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Short Communication
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Sub-bubble Bi-pirouette Splicing of Cationic and Anionic Bases as a Process of RNA/DNA Creation

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Accelerated displacement of ionic hydrates along rising bubble curvatures results in steady grouping of anions and cations into separated domains. The principle of separation is based on mass differences between anions and cations. Since, anionic spherical hydrates are relatively large and heavy, these are more resistant to displacement at the bubble outer wall, and thus are gathered within the upper half sphere, while smaller and lighter cationic hydrates are more prone to being drawn into the bottom half-sphere and into the sub-bubble vortex [1]. In this way, anions are continuously collected in the bubble upper half-sphere, while cations are gathered in the bottom half-sphere and in sub-bubble vortex (Figure 1).

During the bubble rise ionic hydrates are continuously accelerated at bubble curvatures and are forced to rotate and circulate along outer bubble interface in the form of oppositely directed bi-ionic spiraled motion, as for example captured in (Figure 2). As a result bi-spiraling, bi-ionic circuits are continually assembled: an anionic-clockwise directed (CW) in upper half-sphere and cationic-counterclockwise (CCW) in bottom half-sphere [1]. Beside these two rotational systems, also evidence of a spliced CW/CCW motion spontaneously interlaced at bubble equator (Figure 2) was captured [1]. In that case oppositely directed bi-ionic bases interlace overlapping spirals that are projected downward at regular intervals during the bubble ascent (see crossing arrows in Figure 2). Both examples of bubble rotational features, with separated bases (before merge) and spliced are shown in Figure 2, where ionic rotary domains are marked by green/anionic and red/cationic arrows respectively. The spliced case of bi-ionic motion form spirals of double helix architecture, are represented as more transparent “empty cylinders” (see three tracers marked by “X” in Figure 2). In contrast, the bubbles that develop and sustain two separated rotational systems form tracers of more compact and non-transparent cylinders of superimposed bi-modal motions i.e. of cationic (internal) and anionic (outer) rotaries. Such bubbles are also characterized by relatively slower rise speed and reduced pitch between circuits (e.g. right transcript in Figure 2).

Experiments indicated that bi-spiraling i.e., CW/CCW, cationic/anionic as well as hydrophobic matter gathered at bubble curvatures and within the sub-bubble vortex, undergo inevitable narrowing within the wake, which can be extended below bubble to c. $10D_0$. During that phase both systems of oppositely rotating and oppositely spiraling cations and anions, separated by hydrophobic matter, slide along the funnel and undergo vigorous bi-pirouette splicing and narrowing of motion, which likely proceeds within the sub-bubble cavity down to molecular scale. It might result in extreme magnification of both circuits numbers as well as in energy condensation. For example, considering a bubble of D_0=0.2 mm (marked in Figure 2) that performs c. 15 bi-circuits in 1/15 of a second, the calculated bi-number of circuits may increase to 450×10^5 s^{-1}, if the rotary reduction reaches 2 nm, which is the diameter of DNA.

The same order of magnification refer to energy gained by single circuits at the bubble curvatures (E_0), which can be estimated from: $E_0 = m(\pi D_0 f)^2/2$, where: m is the mass of ions gathered at bubble curvature into single cationic or anionic circuit; D_0 is the bubble diameter or approximately the diameter of the assembled circuit; f is the number of circuits assembled in one second. The related condensation of energy after compression of bubble circuit to 2 nm diameter (estimated for all magnified 10^5 circuits) may potentially reach $E_0 10^5$ (Figure 3). For simplicity of calculations, the energy lost due to water viscosity is considered as compensated by external sources; i.e., solar energy or geothermal heat.

It is believed that, an example of sub-bubble bi-pirouette compression was captured in Figure 4, where pre-assembled cationic and anionic threads, although blurry, are visible at top and bottom of bubble transcript respectively. These perform compression and splicing in the transcript center, visible as an axis inside a captured bubble tracer of D=0.18 mm. It is consistent with the fact that bubbles of D<0.3 mm are more likely to assemble and sustain two rotational systems that may eventually undergo splicing of its double helix motion at the bubble equator or within the sub-bubble vortex. In addition it

