A NEW COSMIC HYPOTHESIS

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THE existence of an hitherto unknown cosmic law may be indicated by the remarkable correspondence between planetary distances and orbital velocities and the numbers in a natural series shown below. A clue also may be found there to the cause of Mercury's failure to conform exactly to the law of the inverse square and the physical reason for it. In a system otherwise vibrating uniformly, as shown in the series, Mercury's motion indicates that it functions as a factor of stability by interrupting the rhythm, thus averting the destructive effect of cumulative vibration mechanically due to rotation.

The series is similar to that discovered by Moseley in his investigations of atomic motions and suggests a common relation to electro-magnetism.

The numbers also correspond to vibration frequencies of the musical scale, which revives memory of the Pythagorean concept of the "Music of the Spheres."

2						
4	6					
8	12	18				
16	24	36	54			
32	48	72	108	162		
Numbers.. 64	96	144	216	324	486	

	Ven	Earth	Mars	Vesta	P'd.	Jupiter
Square Roots	8	9.8	12	14.7	18	22
	Jup.	P'td.	Vesta	Mars	Earth	Venus

The numbers correspond to mean planetary distances from the

sun (in millions of miles) and the square roots to mean orbital velocities (in miles per second) of the planets taken in inverse order. The numbers for Saturn, Uranus and Neptune are as octaves of the series between Mars and Jupiter. The ratio of the numbers is 1.5 and the ratio of the square roots is 1.225, the cube of which corresponds to the ratio of periodic time in Kepler's laws.

Extending the proportions inward, numbers are derived which correspond to Mercury's maximum ($.66 \times 64 = 42.6$) and minimum ($.66 \times 42.6 = 28.4$) distances from the sun; as is also the mean orbital velocity of 29.8 M. P. S. The square root of the mean distance for Mercury is 5.95, which corresponds to Saturn's orbital velocity. The square roots of the next two numbers similarly derived, i. e., ($.66 \times 28.4 = 18.6$) and ($.66 \times 18.6 = 12.4$) are 4.3 and 3.5, which correspond respectively to the mean orbital velocities of Uranus and Neptune.

Comparison of the mean orbital velocities of the planets (in miles per second) as determined by astronomers and the square roots of the series in inverse sequence shows almost exact agreement.

Velocities:	29.7	21.8	18.5	15	12	..	8.1	6		4.25	3.45
Planets:	Mer.	Ven.	Earth	Mars	Ves.	Ptd.	Jup.	Sat.	Ur.	Nep.	
Square Roots:	29.8	22	18	14.7	12	9.8	8	5.95	4.3	3.5	

The significant correspondence between Mercury's actual orbit and two of the serial "orbits" suggests that the series may not be purely coincidental. If not mere chance, the assumption may be warranted that planetary distances and orbital velocities are governed by rotational vibration of the sun and are independent of planetary "mass"; and may indicate an electro-magnetic effect.

The rotating "rings" which surround wires carrying electricity are similar geometrically, if not physically, to the planetary orbits. It has been demonstrated that the speed of rotation of these "rings" diminishes with the distance from the wire just as do planetary velocities.

New significance may be given to Leverrier's search for bodies interior to Mercury, if we consider the possible existence of such magnetic "rings" around the sun.

Gilbert compared the earth to a giant magnet. Might not the sun be comparable to a giant electric "spark" spiralling through space and the planets to small magnets revolving around it in magnetic rings? Confirmation of such a view probably would resolve

present discrepancies between electronic and gravitational theories and thus unify several conflicting physical concepts.

To effect such a reconciliation, similarity must be shown between electro-magnetic and celestial motions, which probably can be done experimentally. It may simplify the subject to call these motions "spiro-circuitous," which is descriptive of the revolutions of the satellites around their primaries and of planets around the sun. Some simple experiments will illustrate analogous electro-magnetic motions.

In a shallow glass plate about ten inches in diameter and containing about an inch of water, float a small piece of cork pierced horizontally by a magnetized needle. Under the plate loop about two feet of No. 10 bare copper wire. When the ends of the wire are connected with the poles of ordinary dry cells, the needle will orientate above the wire and then move around the loop with the "current." Next superpose a similar plate and needle over the first, placing the wire on wooden strips supporting the upper plate. When the battery is connected, the needle in the upper plate will move around the loop with the current as usual and the needle in the lower plate will move in the opposite direction, or against the current flow.

