A better HEALTHCARE for a better WELFARE? CHRONOBIOLOGY and LITHOTHERAPY: SUSTAINABLE SYSTEMIC SOLUTIONS

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Systemic Solutions for Systemic problems
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Abstract

Man-made chemicals accumulate in Earth soils and waters: local systematic use of drugs creates systemic problems for our species survival. Our "Take-Make-Waste" society is not sustainable. Systemic solutions must arise at local and global levels. HOW chronobiology, for a better healthcare, and lithotherapy, for a better welfare, could be useful systemic solutions for prevention of such systemic problems?

The temporal organisation of living systems is evidenced as an innate and inheritable specific network of clocks that cannot be changed. But knowing these endogenous clocks functioning allows to understand WHEN and WHY therapeutic strategies are efficient or not. Sleep agenda recording and individual vigil chronotypes determination and their respect is the best way to avoid scholars' failure. Performance changes are depending on chronotypes and societal time changes. Results of students' competency tests (reports, talks, experimentations) are significantly increased (from 20% to 50%) when done AT THE RIGHT TIME. Man is an Earth clock shaped species. The minimal and maximal durations of all sleep cycles of a night obey a relationship that results from interactions between endogenous clocks and exogenous ones. All Earth living systems share a common ecoexotope of survival that is temporally structured by **solar, lunar and terrestrial rhythms**. These rhythms are synchronisers for our endophysiotope clocks. But some people are more sensitive to them than others and someones are resistant. Man night sleep changes depend on lunar cycles entrainment. Our Earth-hosted organism is physiologically structured with Earth as a fixed point and the analysis of sleep records points to **circa-annual solar rhythms** that can be considered as controls for the evidence of **circa-monthly lunar rhythms**.

WHAT methodology to evidence temporal organisations of living systems and their physiological responses? Only individual longitudinal measurements must be used. Into controlled network of clocks, different frequencies are running depending on responses to endogenous or exogenous changes. Not only "on" stimuli but also "off" ones have effects. For 1 clock, its latency phase duration is always equal to at least 1 period of the rhythm. HOW long is the latency of a network of clocks?

WHAT methodology to evidence lithotherapeutic effects? Stimuli responses must be tested according to a double-blind placebo-controlled survey. WHAT mineral to use FOR WHAT to do? It is a *a priori* complex study! WHAT scaling to use?, FOR WHAT treatment?, WHAT mineral to chose and WHY?, HOW and WHEN to treat? The characterisation of jade or jasper varieties, for example, is a challenge. The first difficulty is to identify commercial affordable sources of jade, nephrite and serpentinite, for testing for treatment of night urination difficulties. Each control, placebo or treatment record is lasting at least 120 days. Compared with control, jadeite or nephrite enhances night quality with a decrease of at least 15 fold of awakenings and urinations. Depending on the jade variety, and its trace elements, properties change. Nephrite suits better with a 20 fold enhancement. The highest of all placebo effects was below a 4 fold increase. The mineral crystal structure is evidenced to have an action. The area of contact of a stone with the skin is the limiting factor of an energy transfer. The day phase of our life is structured in cycles as the night phase is. Placebo effects are greater during the conscious day phase than during the unconscious night one, but red jasper treatment enhances significantly the number and the intensity of diurnal physical working.

Minerals act in a dose-dependent manner as drugs do. Using hematite before serpentinite (jadeite or nephrite), enhances the effect, as with chemical agonists, minerals may act in synergy. Hematite sole gives a placebo effect. But hematite increases serpentinite effect from a 15 fold value to a 22 fold one. Surprisingly, within an interactive network of clocks, the latency phase of the whole is shorter than the shortest latency phase of each clocks, thus enhancing the system reactivity to changes: a**s a whole, a system is defined by some unanticipated emergent properties**.

Lithotherapy with affordable, easy to obtain, and not subject to imitation minerals is a ***smooth way for an individualised, easy to use, non-violent, and non-invasive therapy*** to treat chronic pathologies, ***helping people in their today way of life***. Chronobiology is a way of thinking not only for knowing diseases causes and to elaborate treatments, but also for apprentice assisted learning: ***the right interaction at the right place and the right time for the right person with the right person.*** ***New ways of research are emerging.***

Key words: chronotherapy, clocks, dose-dependent effect, double-blind placebo-controlled trials, ecoexotope, endophysiotope, latency, lithotherapy, rhythmicity, system of systems, unexpected emergence.

Introduction

Our modern human society is using drugs everyday, everywhere and for everything: -antibiotics to fight against bacterial diseases or to add to animal food, -hormones to enhanced animal growth or to avoid man reproduction, -phenols as chemical compounds in plastic bottles or disinfectants, -systemic insecticides... *"Drugs use and abuse makes money."* But sooner or later all these man-made chemicals will accumulate in soils and waters. Systematic use of chemicals is creating systemic problems for man survival: -emergence of antibiotics resistant bacteria, -toxic water for drinking or cooking, -feminisation of male fishes... WHY?

Our ***"Take-Make-Waste" society is not sustainable*** and is less and less sustained by people. A ***"Take-Make-Waste but Recycle"*** society is intended to cure these systemic problems [Bricage, 2002c]. Recycling makes money too... And it works [Doolotkeldieva et al., 2015]. But prevention is better than curing! **Systemic solutions exist for prevention of such systemic problems**: -chronobiology for a better healthcare and -lithotherapy for a better welfare. HOW?, WHY?

Chronobiology allows to use -only when necessary- just the right amount of drug, at the right time [Lévy et al., 2008] and the right place. But we must first know the temporal organisation of the living systems we are acting on [Bricage, 1985, 2015]. The question is: WHEN? Lithotherapy is the use of minerals for their natural potential applied to physiological processes. The questions are: WHAT?, WHAT FOR?, HOW?

I. The temporal organisation of living systems.

The time graphed simultaneous variations in man glycaemia, glucagonaemia and insulinaemia can be explained as ***a cybernetic process***: the global control of blood glucose concentration depends on **ago-antagonistic retro-controls** (figure 1).

I.1. Example of temporal organisation: *"the human glycaemia hour touring":* an endogenous clock.

We can graph the same recorded values as ***a systemic process***, using time independent ***instant simultaneous interactions*** between glucose, insulin and glucagon concentrations. We can also graph the instant interaction between glucagon and insulin whatever the time and glucose concentrations and we will have the real time arrow of the living system internal clock. Pointing to the juxtaposed and embedded levels of organisation we can, with ***a cyber-systemic approach***, graph their ***instant local and global interaction network*** to evidence an innate, inheritable, clock. Simultaneously pointing to spatial organisation, network of interactions and temporal organisation (figure 1), the clock is an innate and inheritable specific component that cannot be changed. Knowing the endogenous clock allows to understand WHEN and WHY paradoxical therapeutic strategies are efficient and logical ones are not [Bricage, 2004].

