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The Miracle of Living



*T*here are two ways to live your life

One is as though nothing
is a miracle

The other as though everything
is a miracle.

Albert Einstein

Biodanza

Monography

By James Harvey

*A*lbert Einstein knew this!... The greatest scientific genius knew this...

This is the definition of genius, when we can connect to the essence of knowledge that we are a miracle. A collection of tens of billions of cells organised to operate in union to support the whole. Self regulating, self repairing, evolutionarily reproducing, a thinking, feeling, instinctual being whose root is the stars we stand under and the sun that shines on us.

How can we not see the miracle!

Rolando Toro proposes that we are the expression of the project of the universe. The project of the universe is ***Life.***

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The aims of this paper

The aims of this paper are to demonstrate an understanding of the Biodanza method and present a topic which elaborates some aspect of the aims of the method. To that end I have chosen to explore the Miracle that is a Human Being.

I've collected together some amazing facts about the human body, our incredibly complexity and remarkable ingenuity, our enormity of diverse scale from the macro to the micro and our symbiosis that all contributes to the body which gives expression to our life.

We are remarkable, we are incredible, but we are not what we think we are. In the section on Belief Busters, I challenge some of the traditional beliefs about ourselves, who we think we are and where we've come from and reveal how deeply involved we are in our own evolution.

We discover how Biodanza is an excellent method for freeing us from delusions about ourselves and in fact creates a wonderful supportive environment for our on-going healthy evolution into 'Being' all we are.

But first – let's open with an overview, history and definition of Biodanza, the Theoretical model and the Biocentric principle!

Biodanza is – History and Theoretical model.

In this section we discuss what Biodanza is, what its aims are, where it comes from, its theoretical components and briefly how it differs from other therapeutic methods.

What is Biodanza?

Biodanza is a place where human beings come to dance together recovering their essence of a Global family, through the expression of love in contact, in contact with themselves, another and the group. It is where we can rediscover the path to liberate emotional expression through movement stimulated by harmonious music.

In Biodanza we have the possibility to drop our distortions, to reorganise ourselves from our cells outwards, towards reaching our highest potential. Building and strengthening our Identity as our unique expression of life. Finding our role, from our cells to our psyche, in the universal project of living and evolving.

What are it's Aims

Biodanza aims to offer possibilities for healthier, natural expression to arise, leading participants into organic renovation (*cellular repair and global regulation of biological functions*), enabling the release of historical blocks and healthier lives. These aims are realised by inducing moments of Vivencia - moments of being intensely present and fully alive.

The fully lived moment offers access to existential changes in a person. Who we think we are is dropped and our essential nature revealed. Such changes happen at very deep levels in our being, not at the superficial level. Our thinking is reorientated, our biology reorganised.

As the root of our perception is changed, we cannot hold certain views anymore, separation, racism, differentiation, prejudice all drop like dead leaves from a tree and revealed is our natural loving connection.

Views of individualism, happiness through consumerism, racism, dogmatic religion all serve to separate human beings from their innate connective love for one another. Such views are born of the egoistic, self serving mind and are illusory, separating us from the healthy human condition. Any inner conflict in a person is directly related to the tension between consciousness and reality, our mental model and the vivential lived experience.

Accessing moments of intense presence and aliveness facilitate a change in the core attitudes of a person. We become more present to ourselves and the other thus qualifying both in identity and love. In this way we rediscover the full glory of being human. We recover our existential self and perceive the essential self of the other. We find a pure essence of being, more joyous, more light, healthy and alive.

History

Biodanza was created by Rolando Torro in 60's and named in 1977.

The word Biodanza is an amalgam of two parts;

Bios – from Greek meaning life

Danza – from French means “Integrated movement, full of meaning”

It was created in response to the social unrest Rolando found himself in his life in Chile, and the aftermath of the 2nd World War.

Rolando saw the atrocities that human could perpetrate on each other as created by disassociated actions of the people at the time. Any war highlights such extreme disassociations to life, the extreme being when it becomes OK to kill another human being! However, he also noticed more subtle disassociations, separating humans being from their innate nature and thus health.

“The conceptual basis of Biodanza came from a reflection on life, a desire to be reborn from our broken gestures and our empty and sterile structure of expression. We could assuredly say they came from a nostalgia of love.” – Rolando Torro

The method has grown over the last 40 years into a mature system of Human Integration and Growth offering direct access to the experience of the fully lived moment, the now of existence, the Vivencia of life, the root of being.

Rolando saw that dance and music offered access to be re-born into affective connection, to advance our evolutive state into deeper connections with ourselves, others and nature.

Definition

“Biodanza is a system of affective integration, organic renovation and relearning of the original life functions, based on Vivencias induced by dance, singing and encounter situations in a group.” – Rolando Torro

Biodanza is the ‘Dance of Life’. Using natural movement, full of meaning, to connect to the primordial states of a human being. To elaborate through movement and singing, our natural healthy tendencies towards feelings of

affection, intimacy, transformation through transcendence and joyful connections of happiness.

The Biodanza method provides space for breaking down cultural pathologies like racial prejudice, material idolism and separation, offering re-integration of our natural states of being leading to the re-balance our original functions of life.

The process of a class of Biodanza creates a space in which moments of intense connection to the living moment arise. These moments facilitate a deep connection with ones being, ones visceral organic, original sensation of life. It facilitates going beyond the ego where thought and cultural learning, opinions and values create a fixed and often distorted view of life and reality.

“Biodanza is basically a re-education in love. The dance & movement exercises bring us into real intimacy with other people. Most of us do not connect deeply with others. We just look at the superficiality of the other person - their nose, the shape of their mouth. But the act of looking deeply into another's eyes is ecstasy! It amplifies our entire perception of who we are. The Biodanza exercises wake up our 'vivencia', or aliveness, and this allows us to really feel the intensity of each moment.” – Rolando Toro

Biodanza is progressive rather than radical, each experience adding to and building on the last. In this way, over time, we become more connected to our instincts; we achieve greater capacity for self-regulation which promotes healing. Psychosomatic disorders, such as stress, are dropped, our humour improves - moods, feelings and attitudes improve as we re-connect with the nature that is us and supports us.

Biodanza provides a method for the elaboration of moments of pure being (Vivencia) in every aspect of living experience.

The method of Biodanza in essence is the ‘Art of being in love with life’.

The Vivencia

“Vivencia is an experience lived with great intensity by an individual in the here-now (current genesis) covering the emotional, kinaesthetic, and organic functions.” - Rolando Toro 1968

This term describes the state of being where one is not only present in the immediate experience but fully participating in it as well.

Inducing the state of Vivencia is fundamental to the Biodanza method. This state is essential for transformation from fixed states of consciousness or blocks in natural expression.

It is impossible to rationally communicate the state of Vivencia, in fact doing so may subtly undermine the objective as a person may add the information to their value system, possibly providing more protective boundaries. The state of Vivencia arises as a result of providing the space to allow unfettered direct experience to arise!

(The term Vivencia used throughout Biodanza, and described here, means to be in the fully lived moment. The word Vivencia is also as a reference to a class of Biodanza).