When the distance between the wire and needles is increased, the positions of the latter will change in relation to the wire, indicating the widening of the spiral; and the speed around the loop will vary, becoming slower as the distance is increased, as do planetary velocities. These results indicate that positive and negative effects are simply tangential differences in direction of rotation of the surrounding rings and that magnetic lines are spiral accompanying effects of electric motion—rotating rings, the angles of which indicate a spiral twist.

Recent photographs of high voltage "sparks" show electrical lines or "rings" resembling the invisible magnetic rings which surround electric circuits. If we interpret them to be similar in character, we may infer that their velocity of rotation increases inward. Such interpretation would revolutionize present ideas of electricity.

Norman R. Campbell, the great English authority on electromagnetism, says of magnetic lines: "They are just lines of force and nothing else, and are independent of surrounding bodies for their existence." Paraphrasing this expression, it might be said that magnetic rotating rings are "rotating rings—pure motion—and noth-

ing else;" and thus that "electricity is a system of similar rings of higher maximum rotational velocity."

Solar investigations made by J. C. Adams and others indicate that the interior of the sun is rotating faster than the surface. If the speed of rotation progresses uniformly inward in definite zones, velocities are developed which might explain electro-magnetic effects.

The slowest observed surface rotation on the sun, near the pole, is about one mile per second. If we take this to be the velocity of the outer one of a system of 432 zones or "rings" which increase inward in rotational velocity in arithmetical progression, 1, 2, 3, 4, etc. to 432 M. P. S., each zone having a width of 1000 miles, (comparable to the circumferential "rim" or band of a ring) the aggregate agrees with the observed diameter of the sun.

Applying inversely the law of centifrugal force, such a system might develop a radial force proceeding from the center (analogous to centifrugal force) equivalent to the square of 432 or 186,624 M. P. S., corresponding to the velocity of light and electro-magnetic effects.

The resulting magnetic "rings" surrounding such a system might then be considered as functions of the squares of the width of the zones (intensity) or as the squares of the product of these and corresponding velocities, which would yield planetary orbital distances in millions of miles. The total intensity of such a system would be governed by the size of the hypothetical zones or annular rings. A periodic conjunction of their position might result in a solar vibrating period of 4096 days, corresponding to the 11-year sun spot cycle.

Illustrating his concept of gravitation, Einstein presents an imaginary disc having a negative form of rotation. The force of repulsion being proportional only to the square of the velocities, he shows mathematically that if the disc be given an imaginary negative speed of rotation, $(v\sqrt{-1}.)$, centrifugal force will be transformed into centripetal force. The transformation is purely mathematical and has no material (three-dimensional) analogue, whereas the radial force developed by the hypothetical system of zones or rings with velocities increasing inward may have, both in the sun and in electricity. It would also radiate energy, which of course Einstein's disc will not.

Additional experiments disclose motions which correspond to some exceptional motions in the solar system. By crossing two needles at right angles through a piece of cork and floating them on water in a plate under which is placed a wire loop, the needles will move around the loop in a direction retrograde to the direction of the current when the battery is connected. The satellite Phoebe of Saturn and a satellite of Neptune have such retrograde motion. This may be inferred to be due to the eccentric inclination of their magnetic axes to the primaries.

The peculiar orbits of comets between Mars and Jupiter may be attributed to the great radio-activity of Jupiter conflicting with that of the sun. The distance factors for interplanetary peturbations and reactions of magnetic bodies coincide and by suitable substitution of such factors as magnetic "intensity" for gravitational "mass" similar mathematical results may be obtained in calculating cometary orbits. The erratic minor motions of the moon are conceivably due to the fluctuating intensity of solar electro-magnetic radiation, re-acting on the earth and moon.

It is not necessary here to dwell upon the theory of the common magnet-matter which develops or retains a large percentage of electric motion. The reactions of solenoids are well known. Ampere demonstrated that currents moving in the same direction were attracted and those moving in opposite directions repelled one another. When it is also considered that a greater motion will im-press itself upon a lesser, all the phenomena of attraction and re-pulsion may be accounted for.

It is possible that the Amperian molecular circuits in natural magnets have not the maximum velocity of electric motion, but develop such velocity through mechanical excitation. The maximum velocities of electricity are attainable also through acceleration of atomic or molecular motions by frictional or chemical means.