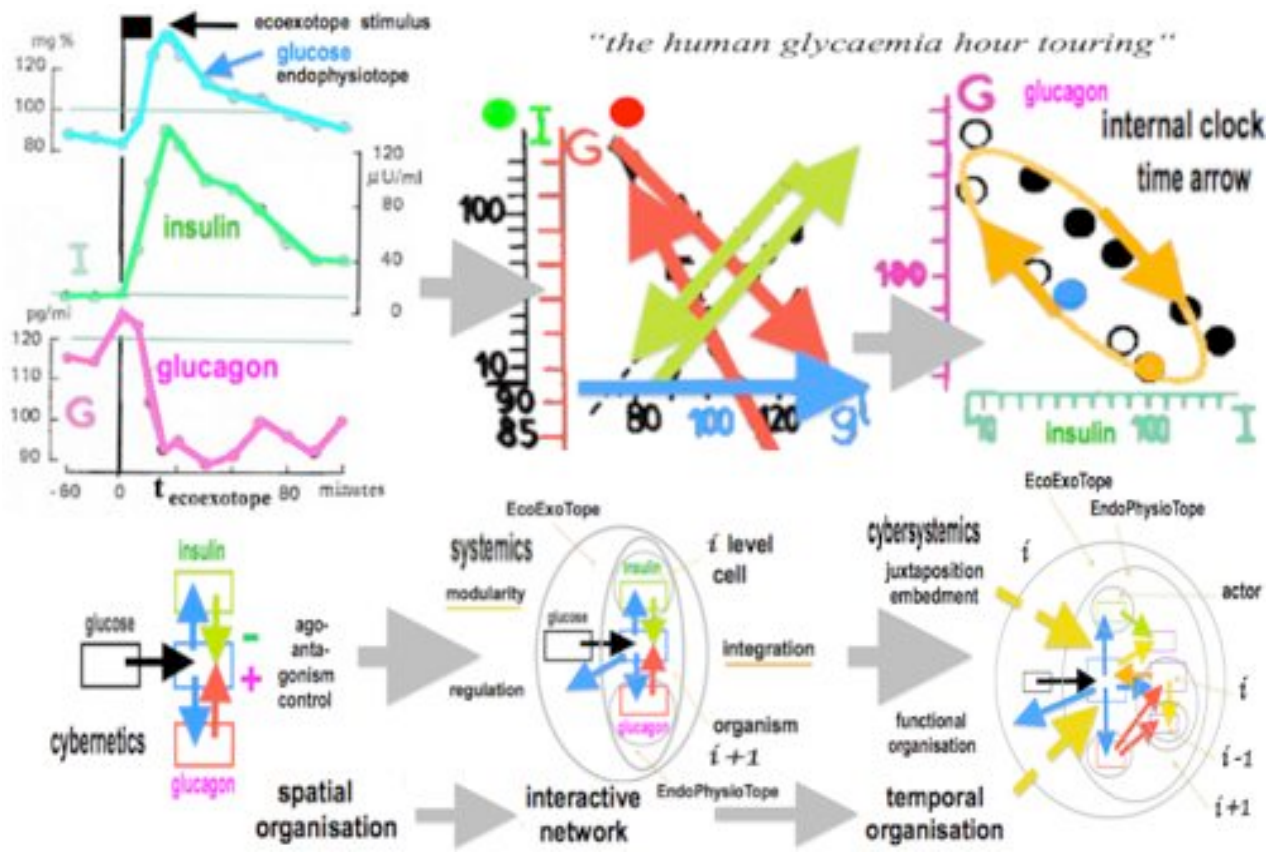

Figure 1. From cybernetic processes to systemic and cyber-systemic ones.
- top left : glucagon and insulin concentrations timed changes are depending on glycaemia timed changes,
- bottom left : but reciprocally, glycaemia changes (blue box) are retro-controlled by glucagon and insulin changes.
- top medium : time independent relationship, Y=F(X), between glycaemia changes, X= **gl** (blue arrow), as a cause, and insulinaemia (**I**) and glucagonaemia (**G**) changes, Y= **I** or **G**, as effects, which is the same as insulinaemia and glucagonaemia related changes as causes, **x**= **I** or **G**, and glycaemia changes, **y**= **gl**, as an effect y=f(x).
- bottom medium : organism internal glucose changes are depending simultaneously from ***ecoexotope*** (*exo*: external, *tope*: space-time, *eco*: of inhabitation) -inputs and outputs [Bricage, 2002a]- and ***endophysiotope*** (*endo*: internal, *tope*: space-time, *physio*: of functioning) changes [Bricage, 2002b, 2004, 2010, 2013, 2014a, b].
- top right : the endophysiotope clock shape and its time arrow are governed by the glucagonaemia and insulinaemia interactions, **I**=f(**G**) or **G**=F(**I**) as here represented, as an ecoexotope independent innate endophysiotope clock.
- bottom right : if taking into account the organisation levels [Bricage, 2001b], the organism temporal organisation emerges (**grey arrows**) from the interactive functional percolating network [Bricage, 2005] of all ecoexotope and endophysiotope embedded and juxtaposed actors [Bricage, 2001a, 2002b, 2010].

For diabetes treatments, now we know it is neither enough to know the place (WHERE), the mechanism (WHAT FOR) [Müller et al., 1970], and the functioning (HOW) [Ren et al., 2015], nor the determinism (WHY) [Nagorny & Lyssenko, 2012], but the time : WHEN [Bricage, 2013]!

I.2. Vigil **chrono-types** determination and respect: the best way to avoid scholars' failure.

Using sleeping schedules (figure 2), with day to day scoring of sleep quantity and quality, everybody can determine her/his unique vigil phenotype based on its going "to bed, getting up and night awakenings" pattern. Three types stand out: a morning type (people who go to bed early and get up early), an evening type (people who go to bed lately and get up lately) and a rhythmic chronotype (people who are neither morning type nor evening one but both, depending on the day).

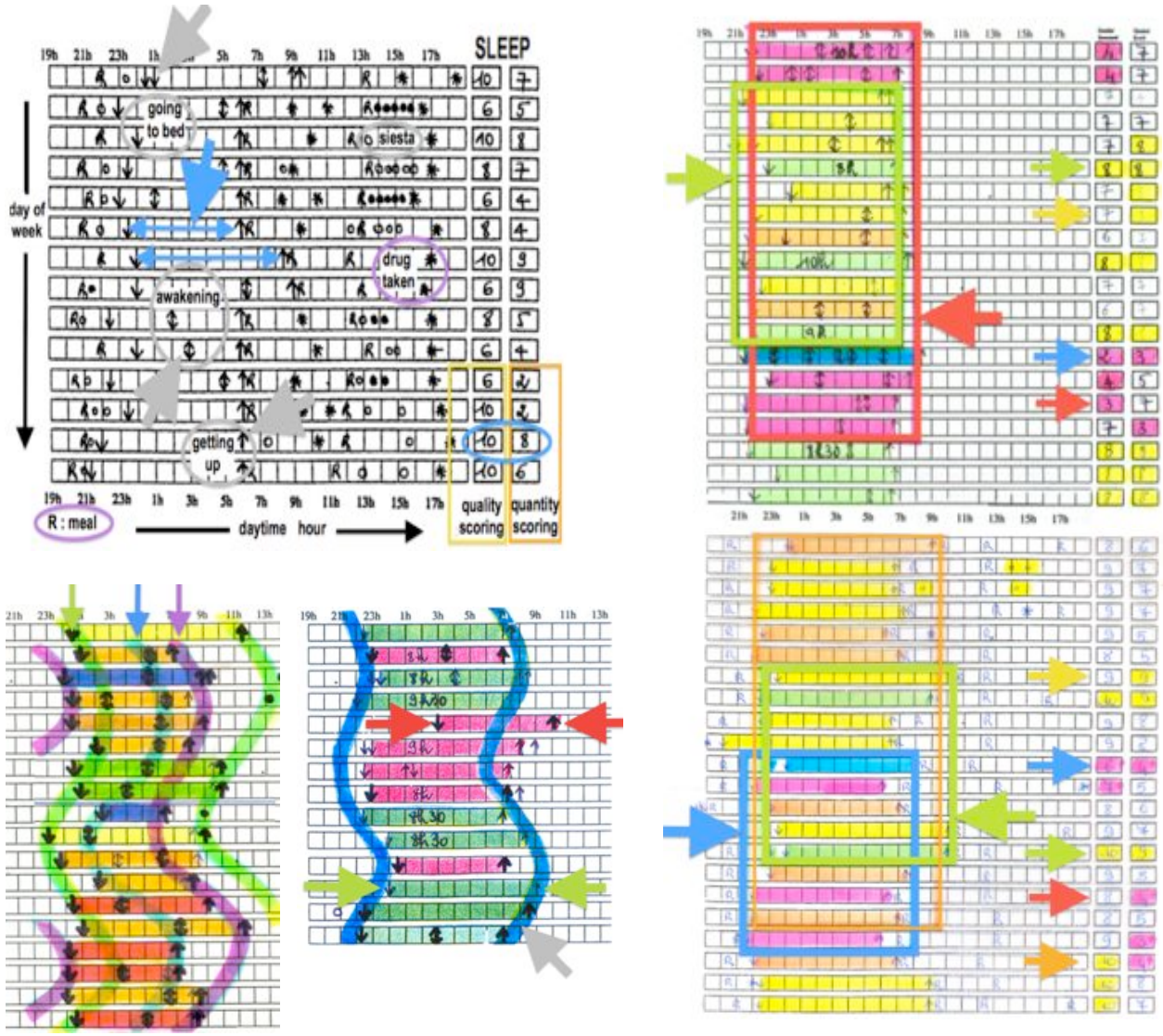

Figure 2. Sleep agenda recording and semiological determination of chronotypes.

- sleep agenda (top left): a longitudinal record (at least a 1 month duration, each day recording, with daytime hour), with each day quality and quantity of the subject's sleep scoring (**yellow rectangles**), the events of her/his day and night phases (going to bed, getting up, sleep awakenings: **grey arrows**, taking food or drug: **violet circles**) and with each sleep duration (**blue arrow**) associated with its global scoring (**blue circle**) [Bricage, 1998a].
- ***morning type*** (top right): good scoring (better nights indicated in **yellow**, and the best one -**small green arrow**- in **green**) if going to bed early (**big green arrow**) and getting up early (**left shifted green rectangle**), bad scoring (bad nights indicated in **red**, and the worst one -**small blue arrow**- in **blue**) if going to bed lately (**right shifted red rectangle**) and getting up lately (**big red arrow**).
- ***evening type*** (bottom right): good scoring (better nights indicated in **yellow**, and the best one -**small green arrow**- in **green**) if going to bed lately (**right shifted green rectangle**) and getting up lately (**big green arrow**), bad scoring (bad nights indicated in **red**, and the worst one -**small blue arrow**- in **blue**) if going to bed early (**big blue arrow**) and getting up lately (**left shifted blue rectangle**).
- ***rhythmic type*** (bottom, left and middle): -on the left- whatever the night sleep quality, all awakenings are aligned on parallel sinusoids (**violet**, and **green** curves) of the same period, ***all events aligned along parallel sinusoids*** -on the middle- good scoring (better nights indicated in **green**) if both going to bed and getting up at the hours of the sinusoid (**green arrows** on the **blue sinusoids**), bad scoring (bad nights indicated in **red**) if going to bed or getting up not at the sinusoid hour (**red arrows** outside the **blue sinusoids**): good if *"on time"* (**grey arrow**), bad if *"lagged"* .

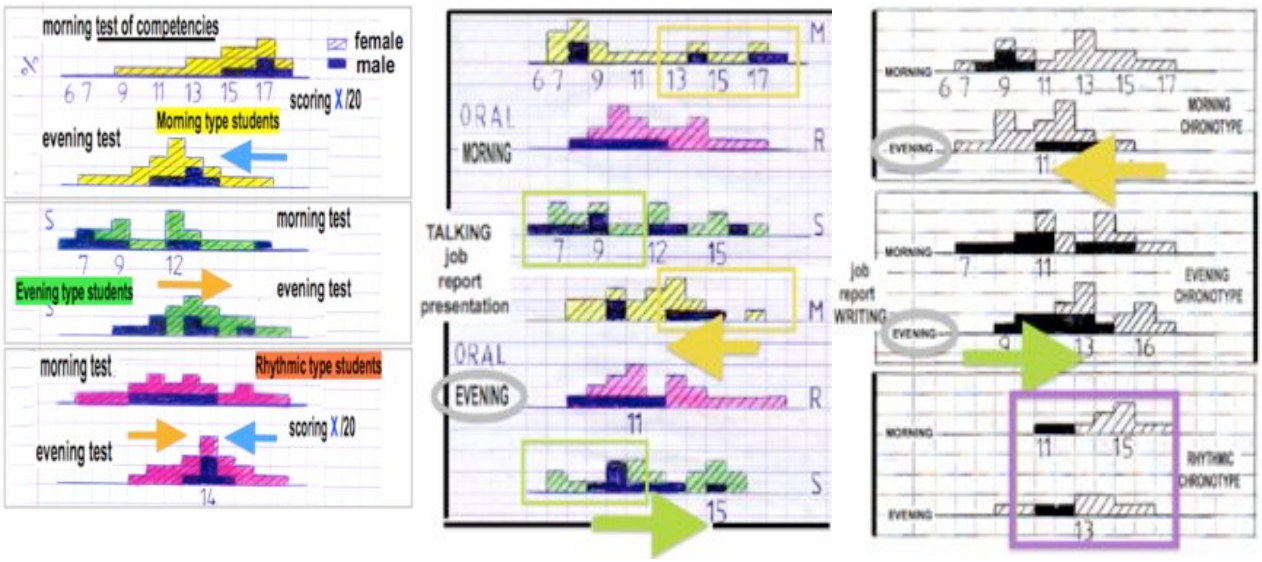

Figure 3. Performance changes depending on chronotypes.