Biodanza theoretical model

The Biodanza theoretical model elaborates the interaction of the components of Human genetic potential expressed through five “lines of living potential” or Vivencia. A person’s evolution in life is directly related to the rate at which their potentials have opportunities to be expressed across different states of consciousness.

Biodanza creates a concentrated field for human potential to be expressed. This facilitates the recovery, expansion and creation of faculties that were not realised or were suppressed in a person’s life.

The lines of living experience or Vivencia are defined as follows:

Name of Line	Description
1 Affectivity	Affection for the self and others through encounters, caress, dances of connection which lead to increased expressions of friendship and love.
2 Vitality	The energy to take action in the world balanced with rest for recovery and immune resistance. Capacity for creating homoeostasis in the body.
3 Sexuality	Stimulation of desire; sexual and motivational. Acceptance of gender. Erotic expression and sensations of pleasure.
4 Creativity	Expression of the creation of ones life. The innovative and artistic impulse. Necessary in the act of evolution and fighting disease

5 Transcendence	Going beyond the ego, re-linking to nature and natural states of harmony. The expansion of consciousness.
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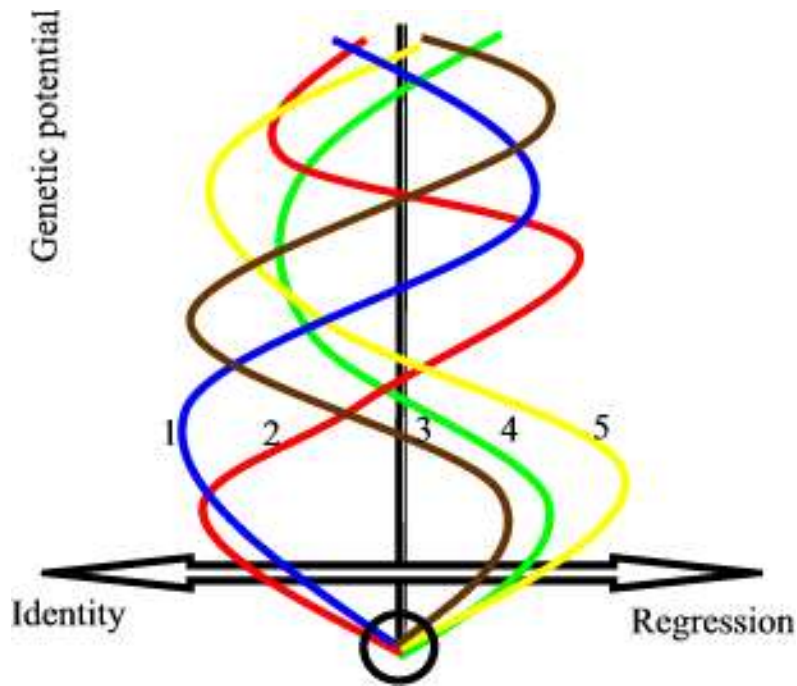
Vivential experience of these lines facilitates positive change and growth. For example, deep states of trance can initiate a “re-birthing” experience where innate patterns can be re-written. The stimulation for transformation operates from traversing the continuum between Identity and Regression.

Name	Description
Identity	The perception of oneself as a unique entity at the physical and psychological levels
Regression	The passage towards the primal, the lessening of our conscious vigilance, thus losing corporal limits.

Exercises of regression return us to a primordial state, at or before early infancy. In this state, unhealthy experiences such as abandonment can be re-imprinted with loving experiences through caress and connection which become integrated into their Identity. Exercises of Identity strengthen our perception and contact with reality and the expression of our self.

Re-writing of the human condition is available in these ways across all lines of living experience (vivential lines).

The diagram below shows the relationship from our root potential to its realisation.



Regression and Identity are linked. As we strengthen one the other becomes more accessible and vice-versa. Lines of Vivencia interplay supporting each other up the vertical axis leading us to our fullest expression of human potential.

The whole system is in a pulsation of position and magnitude of each axis, holistically supporting our growth, expansion and evolution.

The Vital Unconscious

Biodanza proposes that there is a kind of intelligence which governs living expression giving order and balance to living beings. This manifests itself through our internal mood and physical sense of well-being & good health. Rolando Torro has termed this the Vital Unconscious.

The Vital Unconscious is another layer in the definition of the Unconscious. In this model, there are three layers of the Unconscious:

Unconscious Layer	Description
Personal	Freud - Impulses & motivations unaware to the conscious mind which support or inhibit our potential
Collective	Yung - The inherent memory of the species. Archetypes (first patterns) that are common to all humanity.

Vital	Torro - Cosmic intelligence that organises & generates living systems capable of reproduction.
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Rolando proposes that life is the project of the universe. The Vital Unconscious is linked with this living essence of the Universe. When we are operating in tune with the evolutive purpose of the Universe, we experience maximum health and well-being.

In Biodanza, we can access, and so promote, our ‘Vital Feelings’ of holistic well being through inducing Vivencia. Vital Feelings are feelings which cannot be attributed to individual sensations or collection of sensations. They are holistic, holographic in nature, extending through the whole body from the level of the cellular psyche.

“The process of healing is understood as a movement toward recovering that vital synergy with the universe”- Rolando Torro

Differentiation of Biodanza

Biodanza differentiates itself from other therapeutic methods by creating an environment of developing potentials of health rather than from the desire to cure a problem or sickness. Biodanza works from the promoting the healthy.

Rather than pull all the weeds from the garden, Biodanza plants more and more flowers, encouraging and nurturing that which is already healthy, germinating the seeds of potential.

Biodanza does not use diagnostic or analytical methods. Such methods can reinforce existing patterns of behaviour. By continued revisiting, re-playing of events, we can get to practice and thus imprint more strongly, that which does not serve us.

Biodanza does not, like other therapeutic methods, offer a new set of values, it creates a shift in the culturalisation at the core of our being. Biodanza opens transformation by allowing natural expression, without force or coercion. The method respects personal limits, movements and expressions, and does not impose a way of moving, breathing or acting or interacting on a participant. Instead, Biodanza encourages by example, the expression of our potentials.

Structural concepts

The main components of Biodanza are ‘The Group’, ‘The Music’ and the ‘Exercises’

The Group provides a rich diverse nest of love, communication, reflection and containment, stimulating growth and change. The groupal aspect of Biodanza is essential as it offers participants the reflection of differences thus stimulating the Identity and providing a rich pool of eco-factors. Each participant of the group brings their own unique qualities to the whole, which are then shared and amplified by the group through connection to the music and exercises. The music and exercises combine to bombard the participants with powerful positive feedback.

The Music is the link between emotion and movement, providing the stimulus to express, by-passing the cortex and thus any conditioned thinking. The music is rigorously selected to create the intended effect for each exercise, to be emotionally evocative and integrated in nature. This provides stimulation at the organic level into more natural states of being.

Each participant is encouraged to “be the dance”, to let the music permeate and induce movement from the inside out, to be danced by the music. The emotive impact of the music becomes the origin of entering vivencial states, combined with the affective nature of the group, causes holistic transformation.

Specific Exercises are designed to induce vivencial states. Classes are constructed of a series of exercises to lead the group, with safety and confidence, into deep states of living experience.

