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Serious Scientific Lessons from Direct Observation of Atoms through Clairvoyance

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In August, 1895, a small group of [Theosophists \[1\]](#) gathered for a weekend in Box Hill, Surrey, to escape "*malevolent thought-forms*"[\[N2 p. 49\]](#). There, and at a subsequent meeting on a sloping bank beside the Finchley Road on Hampstead Heath, they exercised clairvoyant powers to achieve direct observation of atoms. They considered this possible because the observer's "*conception of himself can be so minimized that objects which normally are small appear to him as large*", although "*as each object is in rapid motion*" it was necessary to use "*a special form of will-power, so as to make its movement slow enough to observe the details*". [\[OC3 p. 1\]\[1a\]](#)

Close examination of the work of the Occult Chemists sheds light on one corner of the intellectual scene a century ago. In some ways the story is amusing, but amid the hoopla of the millennium, it can also provide science students at all levels an important lesson on the nature of scientific proof and the place of authority in science. It might help their teachers consider what lessons are most important to convey through a science curriculum.

Note: Internal links, such as the references in bold square brackets (see [\[1\]](#) above), provide information from within this page and are fast. External links that take you to other pages, and will require more time to return if your line is slow, are indicated by [this font](#).

The Occult Chemists



Charles Webster Leadbeater, 1847-1932, a renegade Anglican clergyman, is shown left in later life as Presiding Bishop of the Liberal Catholic Church, a church with six bishops for fewer than 1000 members [W p. 271, N2 p. 311]. He was the first to "see" atoms and continued this line of research intermittently over a period of 38 years.

Under Leadbeater's coaching **Mrs. Annie Besant**, 1847-1933, acquired the same skill. She is pictured above in 1897 [W frontispiece] as a leader of the Theosophical Society. She was also an influential advocate of Indian - and Irish - Home Rule following her successive careers as an Anglican clergyman's wife, an atheist, a birth-control advocate, a university chemistry student, an executive of the socialist Fabian Society, and a radical labor organizer. George Bernard Shaw called her "the greatest orator in England and possibly in Europe." She would be Leadbeater's loyal companion on and off for the rest of her long life. Her life was fantastically colorful and in many ways influential. For example, when 24-year-old [Gandhi](#) set up his law office in South Africa in 1893, he hung her portrait on the wall. In 1901 she personally initiated into Theosophy 12-year-old Jawaharlal Nehru, who would soon abandon Theosophy and ultimately become independent India's first prime minister (1947-64). In 1917 she founded the Indian Boy Scouts and enlisted as scout master young V.K. Krishna Menon, India's U.N. Ambassador and Minister of Defense 40 years later. In 1917, after a 3-month internment by the colonial government for advocating Home Rule, she was elected president of the Indian National Congress. On her death the Bombay Stock Exchange remained closed all day, and schools and streets in major Indian cities were renamed in her honor. A portion of her ashes, mingled with those of Leadbeater, rest in the [Garden of Remembrance](#) at the [International Headquarters](#) of the Theosophical Society in Adyar, India.[N1 pp. 225, 388; N2 pp. 76, 255-273, 454-455]

Her name is pronounced Bess'nt and rhymes with pleasant. [N1 p. 20])

Curuppumullage Jinarajadasa, 1877?-1953, Leadbeater's young Sinhalese companion since 1889 (shown above right in later life) attended these scientific sessions with his white kitten, Ji [W p. 314, N1 p. 327, N2 pp. 47,49]. Although he could not himself see atoms, "Raja" took verbatim notes of the accounts of Leadbeater and Besant, and prepared diagrams for the publications. As described below, he was also charged with counting anu and dividing by 18. [OC3 pp. 3,6]



Bertram Keightley, a lawyer in his mid-30s who was general secretary of the Indian Section of the Theosophical Society, was present as a supernumerary. [W p. 305, N2 p. 49]