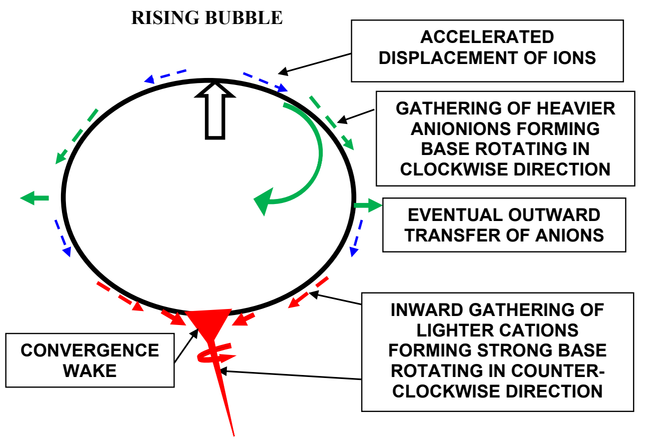

Figure 1: Sketch of a rising bubble-mediated outward accelerated displacement of ions (blue arrows) forcing the gathering of heavier anions (green arrows) that develop rotational motion in clockwise direction in the upper bubble half-sphere and the opposite inward accelerated convergence motion of ions forcing the gathering of lighter cations (red arrows) that develop stronger rotational motion in counter-clockwise direction in the bottom bubble half-sphere and sub-bubble vortex in the Northern Hemisphere.

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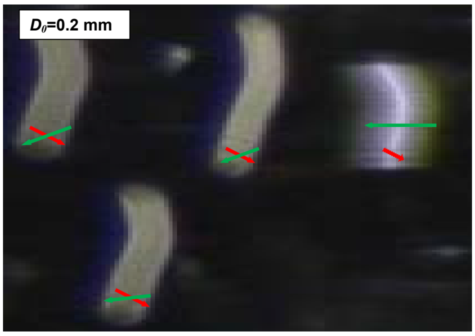

Figure 2: Rising bubble transcripts with marked anionic/clockwise (green arrows) and cationic/counterclockwise (red arrows) helical motions splicing a double helix architecture (three left tracers forming "empty cylinders" of 0.18-0.2 mm diameter, marked by crossing arrows) and a bubble before merging (right tracer) of d=0.36 mm, sustaining both rotaries under the conditions of Tw=30°C, S=30%. Bubbles were generated by fuzzy salt in a vessel illuminated from bellow; tracers captured by Canon EOS 350D digital camera with standard EFS 18-55 mm lens enhanced by 8 dioptric power lens, shutter speed 1/15 s.

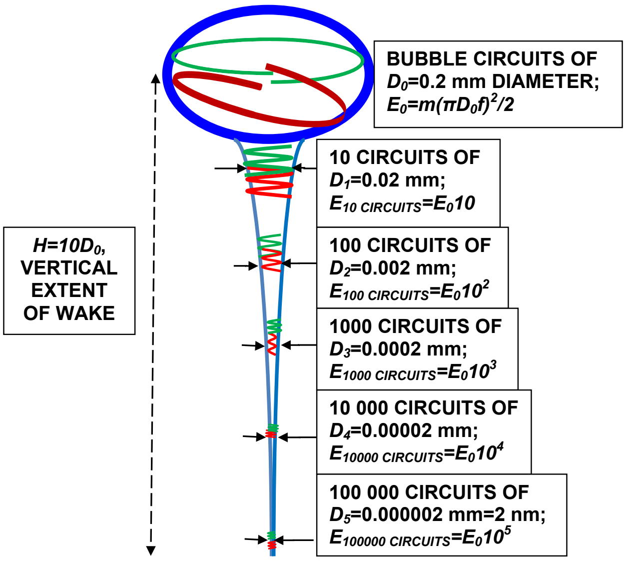

Figure 3: Simplified theoretical scheme of sub-bubble bi-pirouette splicing and compression of CW-anionic and CCW-cationic circuits, preassembled by bubble of diameter D_0=0.2 mm, resulting in magnification of circuits number (to 10^5) and condensation of energy by a factor of (10^5) for circuits compressed to 2 nm, i.e., to a typical diameter of DNA.

was experimentally proved [1] that the bubble mediated double helix motion can be generated only in a relatively clean sweater, under the high temperature range of 25-60°C and salinity range of 8-36%.