Exercises are presented by a facilitator as an invitation to move and dance. The facilitator offers access to states of Vivencia by example. Moments of involuntary movement are encouraged to capture the intension of an exercise and to connect to the essence of the music. Free dance is not used as it is likely to simply encourage participants to reinforce old habits and patterns of movement, and thus expressions and behaviours.

Exercises of caress and eroticism induce changes at the organic and existential levels, linking love and desire, motivation for life, and the expression of the self. Exercises of affection repair our affective motivations towards others and nature, encouraging balance internally, and externally with our environment. Exercises of vitality and creativity provide the energetic balance to express creation, to explore the Art of love and exercises of transcendence provide the framework for transformation and connection

to the divine. Such exercises encourage connection, integration and interaction of each of the lines of Vivencia – expanding living experience.

The Biocentric principle

The Biocentric Principle is the principle that places respect for life at the centre of human endeavours.

Biodanza proposes that the universe exists because Life exists and that everything in existence is in varying states of being alive. This extends the holographic view of the cell to the entire universe, opening us to mystic levels of connection with the all.

The Biocentric Principle provides a route to free thought, to reconnect to the here/now, letting go of philosophical barriers and naïve ideologies which have undermined human experience.

In Biodanza we have an opportunity to reconnect to the cosmic sense of integration with the all, to celebrate the great ceremony of life in connection with the universal project, LIFE.

The miracle that is us

A human being is remarkable. An incredibly complex system of co-operation to create a living entity. About 50 trillion (50,000,000,000,000) cells (science can't agree on this so it's an average – imagine trying to count them!) working in harmony give us the life that we share on this planet. This is such a large number as to be almost beyond comprehension, the number of cells we have is greater the human population on 7,000 Earths.

Wondrous Cells

Every cell in nature is a thing of wonder. Even the simplest are far beyond the limits of human ingenuity. To build the most basic yeast cell, for example, you would have to miniaturise about the same number of components as are found in a Boeing 747 jet plane and fit them into a sphere just 5 microns across (a human hair is about 90 microns across) ; then engineer it so it can reproduce.

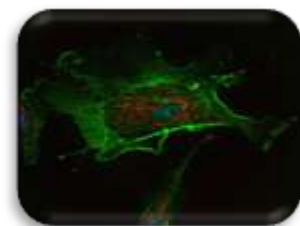
Yeast cells are nothing in complexity and ingenuity compared to a human cell. There we find a whole world of interactions and processes un-relentlessly supporting the whole.



Your cells are a universe of 50 trillion citizens, 320 different types of cell all devoted in some intensively specific way to your overall well-being. There isn't a thing they don't do for you. They let you feel pleasure and form thoughts. They enable you to stand and stretch and dance. When you eat, they extract the nutrients, distribute the energy, and carry off the wastes, they also remember to make you hungry in the first place and reward you with a feeling of well-being afterward so that you won't forget to eat again. They keep your hair growing, your ears waxed, your brain running. They will jump to your defence the instant you are threatened. They will unhesitatingly die for you; millions of them do so daily.

Inside the cell

If you could visit a cell, you wouldn't like it. Blown up to a scale where an atom is the size of a pea, a cell would be a sphere roughly half a mile across, supported by a complex framework of scaffold like girders called the cytoskeleton. Within it, millions upon millions of



1- Cytoskeleton

objects, some the size of cricket balls, others the size of cars, zoom apparently randomly around the interior. There wouldn't be a place you could stand without being bombarded and torn thousands of times a second. Each strand of DNA is on average damaged once every 8.4 seconds, ten thousand times in a day, and must be swiftly repaired if the cell is not to perish.

So let us take a moment now to regard them with the wonder and appreciation they deserve. We are a miracle at the level of our cells, just to stay alive requires 50 trillion miniature factories working tirelessly, selflessly, every day to support the whole.

Genetic coding - DNA

Inside the cell is a nucleus, and inside each nucleus are the chromosomes, DNA in joined pairs, of which twenty three come from your mother and twenty-three from your father. With a very few exceptions, every cell in your body, 99.999% of them, carries the same complement of chromosomes. (The exceptions are red blood cells, some immune system cells, and egg and sperm cells, which don't carry the full genetic package.)



Chromosomes constitute sets of instructions necessary to make proteins to maintain you, and are made of long strands of the chemical called deoxyribonucleic acid or DNA-"the most extraordinary molecule on Earth," as it has been called.

Each DNA strand has about 3.2 billion letters of coding, enough to provide 103,480,000,000 possible combinations (for computer junkies, at 2 bits each that's about 75GB of data). DNA is incredibly robust and inert, in fact the most unreactive of all living matter. This is why DNA can be retrieved from ancient bones and why its uniqueness and longevity make it useful in criminal investigations.



There is about 2 meters (*See App 1*) of DNA coiled up in every human cell. If we stretched it out end to end there would be about 100,000 million

kilometres of it in the average human. Enough to go to the Sun and back over 300 times. (It's an estimate but needless to say – really, really long!)

Over 60 percent of human genes (segments of DNA), are fundamentally the same as those found in fruit flies. At least 90 percent correlate at some level to those found in mice. (We even have the same genes for making a tail, if only they would switch on.) In field after field, researchers found that whatever organism they were working on, whether nematode worms or human beings, they were often studying essentially the same genes. Life, it appeared, was drawn up from a single set of blueprints.

Also, it was expected that the more complex an organism (humans for example) the more genetic information would be required. This also turns out not to be the case. We have 46 chromosomes (23 pairs), but some ferns have more than 600. The lungfish, one of the least evolved of all complex animals, has 40 times as much DNA as we have. That said, remarkably, we are quite closely related to fruit and vegetables. About half the chemical functions that take place in a banana are fundamentally the same as the chemical functions that take place in you. It cannot be said too often: all life is one.

In Germany and then in Switzerland researchers performed some rather bizarre experiments that produced curiously un-bizarre outcomes. In one they took the gene that controlled the development of a mouse's eye and inserted it into the larva of a fruit fly. The thought was that it might produce something interestingly grotesque. In fact, the mouse-eye gene not only made a viable eye in the fruit fly, it made a fly's eye.

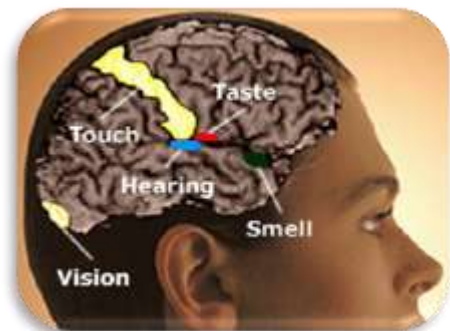
Researchers found that they could insert human DNA into certain cells of flies, and the flies would accept it as if it were their own. There appears to be something else at work other than simply the DNA encoding providing the rules of biological form! The environment plays a far more significant role in what the genetic blueprint creates than we ever imagined. We'll consider this more in the section on Epigenetics.

The brain

The human brain has about 100 billion (100,000,000,000) neurons and is 80 percent water.