- morning types (**M**) in yellow, evening ones (**S**) in green, rhythmic type (**R**) in red, male gender in **black**, score /20,
- *"experiments-design and record"* capabilities (left side): Comparison **within each chronotype** of morning and evening results, for the same tests. The more evening late testing, more the failure (**blue arrow**) of **Morning** types. The more evening late testing, better the success (**orange arrow**) of **Evening** types. Rhythmic types are both like morning ones -but with a higher variance- and evening ones -but with a smaller variance-. As previously evidenced (figure 2), **Rhythmic** types are both *"neither Morning ones nor Evening ones" and "simultaneously Morning and Evening ones"* (**blue** and **orange** arrows), depending on the day of their endogenous rhythmicity [Bricage, 1998a, b].
- *"talking-reporting"* capabilities (middle): Comparison of tests results **between chronotypes** depending on the hour of the same test. The more evening testing, more the failure (**yellow arrow**) of Morning types. The more evening testing, better the success (**green arrow**) of Evening types. On the morning (the 3 upper distributions) Rhythmic types are **intermediary** between the Morning and Evening ones and with **a smaller variance**. On the evening (the 3 lower distributions) they are intermediary too, but got the best results.
- *"writing-reporting"* capabilities (right side): Comparison **within each chronotype** of morning and evening results, for the same tests. The more evening testing, more the failure of Morning types (**yellow arrow**). The more evening testing, better the success of Evening types (**green arrow**). Rhythmic types are both ***"neither** Morning ones **nor** Evening ones" **and** "**simultaneously** Morning **and** Evening ones"* (**violet rectangle**), depending on the day of their endogenous rhythmicity, but with the smallest variance.

Nowadays, genes involved in time organisation have been identified [Ciarleglio et al. 2008] or sequenced [Lim et al., 2012]. The 3 chronotypes are inherited with 3 alleles of the same gene.

Knowing a person's vigil chronotype (figure 2) allows to plan for her/his drugs intake at the right time depending on its rhythmic schedule [Bricage, 1993, 1995]: ***chronotherapy*** [Bricage, 1999]. Taking into account the vigil chronotype allows ***to plan for the best time for the best performance*** of a student or a sportsman and for a particular risky or key activity. Results of students' competency tests (reports, talks, experimentations) are significantly increased (from 20% to 50%) only when done AT THE RIGHT TIME [Bricage, 1998a, b, 1999] (figure 3).

But failures may result from external time changes, as jet-lag, that shift the interactive coordination between the external (*ecoexotope)* time and the endogenous (*endophysiotope*) one: ***clocks desynchronisation*** (figure 3). Innate clocks or calendars are **entrained by ecoexotope synchronisers** (Zeitgebers). Desynchronisation can be avoided and resynchronisation procedures can be enhanced by taking into account the individual chronotype (figure 4).

Vigil **chrono-types** determination and respect is the best way to avoid scholars' failure.

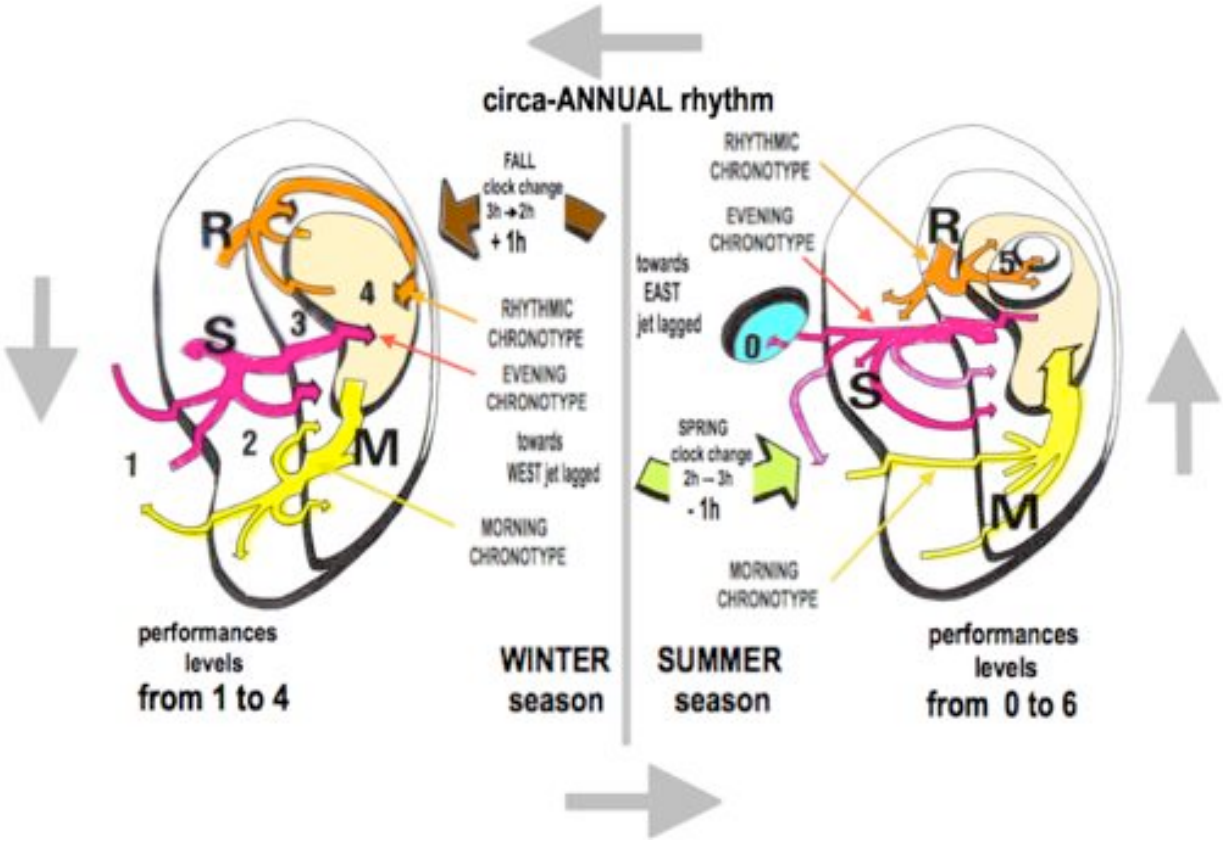

Figure 4. Performance changes depending on chronotypes and societal hour changes. Comparison between chronotypes circa-annual rhythm responses.

- morning types (M) in **yellow**, **evening types** (**S**) in **red** and **rhythmic type** (**R**) in **orange**, year run: **grey arrows**,
- Fall clock changes (left part): entering winter season (**big brown arrow**), the hour is delayed (**-1h** jet-lag towards West), within a **4** degrees of performance scale: **M** types performance decreases from 4 (*before the change*) to 3, 2 or 1 (*after the change*), **S** types one increases from 1 or 2 to 3 or 4, and **R** types one increases from 2 to 3 or 4 (as S types) and decreases from 4 to 3 (as M types, but less), or (typically) maintains at 4.
- Spring clock change (right part): entering summer season (**big green arrow**), the hour is advanced (**+1h** jet-lag towards East), within a **7** degrees scale: **M** types performance increases from 1 or 2 or 3 (*before the change*) to 4 (*after the change*), **S** types one decreases from 4 or 3 to 2, 1 or 0 or maintains at 3, **R** types one decreases from 3 to 2 (as S types, but less) or increases from 3 to 4, 5 or 6 (as M types, but more) [Bricage, 1998b].

I.3. Individual night sleep awakenings rhythms: Man is an Earth clock shaped species.

During a night, each one of us normal or pathological sleep is structured with cycles that end with dreaming [Saper, 2015]. The minimal and maximal durations of all cycles of a night obey a relationship that results from **interactions between endogenous clocks and exogenous ones**. The length changes of cycles duration can be modelled. All Earth living systems share a common ecoexotope of survival that is temporally structured by **solar, lunar and terrestrial rhythms**. These rhythms are synchronisers for our endophysiotope clocks. But some people are more sensitive to them than others and someones are resistant (like with bacteria facing antibiotics). Since thousands of years these physical rhythms have been used by civilisations to improve their ecoexotope independence.

A multifactorial analysis has shown that sensitive persons have their sleeping cycles lengths structured by lunar calendars (figure 5).

The *lunar cycle of apogee-perigee* entrains individual sleeping rhythms along an analemme like curve calendar. The same entrainment with *the lunar ascendancy-descendancy cycle*, but a different analemme calendar. For a lot of animals it is known that even if circadian rhythms and sleep behaviour are genetically determined [Steinmeyer et al., 2012], the *light lunar cycle* is a synchroniser too (as for bees for example [Mohssine et al., 1990]).