The Method

As Mrs. Besant would write 14 years later in *Occult Chemistry, a series of Clairvoyant Observations on the Chemical Elements* (1909):

The method of examination employed was that of clairvoyance; there were only two observers - Mr. Leadbeater and myself - and it is very desirable that our results should be tested by others who can use the same extension of physical sight. The researches being carried on upon the physical plane - the forms examined being gaseous and etheric only - a very slight intensification of ordinary vision is all that is necessary, and many should, therefore, be able to test our observations. They cannot be regarded as established, by the outside world, until others have corroborated them; and we put them forward in the hope of stimulating work along this line, and of thus bringing to science, when its instruments fail it, the old, old instrument of enlarged human vision.

We then took various substances - common salt, etc. ... fragments of metals, as iron, tin, zinc, silver, gold ... pieces of ore, mineral waters, etc., etc., and, for the rarest substances, Mr. Leadbeater visited a mineralogical museum, a few miles off. In all, 57 chemical elements were examined, out of the 78 recognised by modern chemistry. [OC1 p. 2]

The latter paragraph refers to a second phase of experimentation that took place near Dresden in 1907. [OC3 p. 3]

First Publication, 1895

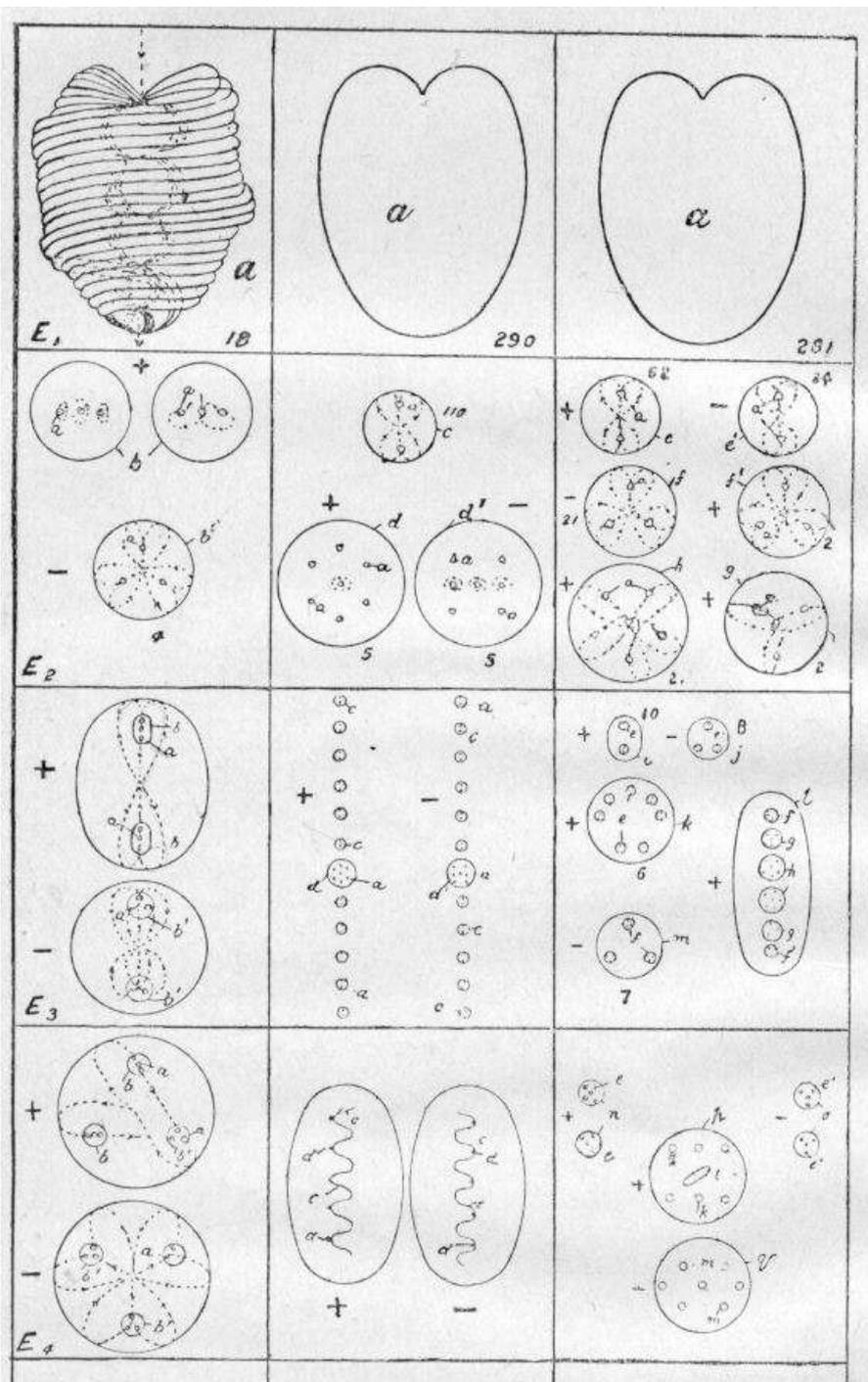
Because gold proved too challenging for early observation, only hydrogen, oxygen and nitrogen were reported in the first publication "Occult Chemistry", an article in the Theosophical magazine *Lucifer* for November, 1895 [reprinted in OC1 pp. xi-xix]. It is notable that this same month marked Röntgen's discovery of [x-rays](#), the tool that would make atoms visible to conventional science. Subsequent observations of all the elements, and then some, would be serialized in *The Theosophist* and collected in three editions of *Occult Chemistry* (1909, 1919, 1951).