Sub-bubble, antiparallel, bi-pirouette processing of cationic/anionic domains may result in the creation of steady compressed bi-ionic duplexes. The process of creation likely combines also i.e., nitrogen- and carbon-containing molecules, dissolved in oceanic water [2-4] as well as dissolved or suspended hydrophobic particulates [2,3,5-7] that can be steadily drawn into the vortex. At the moment of bubble collapse, cationic, hydrophobic and anionic modes experience bi-pirouette splicing and compression. It might result in extensive heating inside the vortex, followed by cooling and thermal contraction after the rotary is finally dissipated. That preserves molecules created beforehand, which after the bi-pirouette-thermal compression are more tightly packed, and thus able to persist in environment even for long periods [8]. In turn, the stretches may "memorize" the motion of ions inside channel residues left inside compressed duplexes in the form of 6Å and 12Å slots that may eventually restore accurate hydrodynamic flows of firstly cations and then anions.

The stronger cationic domain assembled at the concave bottom bubble suggests that the motion of anions is probably "secondary" i.e., is induced and maintained by means of electrostriction. This indicates that the bi-ionic motion at bubble curvatures as well as the one inside RNA/DNA molecule is restored by much stronger cationic domain that somehow forms lined-up chains. These precisely rotating long lines of cations gather significantly more energy. However, there is much about bubble rotational processing of ions and related ionic activity in biota that needs to be explored. In particular the nature of rotational triggering of sodium cations that are somehow able to form strong lined-up chains needs to be explained.

Probably the most conducive conditions for splicing and binding RNA/DNA matter are found in the tropical ocean. In the equatorial oceanic compartments, the relatively reduced viscosity of water and high access to solar energy penetrating even to a hundred meters of euphotic zone, may enhance generation of effervescence bubbles that slowly rise in the water column. In addition, the matter created in the ocean may be ejected into air and contribute to convection/rainfall loops [4], thus the waterborne and airborne processing can be continuous.

Beside the multi-stage bubble/aerosol processing, matter is accumulated at the water surface micro-layer [6] especially along the transverse coastal barriers [5] that can skim floating matter. In fact, the most enhanced biota formation in the ocean and on land has been initiated after the continent of Gondwana sutured tropical land barrier 570 million years ago. That event blocked surface oceanic currents in tropics allowing accumulation of spiraled matter that has been continually processed in tropical Precambrian ocean for c. 3 billion years. Thus the stretches of spiraled matter (likely accommodated into bacteria cells) initiated a fast development of coherent spiraled molecules, allowing early Cambrian unique explosion of bio-molecules and diverse biota [9]. The persistence of transverse barriers in the tropical oceans, especially in the form of a partly closed bays, enabled

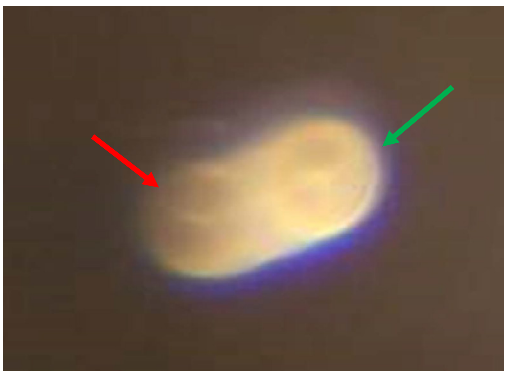

Figure 4: Rising bubble-mediated cationic motion (red arrow) and anionic motion (green arrow) splicing bi-rotary motion during bi-pirouette narrowing in the form of internal axis, revealed by deflected bubble. Tracer of D=0.18 mm motion captured with a Canon EOS 350D digital camera with Tamron Xr Di 28-75 mm lens enhanced by reverse ring; shutter speed 1/30 s. The captured bubble was rising in seawater under Tw=41.4°C and S=8‰.

gradual diversification and successive development of more complex organisms in the ocean and on land; among them the apelike hominids evolved in east Africa, c. 5 million years ago [10].

It is concluded that bubbles rising in oceanic waters are capable of creating abundant stock of bi-spiraled, bi-ionic matter, coherent in size range, thus able triggering its stretches. Therefore, the bubble-mediated separation of ions and then the related double helix motion of bi-ionic bases followed by precise (rotational) bi-pirouette splicing and compression can be responsible for creation of RNA/DNA duplexes. The matter is configured by two channels allowing to restore precise antiparallel rotational motion of ions; firstly long cationic and then anionic, aligned by electrostriction. Perhaps, the same cationic principles maintain the overall motion of ions in all bio-cells. If this concept is right, oceanic bubbles might be regarded as an unique linkage between inorganic and organic matter on Earth. In addition, considering that the same bubble-mediated spiraled matter assembly is still operating in the ocean, further transition of coherent DNA/RNA duplexes can be expected on a geological time scale.

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