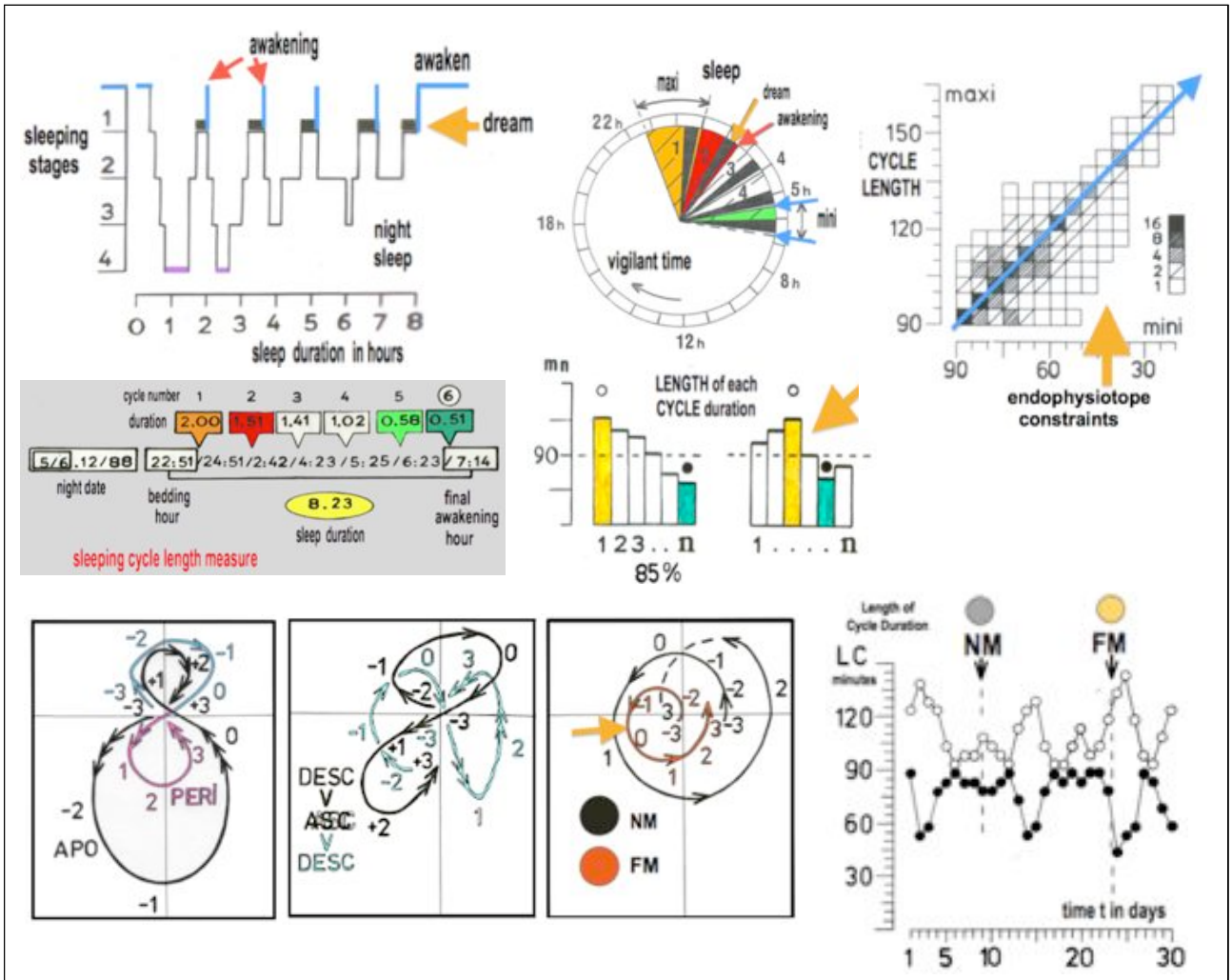

Figure 5. Man night sleep changes depending on lunar cycles entrainment.
- night sleep structure and sleeping cycle length measurement (top left): each cycle is supposed to end with a **dream** (orange arrow) and an **awakening** (blue arrow), measuring awakenings times allow to know each **cycle length**,
- night sleep structure changes (top middle): usually (**85%** of nights) the longest cycle (in yellow) is the first one, the shortest (in green) is the last one and **length duration** (in min) decreases, during nights which are next to a lunar event (**APO** apogee or perigee **PERI**, descending-ascending **DESC>ASC** or **ASC>DESC** ascending-descending phases transitions, new dark Moon **NM** or full enlightened Moon **FM**) the sleep pattern is different (orange arrow),
- correlation between cycle durations (top right): the longest **maxi** and the shortest **mini** cycles (in min) of a same night, due to endophysiotope constraints, are correlated maxi+mini= 2 duration **mean**= 2x **90 min** [Bricage, 1998b],
- lunar calendars evidenced by multi-variate factorial analysis of correspondences (bottom left): for each cycle **-3, -2, -1** is the order of the days before a lunar event (**0** is the date of the event: **APO** apogee, **PERI** perigee, **DESC>ASC** change, **ASC>DESC** change, **NM** new Moon, or **FM** full Moon), **+1, +2, +3** is the order of the days coming after,
-night sleep cycles durations correlated changes (bottom right): the longest -maximum **max** (**white** point)- and shortest -minimum **min** (**black** point)- durations oscillate around the mean (**90 min**) in opposite ways [Bricage, 1993]

Man is not an exception! [Bricage, 1993, 1995, 1998b]

The equation of time we have to consider to trace solar time-tables is ***an analemme*** [Schwarzenbach, 1983].The fact that we are functionally time-structured with both solar and lunar analemmes means that even if from a physical point of view the Moon is running around the Earth and the Moon-Earth couple is running around the Sun, our Earth-hosted organism is physiologically structured with Earth as a fixed point, and each of us a fixed point too, with Moon and Sun apparently running around Earth. Indeed the analysis of sleep records points to **circa-annual solar rhythms**, to be considered as controls for the evidence of **circa-monthly lunar rhythms** (figure 6).

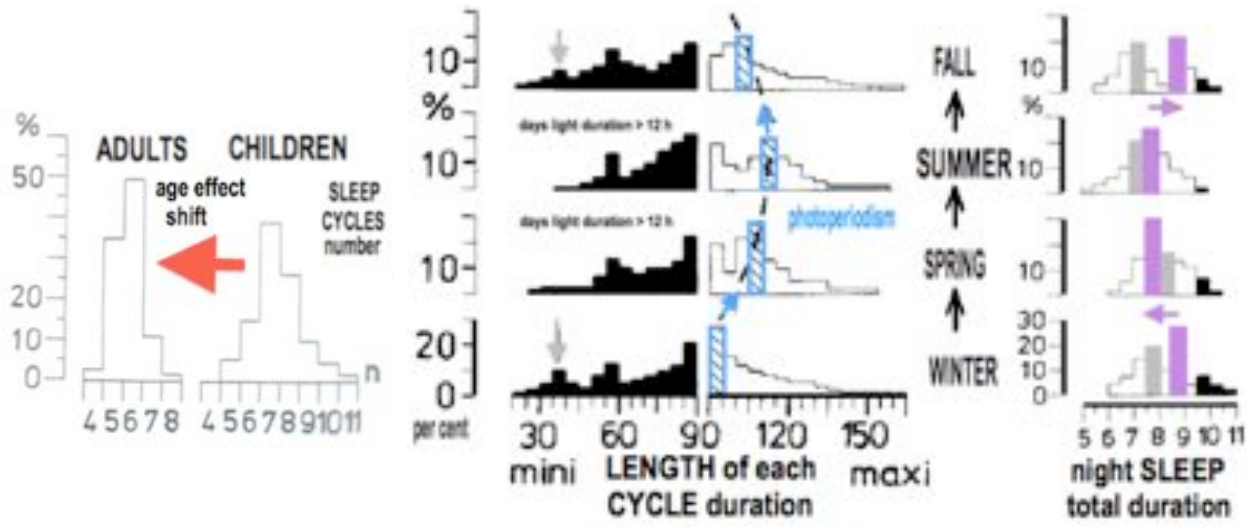

Figure 6. Man night sleep changes: controls.

- night sleep cycles number **adults-children** comparison (on the left): the cycles number, **n**, decreases with age,
- seasonal circa-annual solar rhythmicity (middle and right): **mini** and **maxi** (figure 5) cycles lengths distributions obey a photoperiodic phenomenon with an increase of the longest cycle (**blue mode**) with photoperiod increase (**blue arrow**) and with an increase of **sleep total duration** (**violet mode**) with photoperiod decreasing (from summer to fall and winter) and a decrease with photoperiod increasing (from winter to spring and summer) (**violet arrows**).

A striking result is that, man's organism is running around the Moon candle like butterflies are running around a lamp at night, obeying a spiral curve going towards the light when light is "on" and escaping when light is "off" (figure 5). Man is not an exception! But the lunar candle oscillate along a month duration calendar. So the endophysiotope of our organism, like all terrestrial living systems, is time-structured with endogenous physiological clocks that are clocking up the biological "hour" (figure 1), the Earth day, the lunar month or the solar year (figure 6), according to exogenous physical clocks signals.

II. WHAT methodology to evidence real temporal organisation of living systems and their physiological responses?

We can use a transversal methodology when people are all obeying the same rhythm.

And it is better their rhythm obeys a gaussian law...

II.1. First of all only individual longitudinal measurements must be used. No massive statistics!

We cannot use transversal measurements for chronobiology, that is to say a lot of different people with few days of longitudinal recording. The transversal methodology is used because it is easy to have a lot of people and to use sophisticated statistical tools to get interpretation rapidly and publish as soon as possible (*"publish or perish"*). Populations are heterogenous [Zienolddiny et al., 2013] with poly-modal distributions of markers and effects [Bricage, 1997], uni-modal distributions are often not gaussian, and the sum of uni-modal distributions is rarely an uni-modal one.

The first systemic law is that ***"a system is always both more and less than the sum of its parts"***. So we cannot from the components have access to their sum and reciprocally we cannot from the sum have access to the components [Bricage, 2001a, 2004, 2010, 2014a, b].