From all the oxygen that a human breathes and energy available, 20 percent goes to the brain even though it's only 2 percent of the bodies mass. The brain is also comparatively picky in what it uses as fuel. If you never ate another morsel of fat, your brain would not complain because it won't touch the stuff. It wants glucose instead, and lots of it, even if it means short-changing other organs. As Guy Brown notes: "The body is in constant danger of being depleted by a greedy brain, but cannot afford to let the brain go hungry as that would rapidly lead to death."

Once you reach the age of 35, you will start losing approximately 10,000 brain cells a day. That's about 500 of them an hour, so if you have any serious thinking to do there really isn't a moment to waste! 😊 (There's no need to be concerned, that's only about 0.5% in a lifetime).



By the way, your brain is more active at night than during the day.

Nerve impulses to and from the brain travel as fast as 170 miles per hour. Ever wonder how you can react so fast to things around you or why that stubbed toe hurts right away? It's due to the fast movement of nerve impulses from your brain to the rest of your body and vice versa, bringing reactions at the speed of a super-car.

The brain operates on the same amount of power as 10-watt light bulb. The cartoon image of a light bulb over your head when a great thought occurs isn't too far off the mark.

The human brain can hold 5 times as much information as the Encyclopedia Britannica. Or any other encyclopedia for that matter. Scientists have yet to settle on a definitive amount but the storage capacity of the brain in electronic terms is thought to be between 3 or even 1,000 terabytes. The National Archives of Britain, containing over 900 years of history, only takes up 70 terabytes, making your brain's memory power pretty impressive.

The brain itself cannot feel pain. While the brain might be the pain center

when you cut your finger or burn yourself, the brain itself does not have pain receptors and cannot feel pain. That doesn't mean your head can't hurt. The brain is surrounded by loads of tissues, nerves and blood vessels that are plenty receptive to pain and can give you a pounding headache.

It is not possible to tickle yourself. The cerebellum, a part of the brain, warns the rest of the brain that you are about to tickle yourself. Since your brain knows this, it ignores the resulting sensation. Luckily, this doesn't apply for other forms of self pleasure!

The eyes

The lens, which is really only part of a compound lens system, is responsible for the variable part of the focusing. Focus is changed by squeezing the lens with muscles (or in chameleons by moving the lens forwards or backwards, as in a man-made camera). The focusing muscles of the eyes move around 100,000 times a day. To give your leg muscles the same workout, you would need to walk 80km (50 miles) every day.

The image falls on the retina at the back, where it excites photoreceptors.

The middle part of Figure 2 shows a small section of the retina enlarged. Light comes from the left. The light-sensitive cells ('photoreceptors') are not the first thing the light hits, but they are buried inside and facing away from the light. This odd feature is mentioned again later. The first thing the light hits is, in fact, the layer of ganglion cells which constitute the 'electronic interface' between the photoreceptors and the brain. Actually the ganglion cells are responsible for pre-processing the information in sophisticated ways before relaying it to the brain, and in some

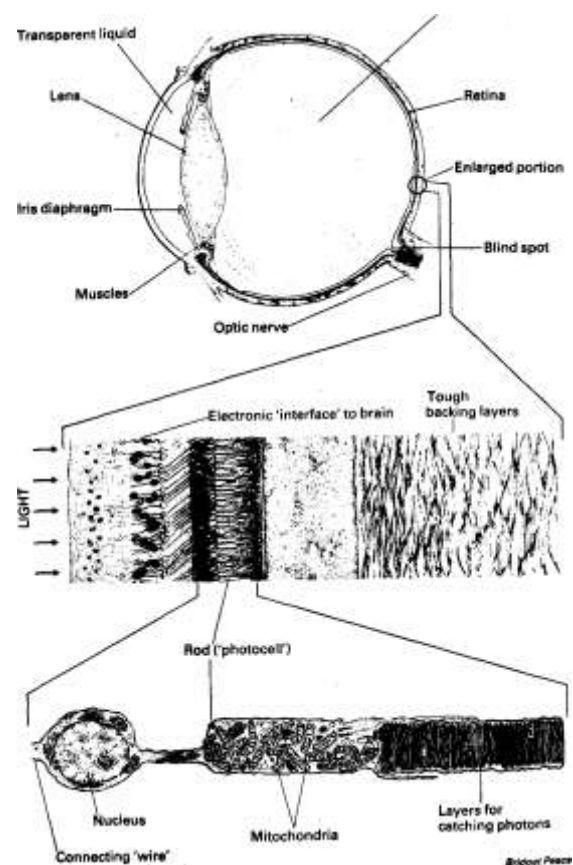


Figure 2

ways the word 'interface' doesn't do justice to this. Satellite computer might be a fairer name.

Wires from the ganglion cells run along the surface of the retina to the 'blind spot', where they dive through the retina to form the main trunk cable to the brain, the optic nerve. There are about three million ganglion cells in the 'electronic interface', gathering data from about 125 million photocells. The figure of 125 million photocells is about 5,000 times the number of separately resolvable points in a good-quality magazine photograph.

Some eyes are capable of detecting a single photon. The fastest and most sensitive film emulsions available to photographers need about 25 times as many photons in order to detect a point of light. They are also capable of seeing more than 1 million simultaneous visual impressions and can distinguish between almost 8 million gradations of colour.

The only part of the body that has no blood supply is the cornea in the eye. It takes in oxygen directly from the air.

The lungs

In one day, adult lungs move about 10,000 litres of air, consuming about 1 kg of oxygen, and even more with vigorous exercise.

The surface area of a human lung is equal to a tennis court. In order to more efficiently oxygenate the blood, the lungs are filled with thousands of branching bronchi and tiny, grape-like alveoli. These are filled with microscopic capillaries which oxygen and carbon dioxide. The large amount of surface area makes it easier for this exchange to take place, and makes sure you stay properly oxygenated at all times.

The adult human body requires about 88 pounds of oxygen daily.

The heart

The Heart is all an immensely demanding process. Your heart must pump 340 litres of blood an hour, 8,160 litres every day, nearly 3 million litres in a year, that's enough to fill an Olympic-sized swimming pool, just to keep all those cells freshly oxygenated. (And that's at rest, during exercise the rate can increase as much as six fold.)

The human heart has to pump blood back and forth through the 70,000 miles of blood vessels in the body once every minute. The human body has approximately 37,000 miles of blood capillaries. Line them up end to end and that's four times around the earth!

The human heart is such an amazing pump; it can create enough pressure that it could squirt blood at a distance of 9 meters. (You've got to ask; who tried this?)

In one day your heart beats an average of 100,000 times, that's 35 million times a year, and during a typical human life span, that's approximately 2.5 billion times. Thank you heart!

Sex - the lesser known facts

There are approximately 100 million acts of sexual intercourse each day, that's just over a thousand a second!

Sex burns about 70-120 calories for a 60 kg woman and 77 to 155 calories for an 80 kg man every hour. That's an average of 210 calories for each act of sex. If we convert this into heat, the amount of energy used in sex in the world could boil a litre of water every 4 seconds. Tea anyone?

A man's testicles manufacture 10 million new sperm cells each day – enough that he could repopulate the entire planet in only 6 months. However, the sperm count of an average male compared to thirty years ago is down thirty percent. (That's still 7 million a day).