In order to include the electronic theory in a general hypothesis embracing the phenomena described, some revision of prevailing concepts is necessary.

If we consider the solar structure previously outlined, or some modification of it, we may also infer that the nucleus of an atom is a similar structure and that "electrons" are carried in magnetic orbits similar to the planetary orbits. The table of chemical elements shows a series of 92 corpuscles progressively decreasing in radiant energy from Radium to Hydrogen. It has been demonstrated ex-

perimentally that the force which ejects particles from radiant atoms is proportional to the frequency of vibration, a function of rotational motion. A series of hypothetical ring systems will numerically correspond to these experimental results.

If we assume radiation to be due to a force proceeding from the center of energy corpuscles, such as the hypothetical force already described, (analogous to centrifrugal force) then the number of rings in atomic nucleii should vary accordingly. A numerical series decreasing serially in alternating groups of 8 can be worked out which will conform to the table of elements and to the hypothetical system of 432 rings and also include the classified octaves of energy "rays".

The foregoing speculations suggest an answer to the question "What is electricity?" Electricity might be defined as a complex form of rotational motions, occuring in nature, which develops radiant energy. It might be further described as a system of "rings" or zones of motion rotating around a curvelinear axis, the speeds of rotation increasing inward to the center in arithmetical progression and developing a radial force proportional to the square of the maximum velocity; and also developing a secondary effect called magnetism, manifested in accompanying rings rotating spiro-circuitously around the electric system producing it. The speed of rotation of these magnetic rings might be considered serially proportional to the square roots of their distance inversely from the electric system, distance being governed by the size of the electric rings or zones (a factor of intensity) of which it is a function. Where the size of the electric rings is negligible, the rotational velocities of the magnetic rings might be considered as serially proportional to vibrational frequencies (or their inverse square roots).

These motions are best illustrated by the motions of celestial bodies traceable in the solar system.

Such definition might imply that space is a plenum which becomes "electrified" by motion at high velocity, this motion conceivably being due to compression of the plenum by Omnipotent Cosmic Force.

A corollary of this concept is that natural motion is spiro-circuitous or spiral, the combination of rotation and translation, which accords with an Archimedean modification of the view held by Aristotle, who thought it circular. Finite time may be considered as a metrical attribute of such motion. The finite space-field in which

motion functions may or may not be curvelinear.

Kepler's laws suggest the true mathematical relationship be tween finite time, space and motion, the three inseparable factors of physical existence, in atomic and solar systems alike, and analogous to the three inseparable dimensions of material bodies.

Matter is inferentially a product of the triune entity, time-space-motion.

Gallileo's laws of motion and Newton's law of (cosmic) gravitation may be empirical formulations applicable to special classes of phenomena which are really governed by a higher law manifested in electro-magnetism.

There is nothing in all this to preclude the conception of Infinite Force exerted eternally in illimitable space.

MATTER AND AETHER

It is conceivable that in the laboratory of the sun, the infinitesimal corpuscles are formed and then radiated into space, where they collect in the magnetic planetary rings or orbits. Here molecular combinations of the atomic corpuscles (matter) pass through inorganic and organic colloids to biological organisms in permutative series, becoming more and more complex, up to sentient beings having sensory nerves that respond to various solar (and similar) vibrations, just as tuning forks respond to their appropriate vibration frequencies.

The corpuscles of highest frequencies, from infra-red, through ultra-violet light to Millikan rays, may form a super-atmosphere. This would correspond to the theoretical aether; a mixture like air, but composed of high frequency corpuscles which are vibrated by solar (and similar) rays. These vibrations, reflected by material bodies, react upon our perceptory nerves, producing the sensations of heat, light, etc., just as low frequency vibrations in air react upon the auditory nerves to produce the sensation of sound.

The principle biological divisions of genera and species, like musical notes and atomic systems, are related in a vibrational way, but are not necessarily derived one from another. Each has its own characteristic identity, the whole being governed by the law of forced vibrations.