Even if we dispose of the Fourier transform tool, distributions of data can be skewed, and different from normal or log-normal ones. There is usually ***an unknown network of interactions*** between endogenous data and exogenous ones. Biological values, like body mass index for example, can shift, depending on gender or age. **Mean values have no biological meaning !**

When rhythms are in interactions, diversity is high, variance is high, and it is difficult to find the same qualitative or quantitative behaviour phenotypes, so we must use individual longitudinal measurements [Bricage, 1999]. The great difficulty is thus to have enough subjects and to be able to follow their functioning along a statistically significant duration [Bricage, 1993, 1995].

II.2. Controls values and latency times must be evidenced and considered first.

Studies of plant transpiration [Brogärdh & Johnsson, 1974] have shown **a time controlled network of clocks** [Bricage, 2005]: ***"time structures living-systems and living systems are structuring time too"***. Different wave frequencies are running depending on responses to endogenous or exogenous changes. Before to evidence a response to a stimulus we must wait for a new steady state. Not only "on" stimuli but also "off" ones have effects too [Bricage, 1985, 1986].

Living systems have an endogenous memory [Bricage, 1986; Fukuda et al., 2013].

The latency phase duration is always from at least 1 period of the rhythm. [Bricage, 2005]

So before using data we must have been running at least 1 period of the rhythm. It is easy for a circa-hour rhythm, more longer for a circa-dian one, boring for a circa-monthly one, and there are annual rhythms and more... And to have statistical significant results we must longitudinally record the more rhythm repetitions we can. But with patience it works [Bricage, 1993, 1995, 1999].

II.3. Stimuli responses must be tested according to a double blind placebo controlled survey.

Both evaluators and subjects must be in the dark to whom is getting real drug and whom is getting placebo. After the test period is finished and all evaluator results are recorded, the identity is decoded, the real drug vs. placebo-control-group are compared for a a true difference or not. An expert statistician reviews the results and determines whether or not there is a difference between groups that beats pure coincidence. A probability is assigned to each result [Bricage, 1988, 1993]. There is *a X% confidence* that the observed effect is physiologically real and ***not a random coincidence*** [Mirmohammadali et al., 2015].

III. WHAT methodology to evidence lithotherapeutic effects?

Since thousands of years *Chinese Medicine* knows the reality of nerves ways into the body and their congruence in nervous plexuses. Both acupuncture and feet reflexology techniques use reflex arcs reality (*meridians*) to treat diseases [Mazic-de Sonis, 2015]. In *Indian Medicine* nervous plexuses have been named *chakra*s. We decided to use a ***Chinese bi*** for to treat on the heart chakra.

Before use, each ***bi*** (or ***pi***) stone was purified, each time, by a 3 minutes water flowing procedure and then energetically charged during 7 hours by exposure to day light on quartz geodes.

III.1. WHAT mineral to use FOR WHAT to do? A *a priori* complex difficult process.

Urine release difficulties in male gender are often associated to prostate cells growth that press on urethra. (1)

III.1.a. Use of **jade, nephrite, serpentinite** and related simulants.

We decided to use jade or nephrite (common Canadian and Chinese "jade"), which names originated to their ancient renown properties to act on kidney or nephron, for to treat urination difficulties. But this supposed effect is a matter of controversial discussions.

The first difficulty was to identify ***commercial affordable sources*** of jade. Under the name of jade we have jadeite (a pyroxene group of stones) -which colour may range from white to yellow and dark green (and even with other colours: red, purple, blue, black) depending on the trace elements in it-, nephrite (an amphibole group of stones) and serpentinite (a stone of the serpentine group). Of course **trace elements could change properties**. The yellow jade which is the most affordable is often serpentinite (also called lizardite). Differences between jadeite, nephrite, serpentinite and other jade simulants can be evidenced through the measurement of their hardness (Mohs scale), density, light absorbance property and X-ray diffraction pattern which reflects their chemical type and crystal composition. Jadeite lattice is a granular material, but nephrite and serpentinite are fibrous ones. Serpentine class fibres are curly.

(Chrysotile, ***obtained from serpentinite rocks*** which are ***common throughout the world***, has been used more than any other fibre type and accounts for about 95% of the asbestos found in buildings in America.)

III.1.b. Use of **red jasper and related stones**.

Jasper is a dense and opaque variety of quartz. It is not really a mineral, but a textural variety, a mixture of different types of microcrystalline quartz with impurities. It is an opaque reddish-brown variety of chalcedony other than carnelian. The common red colour is due to iron.

Traditional Medicines suppose red jasper enhances energy and courage for physical working.

Jasper of homogeneous colour, like goldstone jasper, looks a bit like a coloured, opaque flint, and shares with it and carnelian many physical properties, but it forms in different environments. Multicoloured jasper is used as ornamental stone, and red jasper is cut as a gemstone. Jaspilite is made of distinctive bands of jasper. The classification and naming of jasper varieties is a challenge.

As with jade (generic name!) ***the difficulty is to identify what sort*** of jasper (generic name!) we get to work with? [Kostov, 2010]

III.1.c. Use of **hematite**.

No problem for hematite identification as a black brilliant metallic coloured mineral. Easy to obtain, because consisting of ferric oxide, an important ore of iron. The stone is supposed to have a strong physical grounding energy. But because hematite has been used for a long time, it has ***a too wide variety of healing properties ascribed to it***.

(The silvery hematite stones and magnetic beads that many people wear, are made from reconstituted hematite.)

Can we evidence stones properties using a double blind placebo controlled survey?

III.2. Results: WHAT?, WHAT FOR, WHY?, HOW and WHEN?

All assays are tested for any difference with **the usual time structure used as control.**

Each control, placebo or treatment, **day from day longitudinal records** duration was 1+3 lunar cycles long, to have a 100 days long record out of the expected latency phase and to express results in %. They were obtained with 60 to 71 years old male subjects for to test jade effect and from 25 to 70 years old male or female subjects for to test red jasper effect.

III.2.a. Scaling of control and placebo records (figure 7).

All tests with jade, nephrite or serpentinite (or placebo stone) were made at night.

Use of hematite (or placebo) was done before jade test, from the dinner hour to going to bed.

All tests with red jasper (or placebo) were done during day, from getting up to the dinner.

A special distinctive urination scale was used for night test and all results are expressed in %.

III.2.b. Controls: no-stone and placebo records (figure 7).

No-stone (control) or placebo longitudinal records are showing the same lunar side-effects. This effects are used for chrono-types control. They show the same type of interaction between lunar cycles we knew to exist [Bricage, 1993].

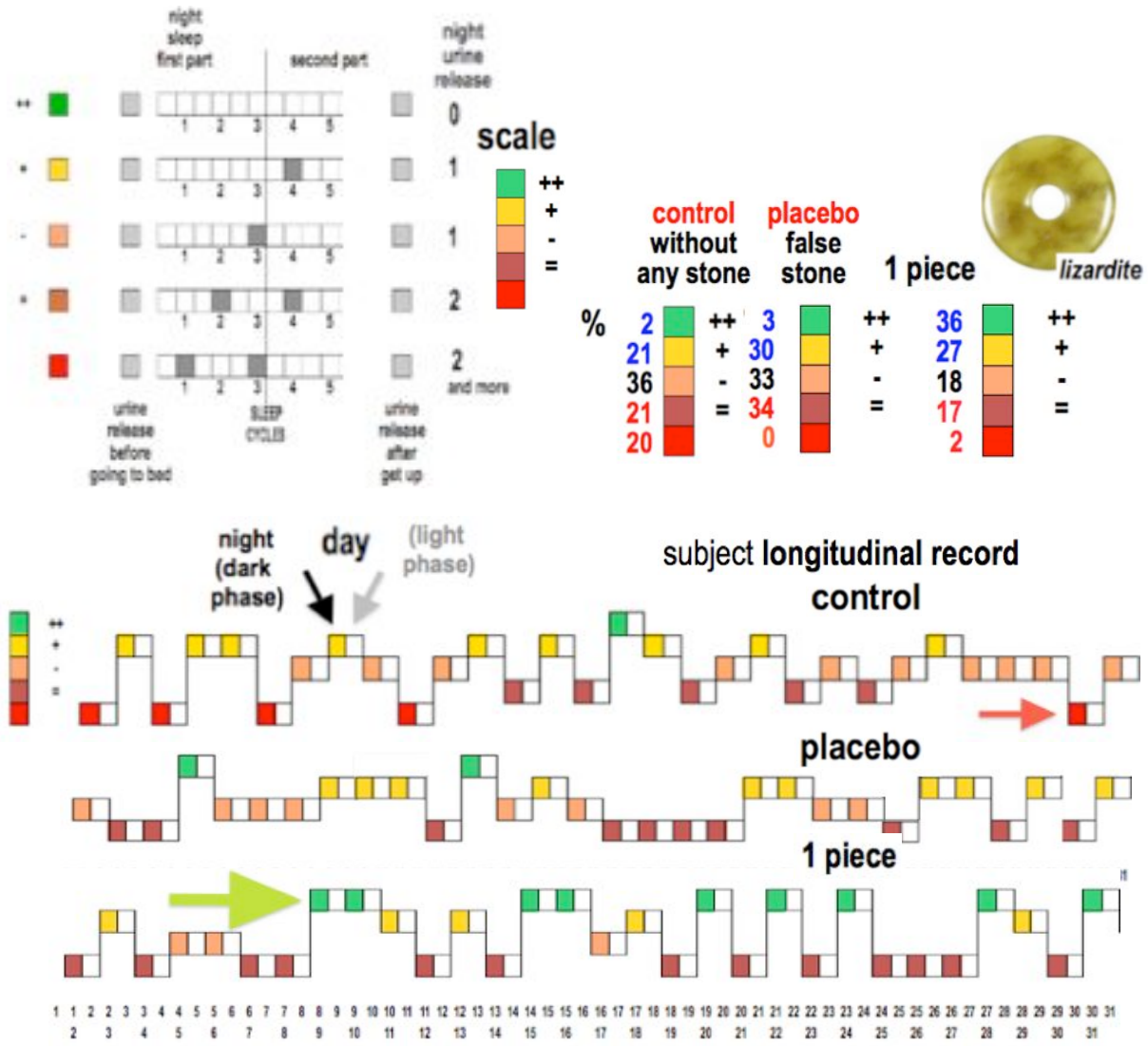

Figure 7. Example of results of a double blind placebo controlled test.
- top left : night sleep awakenings for urination **scale** with no urination **0** (best night quality, in **green**), only **1** urination during the night second part (good quality in **yellow**) or during the first part (in **orange**), bad night quality with **2** urinations (in **brown**) and very bad night quality (in **red**) with **2** urine releases or more, -*bi* diameter: **40 mm**-,
- top right : results in percentage, for **control (no stone)**, **placebo (false stone)** or **1 piece stone** (*bi* of lizardite here),
- below : first line of **longitudinal records** (test at night) **control**, second one **placebo**, third one **lizardite** (*bi* or *pi*)

III.2.c. 1 piece effect (figures 7 & 8).