There are approximately 400 feet of seminiferous tubules in the testes of a human male. This is where sperm is stored until an ejaculation releases 200 million to 500 million sperm, each of which is capable of fertilizing an egg.

To prevent these little guys doing their job, the condom was invented in the early 1500's and was originally made of linen. During World War II, rubber condoms were used to cover rifle barrels from being damaged by salt water as the soldiers swam to shore.

The female ovaries contain nearly half-a-million egg cells, yet only 400 or so will ever get the opportunity to create a new life. Those that do make it past any contraception will confront an egg eighty-five thousand times bigger than it, (which rather puts the notion of male conquest into perspective).

During pregnancy, the average woman's uterus expands up to five hundred times its normal size.

During sex, endorphins are released, which are powerful painkillers, particularly during the female orgasm. So here's some proof that having a headache is in fact a bad excuse not to have sex!

The average amount of time spent kissing for a person in a lifetime is 20,160 minutes. There are many benefits to kissing but one lesser known is that kissing can aid in reducing tooth decay. This is because the extra saliva helps in keeping the mouth clean. Let's get this average up folks!

How fast a man's beard grows is partly a function of how much he thinks about sex (because thinking about sex produces a testosterone surge).

A piece of foreskin, the size of a postage stamp, from circumcised babies take only 21 days to grow skin that can cover three basketball courts.

Other weird and little known gems

The small intestine in the human body is about 5 centimetres around, and 6.5 meters long and when you blush, the lining of your stomach also turns red.

The human body makes anywhere from 0.5 to 1.7 litres of saliva every 24 hours. You may not want to swim in your spit, but if you saved it all up, you could. In a lifetime, the average person produces about 600,000 litres of saliva -- enough to fill two 10m x 15m swimming pools!

Human hair is almost indestructible. It cannot be destroyed by cold, climactic changes, water or other natural forces (except fire). It also can survive exposure to many kinds of acids and corrosive chemicals

In 30 minutes, the average body gives off enough heat (combined) to bring a 2.25 litres of water to boil.

15 million blood cells are destroyed in the human body every second.

Human bone is as strong as granite in supporting weight. A block of bone the size of a matchbox can support 9000 kg - that is four times as much as concrete can support.

The aorta, which is largest artery located in the body, is about the diameter of a garden hose.

An average women has 15,800 square centimetres of skin. When a women is in her ninth month of pregnancy she has 17,200 square centimetres of skin.

Laughing lowers levels of stress hormones and strengthens the immune system. Six-year-olds laugh an average of 300 times a day. Adults only laugh 15 to 100 times a day.

The colour blue has a calming effect. It causes the brain to release calming hormones

Humans smell "in stereo". Scent signals from each nostril travel to different regions in the brain. This may help a person determine the direction the odour is coming from

The skin contains approximately 640,000 sense receptors, scattered unevenly over the body's surface. These receptors are most abundant in the ridges of the fingertips, in the lips, at the tip of the tongue, in the palms, on the soles of the feet, and in the genitals. The picture opposite represents a view of the body proportional to the number of receptors in each area!



Belief busters.....

We've already seen that much of what we take for granted everyday is amazing and not necessarily as we expected of have been led to believe! Our environment (eco-factors) plays a huge role in our evolution at the genetic level and we are host to Bacteria that have little to do with us! (See App 2).

So what else are we assuming?

Many of the things about ourselves we believe are so, are being found, not be true, and in fact detrimental to our survival!

Let's take some examples of who we think we are and where we've come from and examine them a little!

You're how old?

Well, right now, I'm in my late 40's . My body is aging nicely, (actually it would appear that due to the practice of Biodanza, aging more slowly than normal). So, one would think that, quite sensibly, my chronological age, the number of times I've been on the planet while the Earth has gone round the sun, is how old my body is, yes? Well, no....

Most living cells seldom last more than a month or so, in fact every hour about 1,000 million cells in the body must be replaced. Liver cells, however can survive for years, though the components within them may be renewed every few days.

Brain cells last as long as you do. You are issued 100 billion or so at birth, and that is all you are ever going to get. The good news is that the individual components of your brain cells are constantly renewed so that, as with the liver cells, no part of them is actually likely to be more than about a month old.

The stomach's digestive acids are strong enough to dissolve razor blades. Stomach cells are constantly being replaced so that the acids don't have time to dissolve your stomach lining. Every cell in the stomach lining will be completely replaced every six days.

Your surface skin cells are all dead. Just think, every inch of the surface of your body is deceased. Without any kind ceremony, our skin is laid to rest on our body and around our houses daily. If you are an average-sized adult you

are carrying around about 2.25 kilos of dead skin, of which several billion tiny fragments fall off each day (about 2kg a year).

Indeed, it has been suggested that there isn't a single bit of any of us-not so much as a stray molecule-that was part of us nine years ago. It may not feel like it, but at the cellular level we are; partially dead and somewhere between a new born baby and a nine year old. *May explain my more immature moments!*

Where did we come from?

Rolando alludes to a Vital Unconsciousness being the underlying consciousness of life, of cellular psyche. Organic material has the ability of self-organisation, defence, reproduction, affinity and rejection, and of autopoiesis – the ability to define themselves from seemingly impossible situations. There is an organising intelligence at work in a universal project. The project of the creation of more and more complex bodies leading to life itself!

The project of the universe can be said to be evolution. This act is seemingly randomly continuous with no purpose other than that of creation. It would seem logical that, if one found a watch, its existence would imply that there was a watch maker. It has a system, a purpose a well defined function, someone or thing must have designed it. The same reasoning has led to the assumption of a divine engineer of life, and as such the creation of the instantaneous Human! This is an almost natural abstraction but is ignoring the fundamental evidence of evolution. When we view the evolutive process, however, not only does it disqualify the idea of a divine engineer, but it alludes to there being no design at all!

“It [evolution] has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the blind watchmaker” [b1].

So do we accept that we are some random mistake, some combination of chance that just happened luckily over billions of years from the creation of the universe to us, now? Well, apparently not! For years now it has been generally accepted that evolution is random and that our genes set who we are, our pre-dispositions to capabilities and dis-ease and that the fittest will survive!

Evolution - a closer look

Evolution occurs at edges. If we look at crocodiles, they have not changed for thousands of years. Why, if evolution is a random, continuous process, is this not the case? This is because the impetus to evolve occurs when a biological entity no longer suits its environment. Or, to put it the other way around, environmental changes stimulate biological change. When environmental changes occur, biological changes occur to try and meet the needs of the new environment. Animals whose biological changes do not fit the environmental conditions - die out.

Descended from the apes! My dear, let us hope that it is not true, but if it is, let us pray that it will not become generally known.
- Bishop of Worcester after Darwin's theory of evolution was Explained to her.

So what about survival of the fittest? Surely this implies the fit ones, those stronger would survive. Well, no. This misnomer was introduced by Darwin to keep favour with the circles he moved in, upper class ones, who wanted to see themselves as 'evolutively better'. The original paper on evolution, proposed by Alfred Russell Wallace (working class), stated the demise of the less adapted, not the survival of the fittest. This means that the 'weak' would prosper in the right conditions, and thus removes any projected bias on fit or weak being desirable or undesirable, good or bad traits.

