of lakes and rivers rise and fall in cycles. Advertising effectiveness fluctuates in cycles, as do human intellectual activity and the cattle population. Even political landslides and the number of infants born per day fluctuate in cycles. Why?

In many instances the regular rhythm is undoubtedly the result of chance. But are *all* these cycles, some of them recurring time after time for hundreds of years, merely chance phenomena? Can we arbitrarily blame them all on chance when we discover that many of them, in phenomena completely unrelated to each other, have their highs and lows *at the same time*—as if their rhythms were all being controlled by a single gigantic metronome?

Somewhere Out There

Many cycles in nature seem to have the same wavelength as cycles in human affairs, and some cycles found on earth seem to have the same wavelength as cycles found on the sun. The other planets may even be involved, and the implications are strong that the solution to the mystery of the cause of cycles will be discovered somewhere in the universe—"somewhere out there."

The dimensions of the stage on which this search will take place are awesome. Stand anywhere on the earth and you will be able to see approximately 2,500 stars on a clear night. Imagine for a moment that each star, actually a flaming ball like our sun, has been transformed into a grain of rice. If this were so, you could hold all 2,500 visible stars in a single hand.

But there are over 100 billion stars in our galaxy alone—and if every star were only a grain of rice you would need more than forty railroad cars to hold them all! And our galaxy is only one of 100 million galaxies, each rotating slowly in a cycle of its own, each following its own path in the universe.

Just as grains of rice help us to visualize the star population, let us borrow a few fruits and vegetables to reduce heavenly distances to a scale we can understand. We will begin with one large pea, a quarter-inch in diameter, as our earth. A small seed, one quarter as big, placed only nine inches away, is our moon. Using this scale of dimensions, our sun would be a giant melon, about thirty inches in diameter, almost the length of a football field away. Mercury and Venus would be peas spinning around the sun between the sun and earth. Now 423 feet from our sun let us place another pea, Mars. Then we walk a quarter of a mile and drop an orange, Jupiter. We travel another quarter of a mile and place down another orange, Saturn. A mile from our sun we drop a plum, Uranus; Neptune, another plum, is dropped at a mile and a half; Pluto, a pea, at two miles.

Merely to lay out our own solar system (remember, the size of our earth on this scale is a pea) would require a field four miles square. Then, of course, to make things complete you would have to add dust to represent the 1,500 asteroids, the comets (more than a thousand of them), and various moons, each with their cycles of rotation and revolution.

Now the true immensity of our task is upon us, for in order to position accurately the nearest star to earth we must leave our four-mile-square field and travel 14,000 miles! To continue until we have covered *only the stars in our own galaxy* on the same scale we must travel $3\frac{1}{2}$ times the real distance to our sun!

And yet evidence is mounting that there is “something out there”—some force, or forces, that affect every living thing on earth, and it does so with rhythms that have taken man through cycles of war and peace, prosperity and depression, optimism and despair, discovery and isolation, morality and degradation, creativity and ignorance, famine and plenty.

Time: The Yardstick

While you are still trying to relate the size of your own neighborhood to the vastness of space, let us consider time and age.

In all cases we measure the recurrence of cycles by time—fractions of a second, seconds, minutes, hours, days, weeks, months, years, centuries, millenniums.

Some electromagnetic waves have cycles so swift that they are measured in billionths of a second. The sun, on the other hand, makes its circuit of our galaxy in a cycle of 230 million years.

At the turn of the century many people actually believed that the world was created in 4004 B.C. Today the generally accepted age of our universe is approximately 15 billion years. Our earth, however, is a youngster, only about 5 billion years old.

Do you know how long 5 billion years is?

Let's try to comprehend this planet's age through another simple scale with proportions we can all understand. An effective method that I used years ago when teaching was to load my students in my car and say, "Now we are going to take a twenty-mile drive to such-and-such a monument. We will let this twenty miles represent the time from the creation of the earth to the present. As we go along I will point out when various things happened—such as the solidifying of the earth's crust, the beginning of life, the emergence of the earliest mammals, the appearance of the earliest men, the beginning of recorded history, when the United States was born, etc."

On our scale of twenty miles to 5 billion years it was quite surprising to the students how many miles we had to drive before we came to the first life on earth—some sixteen miles, if I remember correctly. Man, however, did not appear until forty feet from the end of our journey. Recorded history began only *one inch* prior to "now"; and the United States appeared only in the last *1/20th of an inch!*

Peas, plums, oranges, rice, melons—and a twenty-mile ride in the country. Did they help you, in some small way, to comprehend

the grandeur of That Which created and sustains the universe—call it God or Nature or whatever you prefer?

Man's Great Mental Change

What you have been able to grasp in the last few moments required thousands of years for our predecessors to understand. Revising our estimate of the time of the earth's creation from 6,000 years ago to 5 billion years ago—from 1½ inches to twenty miles—is perhaps the greatest revision in knowledge in human history.

This mental change also applies to our concepts of mass and space. Three hundred years ago people thought that our little planet was the whole universe except for a couple of lanterns hung in the sky by God to give us light by day and by night, and a handful of fireflies scattered up there for no particular reason. Since then man's "universe" has changed, first from the conception of our planet to our solar system, then from our solar system to our galaxy, then from our galaxy to the entire universe.

The widening of our mental horizons has been accompanied by revolutionary changes in knowledge and technology that are even more startling. Twenty-five years ago all that was known about steroid chemistry could be contained in one slim notebook. Today all four walls of a large room, floor to ceiling, are required to hold the books and papers recording our knowledge in this field.

In our grandfathers' time (1/50th of an inch ago on our twenty-mile scale) it required six weeks or more for a letter to travel from New York to San Francisco. Now we can watch athletes competing in the Olympic Games halfway around the world as the events are happening. A little over 1/100th of an inch ago we were earth-bound. Today we not only soar in the air faster than any bird but we have broken our bond with the earth and its gravity, confidently looking toward a future of interplanetary space travel.

Further examples are superfluous. The point, I think, has been made. The present—the last 1/100th of an inch—is the most exciting and wonderful time to live in of all the ages since the beginning of the world.

Is Man Only a Puppet on a String?

Yet as man brushes away his cobwebs of ignorance, as man acquires new knowledge of himself and his universe, he is swiftly approaching a point in time when he will be confronted with what may be a basic secret of nature, for the evidence is mounting that we are surrounded by cyclic forces, of which, as yet, we know almost nothing. These forces bounce us like marionettes on a string. They make us fight; they make us love. And all the while we think we are doing these things solely for rational reasons.

This is an unsettling concept. It ranks with the discovery that the earth is not the center of the universe, that man is not a special creature but has roots in the animal kingdom from which he developed, or that many of man's actions result from subconscious loves and hates of which he is ordinarily ignorant.

Since it is demeaning to his self-esteem, it is perfectly understandable that man should resist any hypothesis that holds that his life and his universe vibrate in rhythms that are regular and at least partially predictable and are caused by a force or forces still unknown and possibly uncontrollable by him.

Nevertheless, the evidence that man is not one step down from the angels, sublimely in command of himself and his world, continues to accumulate. He is more like a character in a Punch and Judy show, pulled this way and that by environmental forces. And he will continue to be so manipulated until he solves the mystery of these forces. Only then will he be able to cut the strings and become himself.