Compared with control, one 40 mm diameter *bi* piece of jadeite or nephrite -night dark phase treatment (figure 7)- may enhance night quality (green arrow) with a decrease of at least 15 fold of awakenings and urinations. Nephrite suits better with a 20 fold enhancement of night quality (figure 8). The highest of all placebo effects is below a 4 fold enhancement (figures 7 & 13).

III.2.d. Crystal lattice and mineral composition influences (figure 8).

The crystal structure of the stone is evidenced to have an action because broken-glued serpentinite (or jadeite) lose at least 40% of their enhancing property. Depending on the jade variety (and trace elements) properties change. White jadeite has no effect (and eventually an adverse one). Translucent green jadeite allows the more enhancing 22 fold effect.

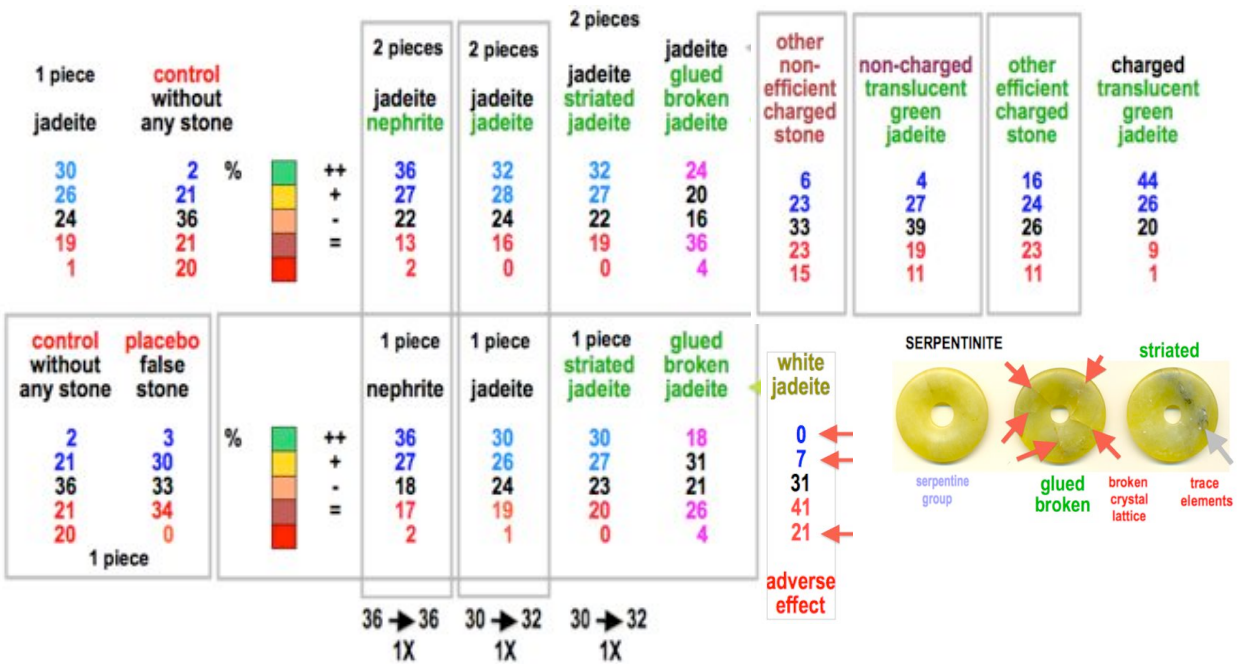

Figure 8. Factors influencing effects: energization, crystal integrity, number of stones.
- positive and negative controls (top left): 1 piece of **jadeite** as control of effect, no-stone as control of no-effect
- no 2 pieces effect by comparison with 1 piece effect (middle, top and bottom): no difference between 1 piece (of jadeite or nephrite) effect and 2 pieces (jadeite with nephrite, or with another stone) effect, -*bi* diameter 40 mm-,
- white jadeite adverse effect (bottom middle): **red arrows** indicating decrease in night quality,
- influence of crystal lattice integrity (top right): glued broken jadeite or serpentinite loses 40% of its effect (**30** to **18**),
- influence of stone energization (bottom right): no difference between placebos and non-charged stones.

III.2.e. Cleansing and energy charge influence (figure 8).

We may suppose on energy transfer because non-charged stones have no effect and energy charged non-efficient stones may have a 8 fold effect, 2 fold greater than all placebos effects.

III.2.f. No 2 pieces enhancement effect (figure 8).

With a 1 stone treatment (green jadeite, nephrite or serpentinite) the best night quality (green class) increases at least 10 fold, from 3% (placebo) to a range between 30% (striated jadeite) to 44% (translucent jadeite). No difference with a 2 stones treatment! Not the volume of stones but the area of contact of a stone with the skin is the limiting factor (figure 9).

III.2.g. Placebo effect and test timing.

Red jasper effect scaling is more difficult to built, it is more difficult to built a scale for quantitative effects than for qualitative ones. The day phase of our life is structured in cycles as the night phase is. Even if the placebo effect is greater during the conscious day phase than during the unconscious night phase, red jasper treatment enhances significantly the number and the intensity of efforts for the day cycles of physical working (figure 11).

III.3. WHAT mineral to use FOR WHAT to do? A *a posteriori* easy to explain process.

The use of 2 *bi*s simultaneously has no more effect than the use of only 1 *bi* (figure 8).

III.3.a. ***Minerals properties act the same drugs properties do.***

But the enhancing effect increases with the diameter of the bi, in a dose-dependent manner (figure 9). So we may consider a "from surface to surface" transfer, an energy concentration effect, depending on the contact area.

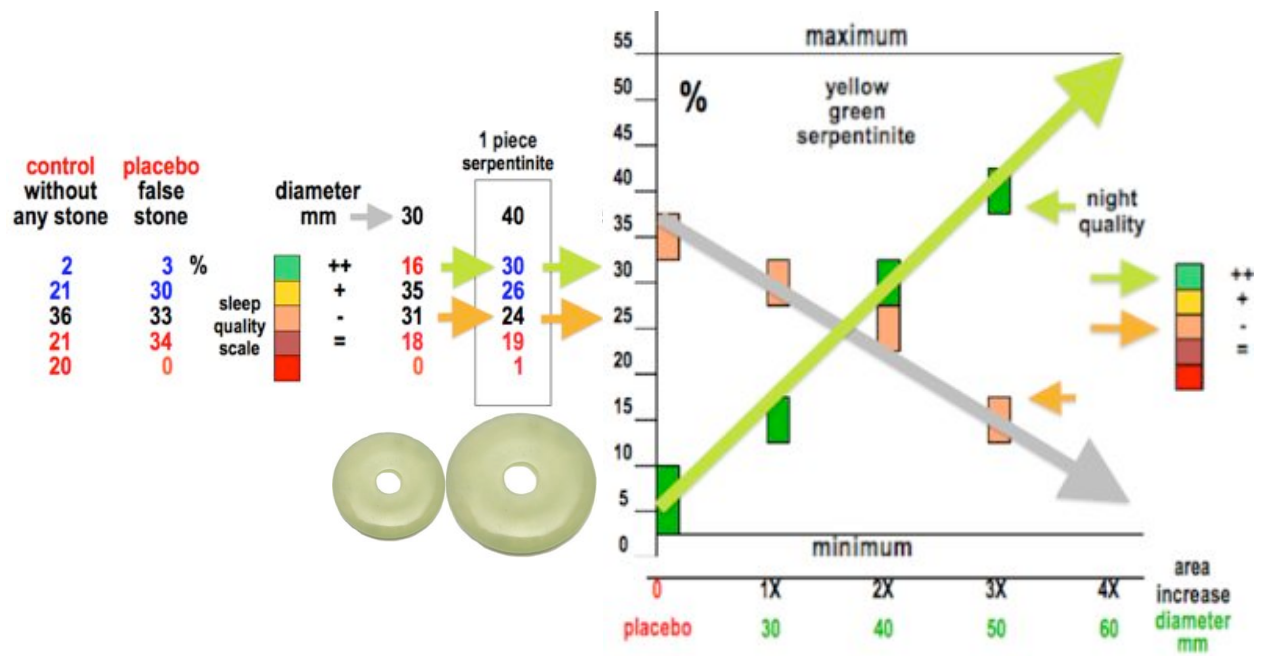

Figure 9. Influence of skin contact: a "dose dependent like" effect.