Darwin's paper implied we must struggle to acquire the status of being the best whereas Wallace's supposition implies we have to improve so as be best adapted to our environment.

Consider the implications for a moment!

We now live in a Darwinian world where it is accepted that competition is the key to survival. To have higher status, more money, more power at the expense of others and the planet appears to be our evolutive imperative! In a Wallancian world our evolutive imperative would be to co-operate in line with our environment, one where we strive together to support the whole.

Further to this it has been shown that evolution is not random! Experiments on bacteria have shown that, given the same environmental change, the same strains of bacteria will evolve identically. The progression is not random; otherwise you would expect many different changes to occur and one of those to be the one that won-out. This flies in the face of accepted thinking of evolution by chance.

So, not only is evolution not the survival of the fittest, it is not random and not continuously happening just for the sake of it.

These discoveries and corrections of perception are still not the whole story. We have much more influence over our evolution than we previously imagined.

Where are we going - Epigenetics

Your genes do not make you! We are led to believe by popular science that your genes pre-determine who you are and how you are going to be, this is simply not true; your genes are actually a blueprint!

If you were building a house and you left the blueprint for it lying around the building site, the house would not miraculously build itself from the blueprints – this would be absurd. It takes the builders to make the house. It's the same for cells, the genes provide the blueprint and the body/mind / environment creates the cells. That's why a human cell put into a fruit fly eye, creates a fruit fly eye, not a human eye – the environment for that cell is different.

However, it's more profound than this. The mind creates much of our environment. We are a community of 50 trillion cells connected via a neural network, a hormonal wash and nutrient bath. What we think, our beliefs, our concepts affect what is transmitted throughout the body via our nerve cells and endocrine system. Also, what we eat and our ecology affect the whole system. Beliefs and perceptions that are not true – create biology as if it were true and chemistry that supports the mis-perception. Support this with poor nutrition and pollution and we have a recipe for disease.

Today, stress creates many diseases in our culture (*over 90% of diseases are caused or complicated by stress*). Mostly, the stress exists due to mis-perceptions and lack of the capacity to disperse stress hormones. If we constantly react as if faced by life threatening situations by simply looking at our bank account, talking to our boss or worrying what others think of us, our bodies will be flooded with a cocktail of hormones including cortisol. Simple situations then create dis-ease and our cells actually start to adapt to be more aware of stress. In this case, the number of cortisol receptors on the cells surface of each new



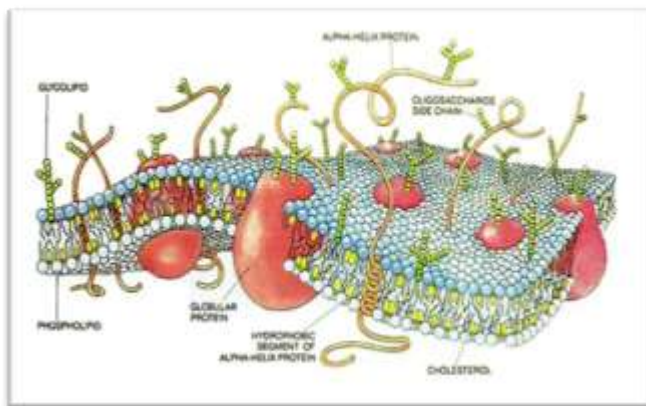
cell generation will increase making our sensitivity to stress increase in a vicious circle until....

Change our beliefs, (*or at least recognise they are not real – something that is real does not need to be supported by belief*), the food we eat and our environment and our cells adapt to reinforce the new information.

Being immersed regularly in a bath of positive eco-factors progressively re-trains the mind that love, emotional security, fraternity and nurture are our normal state. This feeds back to the body literally changing us at the cellular level to become not only more healthy, but more prone to health – resistant

to short term negative feedback.

The cell membrane is the communication interface to the environment. Our cellular intelligence is here at the boundary – 50 trillion of them!



It doesn't end there either! Studies have shown that not only does bombardment by positive eco-factors lead to a cellular healthier you; this information is fed back into the genes, into our DNA. When DNA was first discovered, it was simply accepted by the scientific communities at the time that DNA was fixed, static. It was Howard Temin studying tumour viruses that first discovered that DNA was being changed by the very chemicals usually associated with being defined by DNA. This was thrown out as heresy by the scientific community as it flew in the face of static heredity. It implied that our own enzymes could modify our DNA. Temin went on to receive the Nobel Prize discovering this process now known as 'reverse transcriptase'. Further to this, Fredrick Nijhout discovered that our genes are not, as previously accepted, self-emergent. Our genes have no capacity to switch themselves on or off. It would be like ingredients in a recipe appearing and disappearing at will to make a different meal. Genes cannot activate their own expression. "When a gene product is needed, a signal from it's environment, not and emergent property of the gene itself, activates the

expression of that gene” – Nijhout. Fancy that, environmental conditions control gene activity!

The affirming facts are, we can literally re-code our DNA and alter the genetic traits that manifest in us to become healthier and, remarkably, these traits are then passed to our offspring! This is known as epigenetics, the re-writing and stimulation of our genetic code from environmental conditions.

We owe it to our future children to immerse ourselves in rich, positive eco-factors, to elicit more whole, healthy and complete human beings!

The process of the evolutive project of the universe has led to more and more complex entities perhaps arrogantly, culminating in us. We can be said, truly to be the result of the act of pure creativity expressed as a biological entity. The divinity sought in an external ‘watchmaker’ - is us!

Summary

Our physical existence is a miracle, a marvel to our current understandings. We look with the mind and are astonished at the complexity and brilliance of our body, of all life, all matter. 50 trillion cells in harmony is almost unimaginable, all functioning in concert with no input required from the conscious mind.

But does it define us – does it define our experience of life, our health, our sensations of well-being. Well, partly, however, it cannot, and should not be viewed in isolation, it is a whole system. Reducing our experience to its component parts is like trying to understand the function of a watch by looking at one of its cogs – impossible! Reductionism can never explain life - genius is in understanding and working with the relationships [Rolando Torro].

We could infer a divine engineer who created a human being much like a human being created a watch! To do this is an almost natural abstraction; however it would be ignoring the fundamental evidence of evolution. This is not to say that there isn’t a Vital unconscious, it is more to draw us to the progressive, evolutive nature of existence rather than an instantaneous one.

Does evolution have a purpose in mind? It would appear not. Apparently it is the unfolding of creativity for the sake of creation. However, it does seem to have a pattern. The exciting thing for human beings is, we appear to be the only organism on the planet that can actively affect our own evolution.

Yes, we are miraculous, we are complex, we are an enigma of existence. We can wonder at our being, at our own awareness of our existence. We can stare at our navels and ask, WHY? But, does this help with our expression of living?

When we return to our biological roots, when we allow ourselves freedom of expression as a constituent of the whole, when we integrate our thoughts, actions and feelings, when we return to our original functions of living expression, this is life. We add life to life, we build and create in a celebration of our existence in harmony with all things.