Columns of the 1895 figure (right) show successive dissection and magnification of **Hydrogen** (left column), **Oxygen** (center column), and **Nitrogen** (right column) from the solid, liquid, and gaseous states of the entire atom (at the bottom) rising through three intermediate "etherial" levels to a common particle (at the top). "The ultimate physical atom is marked *a*, and is drawn only once, although it is the same throughout." [OC1 p. xiii]

Later the Occult Chemists would identify this ultimate particle with "**anu**", the term for the indivisible elementary particle of matter in Jain metaphysics. [1b] The plural of anu is also anu [OC3 p. 4]. It is not to be confused with the atomic mass unit (amu) of conventional science.

As indicated in the lower right corner of the top frames, H contains in all 18 anu, O contains 290 anu, and N contains 261 anu.

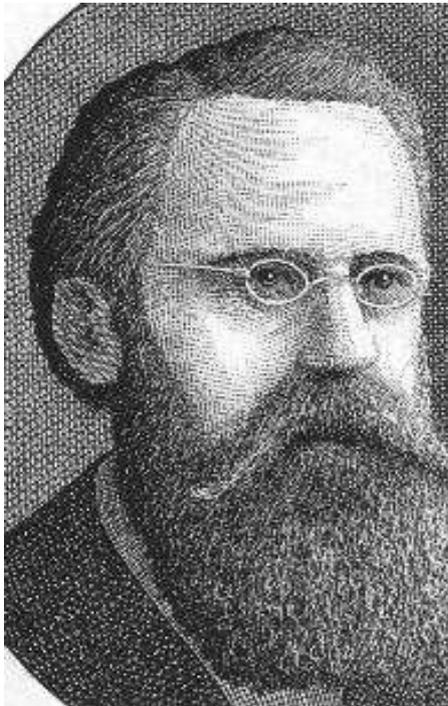
They noted the analogy between the anu and "protyle" which had entered Prout's theory of the elements in 1815 and was being reconsidered by Crookes and others in the late 19th Century. [OC1 p. xii]