- influence of *bi* diameters increase on night quality increase (left): for 1 piece of serpentinite compared to placebo, *bi* diameters ranging from **30 mm** to 50 mm, when **diameter** (**1X**) increases 2 fold, **area** increases 4 fold (**4X**),
- linear increase of night quality with *bi* surface area increase (right): with serpentinite the amount of best night quality (**green** spot of the scale and **green arrow**) increases inversely the amount of bad quality (**grey arrow**) decreases, **maximum**: the maximum observed highest value is a 22 fold enhancement (vs. control), obtained for hematite and serpentinite successive treatment (figure 10), but the maximum predicted one is 27 fold for a **60 mm** diameter *bi*, **minimum** is the highest placebo value (which ranges from 1 fold to 4 fold control values) .

III.3.b. ***Evidence for synergistic effects.***

Using hematite before serpentinite, jadeite or nephrite, enhances their effect (figure 10).

As with chemical agonists, minerals may act in synergy. Hematite sole gives a slight effect: from 1 fold to 4 fold placebo value. But hematite increases serpentinite effect from a 15 fold value to the maximum 22 fold one (figure 10), maximum which is probably limited by lunar influences.

III.3.c. ***As a whole, a system is defined by some unanticipated emergent properties***.

That is exactly the case! We could logically suppose that within an interactive network of clocks, the latency phase of the whole will be greater than the shortest latency phase of each clocks (equal to their sum for example), but surprisingly the whole latency phase is reduced (figure 12). Considering here a network of 3 circa-monthly lunar rhythms (figure 5), each with a latency phase of a 1 cycle duration, their Whole is getting a 4 fold reduced one, thus ***enhancing the system reactivity*** to changes. Times are embedded and juxtaposed as spaces are [Bricage, 2013, 2015].

The Whole is both more and less than the sum of its parts [Bricage, 2004, 2010, 2014a, b].

Of course, because the interactions (figure 1) between each individual endophysiotope and its population common shared ecoexotope are unique [Bricage, 1997, 2002b], lithotherapy effects are obviously variable in a great range (figure 8), greater as placebo effects are variable (figure 13). As with drugs, different minerals (and lunar cycles) sensitive degrees exist [Bricage, 1993, 1995, 1997] depending on the individual inherited endophysiotope (figure 13).

Quick *"emergency and recovery"*, fast urgent curing, is not a role for chronotherapy and lithotherapy but *"maintenance and prevention"*, smooth steady state equilibration [Bricage, 1995, 1999] or punctual energizing (figure 11) is.

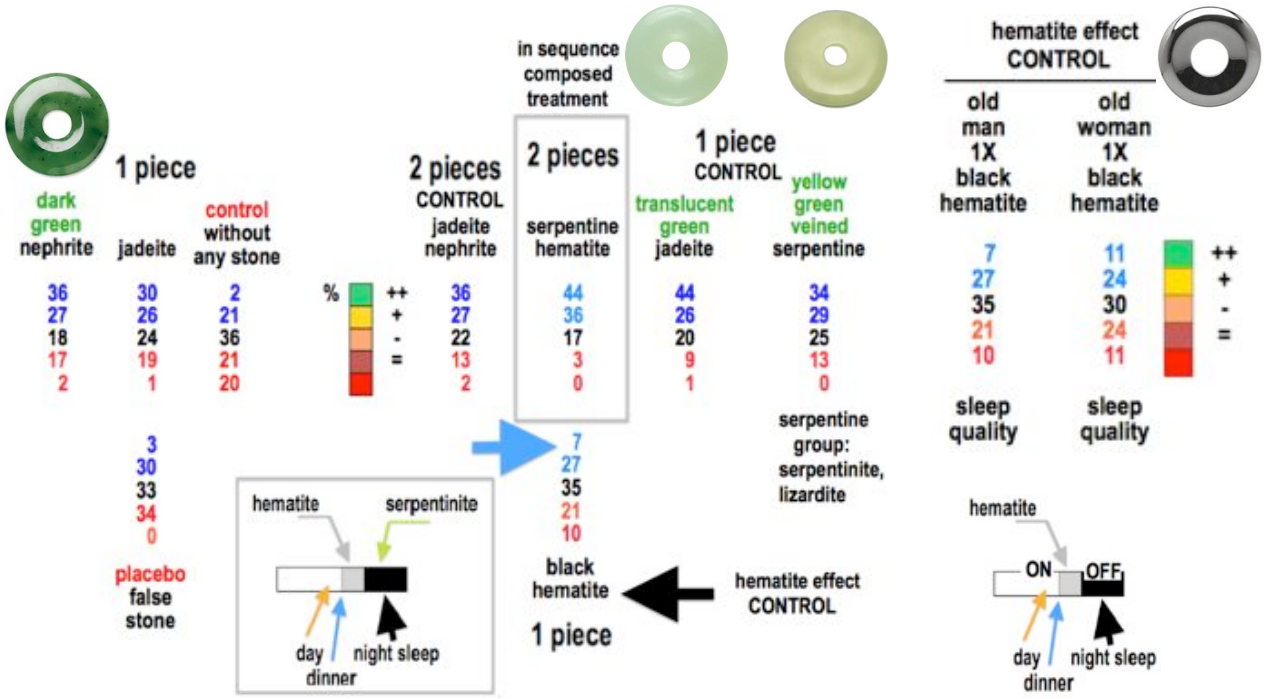

Figure 10. A double-blind placebo-controlled test of a combined sequential treatment.
- jade effect controls (on the left): no-stone, placebo-stone and 1 piece treatments (nephrite or jadeite) as references,
- hematite effect control (on the right): hematite treatment from dinner to going to bed,
- sequential treatment (middle): 2 pieces no-effect control vs. sequential treatment compared with all 1 piece controls.

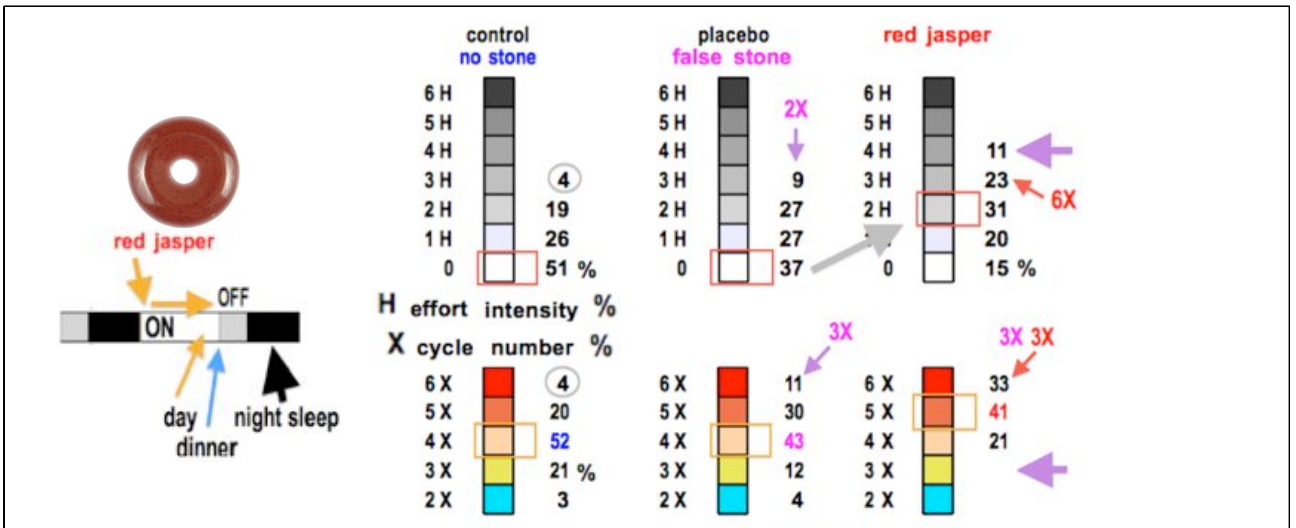

Figure 11. Evidence of red jasper effect. (red jasper *bi* diameter 40 mmm)
The diurnal (light) phase is structured with cycles as the night (dark) one is (figures 5 & 6). Each cycle of working only two effort intensities are considered, moderate or high, and the cycles number **X** is counted. For each whole diurnal phase the number of cycles **X** with the respective high intensity cycles amount **H** is represented. The mode of the observed distributions is indicated with a **rectangle**. Compared to placebo, the highest cycles number (**6X,** red part of the scale) increases 3 fold (**3X**), the placebo-referred highest intensity (**2H**) increases **6X** compared to control. Placebo effect is greater during the light phase than during the dark one (figures 8 & 13).
- no-placebo control (left part): cycles number mode **4X**, **51%** of cycles with **no** high effort (**0**),
- placebo (middle part): cycles number mode **4X**, **63%** of cycles with **at least 1 cycle of high effort (from 1 to 3)**,
- red jasper effect measure (right part): cycles number mode **5X**, effort mode **2H**, **from 1 to 4 cycles of high effort**