We come to understand, to have at the core of our being, in our nature, that we are our own reality, we are divinity expressed, and the purpose of our being is simply that.

Biodanza is one way to find this. In the dance we find our spirit!

In the dance we are free to be with 'what is' in the moment, and this becomes perfect, devoid of delusion.

It's a moment free from any burden of thought or of thought generated feeling about the moment. Perfection is not the goal; it is the way it is when everything else is removed. It is the natural state of all that is.

Ease comes when we allow the dance of life to be. The dance of the body-mind-spirit occurs naturally, in union with reality. We relax into what we are, instead of analysing the mechanism, instead of thinking we are in the driving seat. It's a good idea to keep the mechanism in good order, but not to make that the purpose of our life. The purpose is to wake up into the moment from the sleep of being the driver, from being in control, into fully lived moments of presence.

Investigation into our nature brings us inexorably back to where we started. To: who is asking the questions? Through the practice of methods like Biodanza, we drop our illusions, we directly experience ourselves, we find in the fully lived moment that we simply ARE THE MIRACLE!

*We listen to the music of our Universe,
and dance it as the miracle of our life!*

My Personal statement

I discovered Biodanza in the summer of 1994. I had been to an amazing dance event in Covent Garden where my dance opened from disco to the kind of flourishes your might see in ballet! There, playing as a two year old, I met Sue Muzgrave who told me about Biodanza. I did not pay it too much attention until one rainy, dull Saturday when something pulled me out of my doldrums and whispered – “go to Biodanza”. So, I overcame my resistance and travelled into London.

If memory serves, the hall for Biodanza was in Rossmore Road in Paddington. I remember entering a fairly plain hall to find a few people milling around inside and not knowing what to expect at all.

What I remember most from that first experience was a sense of freedom, of liberation I had never felt before. I was flying for the first time in my life. I felt like I was up in the rafters, given permission for the first time ever to express everything I had inside (or at least I felt at the time).

Patricia Martello was the teacher and she was only in England for a couple of months. I did every class that was offered. I didn't understand a thing about what was happening to me, I just wanted more, more, more. It was like a drug, I was almost permanently high. I had fallen in love with the process, the people, the teacher – everything.

What happened after that is unclear to me now, only the most intense experiences remain. I remember Patricia deciding she wanted to move to England and I remember collecting her from the airport with Carolina Churba & David Brown. We were all very excited to have this amazing woman to be permanently offering the gift of Biodanza to us.

Carolina instigated Patricia being in England and organised Biodanza events with a fervour. Classes moved to Covent Garden and we were often to be found promoting Biodanza in the streets. Carolina was a magnet of passion, drawing people into share this method which was so foreign to most but so needed by many. This was the first time noticed feeling strange about Biodanza. It felt weird to try and communicate this to others. How do you put into words something that is such a personal experience, even why should I want to and what would people think of me. It appeared crazy when I looked at what I was doing every week and this madness was thrown into relief when I tried to explain it to others.

Even though I had this gap in perception, I had a strong passion to keep going to classes. I felt more whole, more loved, more honoured in this than in anything I had ever done. Using my body to communicate was a delight for me. It meant I did not need to explain myself with words, I could simply express through my body all that I had inside. At one stage I became frustrated that my body could not move in more expansive ways and that I was trapped by gravity. My passion for expression was bursting in me. I even started my own Bare foot boogie event in Guildford called Toes so I could share more dance with others.

At this time I was working for a Computer company in Bracknell and decided I wanted to be closer to London to be more involved in Biodanza. I decided that I could change my job to contracting and started with a Bank in London. My friends thought I was nuts! Why would I use a dance class as a compass for me life? Well, I can safely say it was one of the best things I ever did. My life improved dramatically. My income trebled, my friends grew, my experiences deepened. This, I now know, is one of the effects of doing Biodanza. Things open that you do not expect, as we come more into ourselves, our horizons expand, more potential is realised.

I started in the School of Biodanza in 1995 or 96. This was mainly so that I could spend more time in the practice. I had no illusions of teaching at that time. I have fond memories of struggling to understand the theory. It was originally written in Spanish, badly translated to English then presented by someone who could only speak a little English. Also couldn't really see the point of trying to analytically explain something that was so experiential in nature.

Well, to my due, I also got involved in helping to translate some of the material with one of the other participants. It was extremely difficult to translate due to the depth of the language being used; technical, poetic and full of meaning about the human condition.

My horizons expanded further with trips to dance Biodanza in France, Holland, Belgium, South Africa and taking holidays together in Greece. I discovered a new world wide family where the people were open, loving, inclusive and generous. Some of the best times of my life have been on these trips inside and outside of classes. These events further extended my imagined boundaries and connection to the planet we live on.

In 2000 I decided to get married. I had been in Turkey to offer a dance holiday (not Biodanza but a mixture of things I and my friend had learnt over the years). Only one person turned up, it was not a success. I learnt the hard

way how difficult it can be to get participants for anything. How we need to grow these things organically and how basic advertising doesn't really work. The result of the trip was that I either had to split up with my then girlfriend or get a fiancé visa so we could be together. Well, the choice was obvious to me – towards life!

I was only married for a short time. Initially it met all my expectations and desires for a 'normal' family life. However, I started to become restless as it became more and more apparent that the things in life that sustained me, that I was passionate about, were not shared. In fact they became points of contention. This finally, with much fighting, led us to divorce. I had left Biodanza behind and other personal growth activities I was involved in, for the marriage. I became dried up. Shortly after the divorce I entered a very dark place, a crisis of the soul, or healing crisis as it is often referred to. My close friend Maz saw me through my darkest hour. My world had collapsed. I did not know what to do. I thought that having a wife, a steady job, a social life, some fun and occasional holidays was how things should be. They weren't!

In Feb 2003 I crashed. Stopped working and in March went to Thailand for a holiday, to recover. I took several holidays over the next six months and slowly recovered my joie-de-vie. My life started to take off again...

In 2004 I got a phone call from some friends I'd made in Pilion in Greece. They were having trouble with the holistic holiday centre they had set up and asked if I could help. I said, 'sure, happy to consult, but I don't want to get involved'. A year later I was running the place.

Around about the same time, thanks to Niraj, I discovered Osho Leela. Niraj had gone there to live and start teaching Biodanza there. Osho Leela, is an Osho Community in Gillingham, Dorset, and it scared to willies out of me to go somewhere so foreign to my experience. However, I wanted to support Niraj, and this overcame my fears. Needless to say, I loved the place. I had discovered a home from home. It even felt similar to the house I had grown up in.

I invited Niraj to bring a Biodanza group to the Pilion Centre in Greece for an alternative holiday and all was well with the world again. I worked in Pilion every summer and took an IT job to support myself every winter in England, continuing to do Biodanza whenever I could.

Niraj started a Biodanza School at Leela in 2008 so it was back to school for me. Biodanza had grown up quite a lot since then and the theoretical material was much better presented.

Over my years of experience with Biodanza, I still held a resistance to teaching. I had taught various classes of Dance but had found myself depleted by the experience. I felt there was something missing. I still had misgivings from my experiences of promoting Biodanza in London. The sense that this is weird, never really left me. I could not put my finger on it until one-day....