An experimental arrangement of the table of elements conforming to the 432 ring system and to the Mendeleef table of groups and series starts thus:

$$
\begin{array}{cccc}
8 & 3 & 24 \\
 & 11 & & 27 \\
16 & & 32 \\
 & 19 & & 35
\end{array}
\quad \left.\begin{array}{c} \\ \\ \\ \\ \end{array}\right\} \text{Low Frequencies}
$$

Helium 40 43   48   51   56   59   64   67
Neon 72 75   80   83   88   91   96   99

This progression runs through the atomic system in alternating series of 8 to 403, 411, 416, 419, 424, 427 and 432, the latter figures representing high frequency energy corpuscles including ultra violet "rays".

A corresponding solar series would be governed by the law of forced vibrations and the mechanical law that a "vibrating system not itself harmonic may nevertheless produce harmonic vibration."

The order of solar frequencies characteristic of atomic vibrations, of course, requires the use of units appropriate to the relative difference in the size of the sun. These units are conveniently derived from solar Time-Space-Motion relations:

Time—Number of seconds in day—86,400.

Space—Diameter of Sun—864,000 miles.

Motion—Periodic time of surface rotation—31.4 days, as observed for a period near the (magnetic) pole. The unit velocity of surface rotation is 1 M. P. S. Treating these relations in a purely numerical way we get:

$$
\frac{864,000 \times \pi}{86,400} = 31.416
$$

Thus the diameter of the sun numerically corresponds to 10 (days). From this we derive a unit day of 86,400 seconds, with which to compute frequencies, representing the number of complete revolutions each ring makes in one day. In this way we find the solar rings corresponding to the planetary harmonic series, frequencies being as the vibration numbers in the table. The innermost ring has a diameter of 2000 miles (outer circumference) and rotational velocity 432 M. P. S. Hence

$$
\frac{86,400 \times 432}{1000 \times 2\pi} = 5920; \qquad \frac{86,400 \times 431}{2000 \times 2\pi} = 2900 \text{ Neptune, etc.}
$$

For those who wish to compute the whole series, the mean of the next two rings is 1715, corresponding to Uranus. The following rings correspond to the other planets:

7 Saturn; 12 Jupiter; 18 Planetoid; 26 Vesta; 38 Mars; 55
Earth; 76 Venus. The mean of rings No. 106 and 142 is 35+,
corresponding to Mercury. The mean used for Uranus may be
considered as the inner and outer diameter of one ring, or as the
mean of adjoining rings. The mean for Mercury, however, is de-
rived from two rings not in juxtaposition.

To relate solar and atomic frequencies is a simple matter of
arithmetic. The same rotational velocities being retained throughout,
it is obvious that frequencies (revolutions of the rings) will vary
as the diameters. Solar frequencies multiplied by 10^n, proportional
to relative sizes, would correspond to frequencies of the smallest
imaginable corpuscles of energy. The number of rings in any sys-
tem would be the governing characteristic of given corpuscles (e. g.,
atoms). Thus, solar, atomic and other groups are members of the
same family, alike in all but size.

The harmonic planetary intervals are analogous to the ratios of
vibrating strings, but in inverse order, and seem to be governed
chiefly by the frequencies of the two innermost rings, their ratio
being as 2:1 approximately. The frequency of the 432nd ring is
5900 and of the 431st, 2900.

A similar rhythm is found in the 11-year sunspot cycle, which
has a period of minimum activity of about 7.5 years; maximum ac-
tivity 3.7 years; ratio 2:1. The vibration number corresponding to
Neptune's distance, 2900, is little more than two-thirds of the whole
cycle 4100 days, approximately. Thus the ratio between the solar
cycle in days and the highest "ring" frequencies seems to be about
2:1 also.

The following "law of forced vibrations" may be applied: "If
one part of any system connected either by material ties, or by mu-
tual attractions of its members, be continually maintained by any
cause, whether inherent in the constitution of the system or exter-
nal to it, in a state of regular periodic motion, that motion will be
propagated throughout the whole system and will give rise in every
member of it, and in every part of each member, to periodic move-
ments executed in similar periods with that to which they owe their
origin, though not necessarily synchronous with them in their
maxima and minima."

All the foregoing figures are worked out only experimentally, of
course, to illustrate the general principle and a method for exploring
the hypothesis. The square of the product of size and velocity of

rings corresponding to planetary distances might give better results.

If all scientific postulates and physical properties and forces of every kind are omitted, these figures develop an arithmetical analogue of a known geometrical design, a curious circumstance if it has no significance. In that respect it resembles Kepler's laws before they were interpreted by Newton or Moseley's natural series before it was applied to physical chemistry.