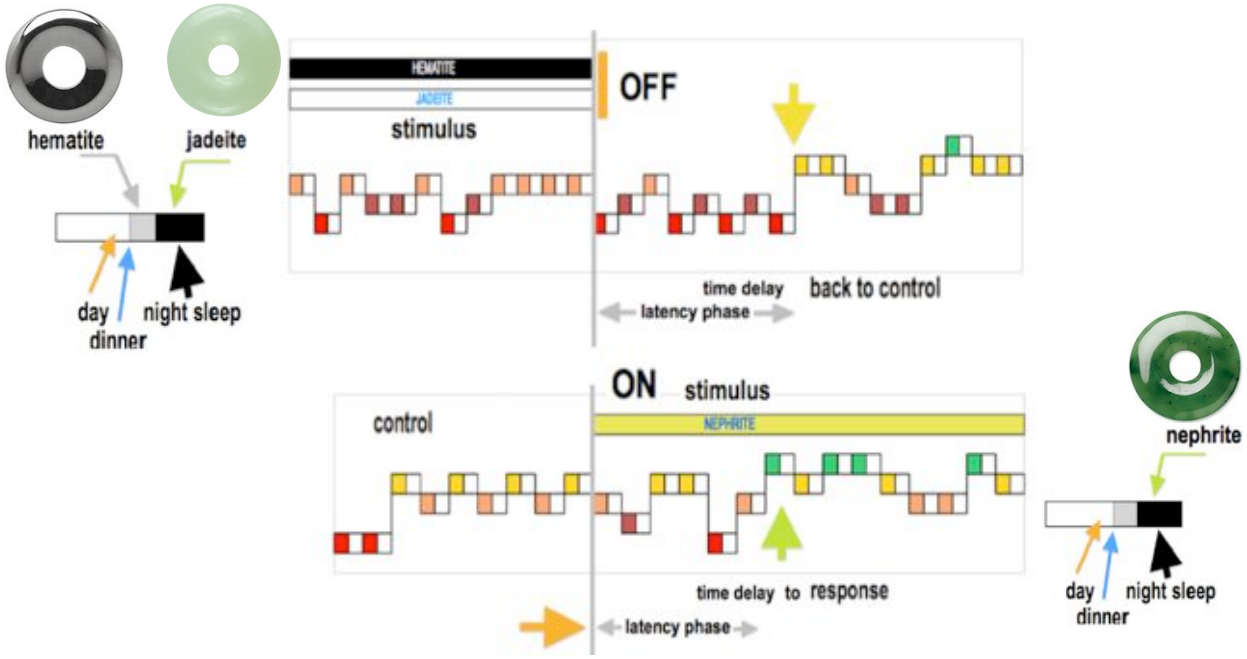

Figure 12. Shortening of the latency phase, a new Whole emergent property.
- end of a stimulation phase (top, left part): ***stimulus*** using false jadeite (aventurine) with no effect (or adverse one), right part: beginning of the following no-stimulus phase (**OFF**), back to control evidenced (**yellow arrow**),
- down, left part: end of a ***control*** phase, right part: beginning of a stimulation phase (**ON**) -***stimulus*** with nephrite-,
- ***latency phases*** (**greyed arrowed**): time delay back to control (top) or time delay to response (down **green arrow**).

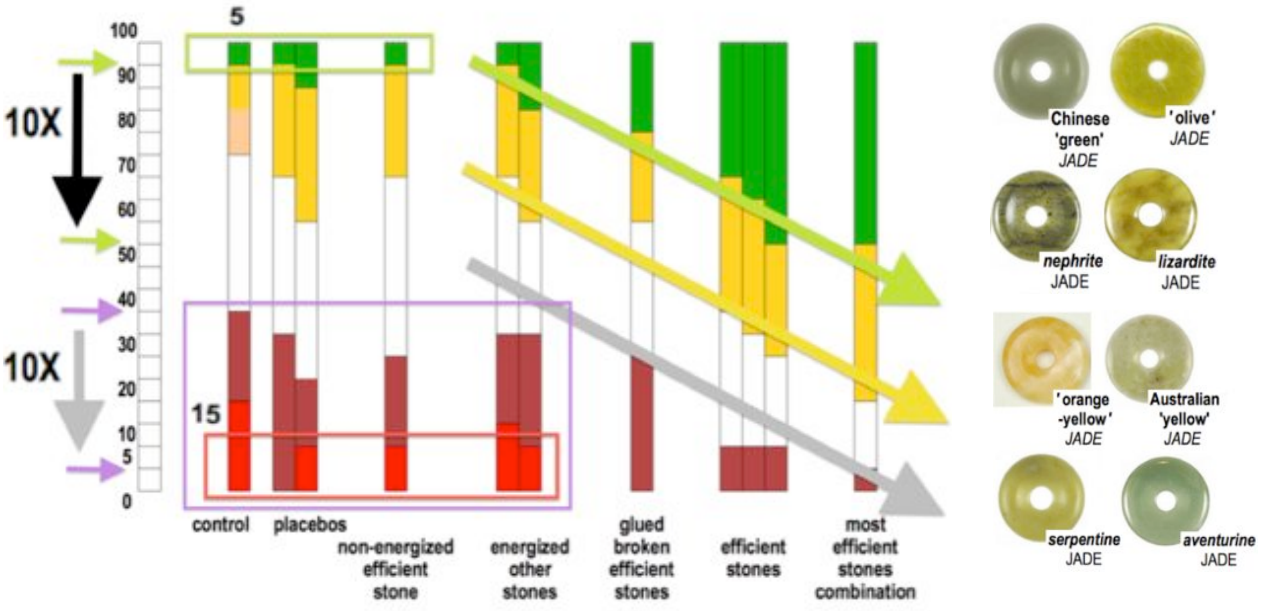

Figure 13. Governance of minerals effects to treat night urination difficulties.
0-100 percentage of each effect class, each in its **green**, **yellow**,.., **red** colour according to the global scale (figure 7), **green** for the best night quality, **red** for the worst one, the high amount of best night ranges from 5 (**control**) to 10 % (**placebos**), the highest amount of worse nights ranges from 15 (control) to 0% (placebos), only cleansed energized intact stones are efficient, efficiency depends on the stone (*pis* tested on the right: aventurine is placebo, most efficient stones are green translucent jade, nephrite, serpentinite and lizardite), **10X** net global increase for night quality.

Conclusion

We must consider not only first order models for statistical use or second order ones [Bricage, 2013] but more... All living systems are ***n cybernetic order system-of-systems***. Their endo-physio-topes and ecoexotopes are ***juxtaposed and embedded as matryoshka dolls*** are [Bricage, 2002b]. The endophysiotope of a ***i*** level of organisation is an ecoexotope of survival for other ***i-j*** levels. The same ***i*** level ecoexotope is shared between endophysiotopes of different organisation levels [Bricage, 2001a, b, 2010].

Local problems always give rise to global systemic problems [Bricage, 2004].

Systemic solutions must arise both at local and global levels [Bricage, 2004].

Times are embedded and juxtaposed as spaces are [Bricage, 1986, 2002b, 2005]. A global healthcare, but for an individual welfare, requires to determine and respect individual endogenous clocks (figure 2) in adequacy with their respective exogenous calendars (figure 3) [Bricage, 2013].

Despite of their systemic adverse effects, herbicides, pesticides and antibiotics are always systematically used [Bhattacharya and Mukherjee, 2015]. Fortunately chronotherapy is yet used for knowing cancer origin and treatment [Zienolddiny et al., 2013] because it allows to reduce the amount of drugs and their side-effects [Lévi et al., 2008] and also because of the drugs increasing cost [Tarhini et al., 2015] ! Unfortunately ***the usual thinking is not a holistic systemic one but an analytic, step by step, one*** and ***with escalade*** in new drugs research for added treatments to treat adverse effects [Lolignier et al. 2015]. Both holistic and analytic methods, with bottom-up and top-down recursive ways, are necessary. Acupuncture is a common practise [Mazic-de Sonis, 2015] but lithotherapy is not. *Bi*s of hematite and serpentinite are ***affordable, easy to obtain,*** and not subject to imitation. Lithotherapy, and massage with essential oils [Mirmohammadali et al., 2015], are ***smooth ways for an individualised, easy to use, non-violent, and non-invasive therapy*** to treat chronic pathologies, ***helping people in their today way of life***. Of course we don't know what hematite property (figures 10 & 12) is acting on biorhythms frequency [Ulmer & Cornelissen, 2013] or what red jasper property (figure 11) is acting on effort intensity but it works.

A new way of research is opening.

Asbestos mining existed more than 4,000 years ago, but large-scale mining began only one century ago, for using asbestos for insulation because of its desirable physical properties (sound absorption, resistance to fire, heat, electrical and chemical damage) and its affordability... until the carcinogenic effects (1) of asbestos dust caused its effective demise as a mainstream construction and fireproofing material in most countries (100,000 people in the United States have died, or are terminally ill, from asbestos (or *amiantos*) exposure related to cheap building). Health issues related to asbestos exposure can be found in records dating back to Roman times. Surprisingly serpentinite *bi*s act as a solution for urination problems... in a similar way of homeopathy? And maybe as inhibitor of prostate growth? Today cancer therapies are still ***extremely violent and invasive*** [Bhattacharya & Mukherjee, 2015; Lu et al.,2015]. ***A new way of research is opening.***

Lithotherapy is used in cosmetology and "modern" medicine but only with special minerals for special uses [Hecht et al., 2010]. ***New holistic oriented approaches versus partial analytic ones*** are on the way [Karabeg et al., 2011] but experimental testing must to be designed. New sample analysis methods should be used or developed [Hu et al., 2015]. ***A new way of research is opening.***

The discovery of the emergent property (figure 12), -which is a great advantage for living systems survival-, that an interactive network of clocks (the whole) has a reduced latency phase compared to clocks separately (the parts), allows to spent less time for waiting before an effect.

Chronobiology is a way of thinking not only for knowing diseases causes [Kripke et al., 2013] and to elaborate treatments (figure 13), but also for apprentice assisted learning (figures 3 & 4): ***the right interaction, at the right place and the right time, for the right person, with the right person.***

New ways of research have just emerged.

A toxic *"cocktail effect"* has been discovered with *"beneficial"* drugs (Delfosse et al., 2015).

We are just now knowing that everyone has got an innate endophysiotope temporal structure [Bricage, 2014a, 2015] with a unique pattern of ageing [Belsky et al., 2015] and that our birth date may influence, all our life long, the kind of diseases we are sensitive or resistant [Boland et al., 2015]. We now know we need an *"individualized handcrafted medicine"* [Bricage, 1995] and no more a mass industrial unsustainable one.

Whatever the therapy we will use ***"there are never advantages without disadvantages"*** [Bricage, 2014b], but ***"The creation of a sustainable society depends on emergence and application of innovative systems thinking"*** [Bricage, 1997, 2001c].

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(1) ***This work is dedicated to Prof. Dr. Ranulph Glanville our late IASCYS Vice-President, and founding member of the International Academy for Systems and Cybernetic Sciences, who died, after a lot of pain, from a ravaging prostate cancer.***