One day, in a moment of grace, I got it. The Biodanza method works by bring people to a place where their movement is involuntary. This was a huge break-through for me; it was my AH-HA moment.

Now in retrospect, this is a small part of the method, but it was the catalyst that had the whole system make sense to me. From this point on, I knew I could teach. I needed to understand the simplicity of what it means to be danced and the profundity of how healing this, seemingly simple, act is. I suddenly was Biodanza in a whole new light!

In August 2009 I was at the Biodanza Festival at Osho Leela and I met Shashi Soulna who lived at a Detox Centre in Thailand. Shashi encouraged Niraj to run a Biodanza workshop at the Sanctuary Thailand, and knowing this place to be so regenerative for me, I jumped at the chance.

This was a life changer. While I was at the Sanctuary I realised that I could potentially live there. I had a mind blowing Satsang (self realisation) experience while I was there, and that coupled with an invitation to teach at the Sanctuary sealed the deal. Two months later I was living in Thailand, teaching Biodanza. WOW!

I lived in a wooden hut on the most beautiful beach on Koh-Phangan for 5 months. I danced and partied and loved and played and swam and lived in paradise.

In March 2010, again, inspired by Shashi, I came to Bali. This was to experience the Bali Sprit Festival. Little did I know until I arrived in Bali, that it was a Yoga festival. Well, I didn't do Yoga!!! When I arrived in Bali, in Ubud, it was such a shock to my system. It was busy and noisy with lots of traffic and people and restaurants and dirt and no beautiful beach. What was I doing here?

I was soon to find out. Ubud is now my home. A rich combination of spiritual community, beautiful people, amazing nature and it's an island, so guess what, plenty of beaches. After being here a short while I was running Biodanza classes at the top Yoga studio in town and having the time of my life!

I am Forever grateful to Rolando and the method of Biodanza – offering a life full of love and possibility. My growth has brought joy and experiences beyond the capacity of my wildest dreams all those years ago.

Now I get to share that with others. To be present to the depth of connection created by facilitating others in Biodanza is a gift. The sense of love in a room at the end of a class is palpable. I can feel it, see it, taste it, and swim in it. It's glorious. I feel honoured and privileged to be part of the evolutive process of the planet.

Appendix 1 – Length of DNA

The length of DNA when unravelled has no consensus. An average of 2m has been assumed for this paper.

Bibliographic Entry	Result (w/surrounding text)	Standardized Result
Mitchel, Campbell Reece. <i>Biology Concept and Connections</i> . California, 1997.	"At actual size, a human cell's DNA totals about 3 meters in length."	3.0 m
<i>McGraw Hill Encyclopedia of Science and Technology</i> . New York: McGraw Hill, 1997.	"If stretched out, would form very thin thread, about 6 feet (2 meters) long."	2.0 m
Matthews, Harry R. <i>DNA Structure Prerequisite Information</i> . 1997.	"The length is (length of 1 bp)(number of bp per cell) which is (0.34 nm)(6 × 10 ⁹)"	2.0 m
Leltninger, Albert L. <i>Biochemistry</i> . New York: Worth, 1975.	"Chromosome 13 contains a DNA molecule about 3.2 cm long."	1.5 m
"Cell." <i>The World Book Encyclopedia</i> . Chicago: Field Enterprises, 1996.	"On the average, a single human chromosome consists of DNA molecule that is about 2 inches long."	2.3 m

Appendix 2 – Bacteria

Are we the culmination of evolution? (Bacteria)

Bacteria may not build cities or have interesting social lives, but they will be here when the Sun explodes. This is their planet, and we are on it only because they allow us to be.

Bacteria, never forget, got along for billions of years without us. We couldn't survive a day without them. They process our wastes and make them usable again; without their diligent munching nothing would rot. They purify our water and keep our soils productive. Bacteria synthesize vitamins in our gut, convert the things we eat into useful sugars and polysaccharides, and go to war on alien microbes that slip down our gullet.

We depend totally on bacteria to pluck nitrogen from the air and convert it into useful nucleotides and amino acids for us. It is a prodigious and gratifying feat. As Margulis and Sagan note, to do the same thing industrially (as when making fertilizers) manufacturers must heat the source materials to 500 degrees centigrade and squeeze them to three hundred times normal pressures. Bacteria do it all the time without fuss, and thank goodness, for no larger organism could survive without the nitrogen they pass on. Above all, microbes continue to provide us with the air we breathe and to keep the atmosphere stable. Microbes, including the modern versions of cyanobacteria, supply the greater part of the planet's breathable oxygen. Algae and other tiny organisms bubbling away in the sea blow out about 150 billion kilos of the stuff every year.

And they are amazingly prolific. The more frantic among them can yield a new generation in less than ten minutes; *Clostridium perfringens*, the disagreeable little organism that causes gangrene, can reproduce in nine minutes. At such a rate, a single bacterium could theoretically produce more offspring in two days than there are protons in the universe. "Given an adequate supply of nutrients, a single bacterial cell can generate 280,000 billion individuals in a single day," according to the Belgian biochemist and Nobel laureate Christian de Duve. In the same period, a human cell can just about manage a single division.

Mitochondria – bacterial beings within our being

Mitochondria are thought to have originated as captive bacteria and that they now live essentially as lodgers in our cells, preserving their own genetic instructions, dividing to their own timetable, speaking their own language.

You may also recall that we are at the mercy of their goodwill. Here's why. Virtually all the food and oxygen you take into your body are delivered, after processing, to the mitochondria, where they are converted into a molecule called adenosine triphosphate, or ATP.

ATP molecules are essentially little battery packs that move through the cell providing energy for all the cell's processes, and you get through a lot of it. At any given moment, a typical cell in your body will have about one billion ATP molecules in it, and in two minutes every one of them will have been drained dry and another billion will have taken their place. Every day you produce and use up a volume of ATP equivalent to about half your body weight. Feel the warmth of your skin. That's your ATP at work.

We couldn't live for two minutes without Mitochondria, yet even after a billion years mitochondria behave as if they think things might not work out between us. They maintain their own DNA. They reproduce at a different time from their host cell. They look like bacteria, divide like bacteria, and sometimes respond to antibiotics in the way bacteria do. In short, they keep their bags packed. They don't even speak the same genetic language as the cell in which they live. It is like having a stranger in your house, but one who has been there for a billion years.

Mitochondria manipulate oxygen in a way that liberates energy from foodstuffs. Without this niftily facilitating trick, life on Earth today would be nothing more than a sludge of simple microbes. Mitochondria are very tiny-you could pack a billion into the space occupied by a grain of sand-but also very hungry. Almost every nutriment you absorb goes to feeding them.

The oxygen is taken up by the mitochondria. These are the cells' power stations, and there are about a thousand of them in a typical cell, though the number varies considerably depending on what a cell does and how much energy it requires.

As well as viewing humans as the top of the food chain, we could just as easily view ourselves as a by-product of Bacterial supremacy. We are far more integrated with other life forms on this planet than we are generally aware of in our day to day existence. We are on an evolutive journey with many – many other organisms on which we depend - lest we forget!

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