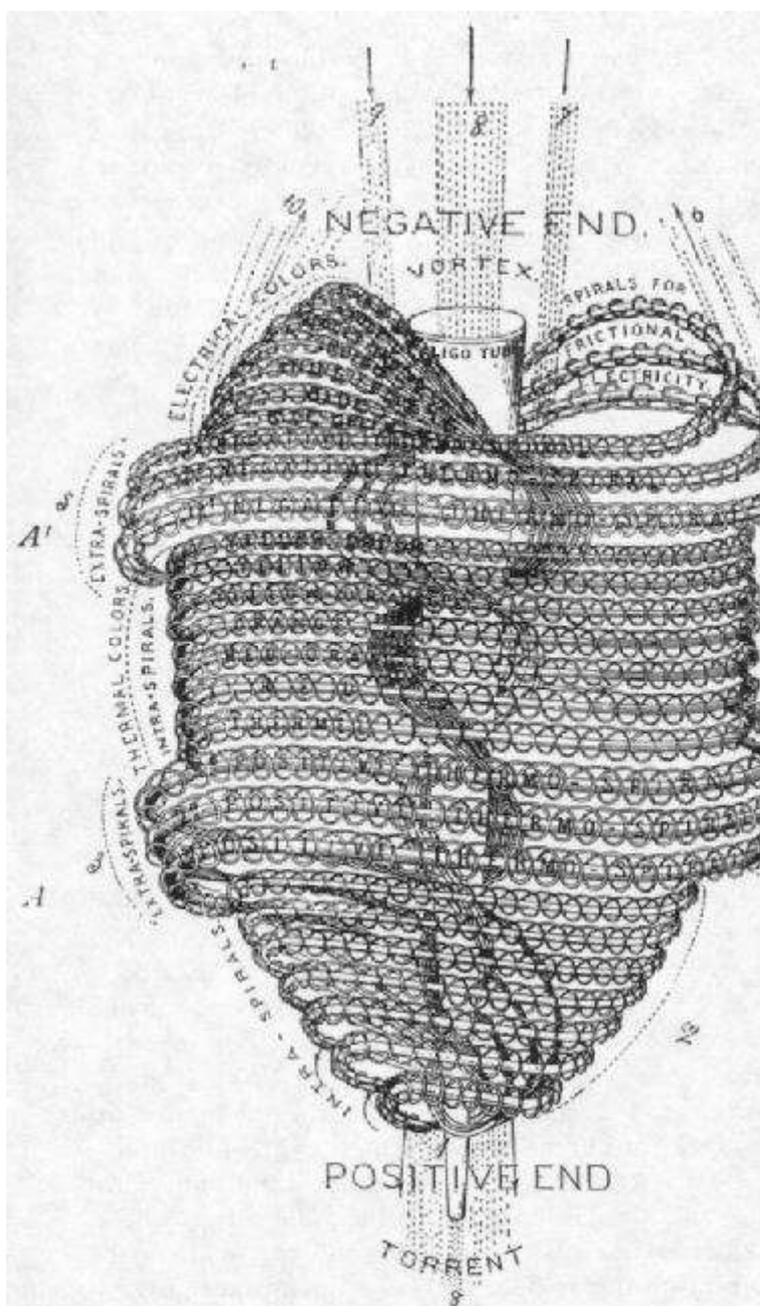
The form of the anu is strongly reminiscent of the drawing of the atom concocted by Edwin D. Babbitt in 1878 to explain bonding, heat, electricity, light, color, friction, psychic power, and nearly everything else in his 290-page work:

The Principles of
LIGHT AND COLOR:
including among other things
the Harmonic Laws of the
Universe, the
Etherio-Atomic Philosophy of
Force,
Chromo Chemistry, Chromo
Thera-
peutics, and the General Phil-
osophy of the Fine Forces,
Together with numer-
ous Discoveries and
Practical Appli-
cations.

(New York, Babbitt & Co., 1878).



Edwin D. Babbitt, 1828-1905



Click here to study a [higher-resolution version](#)

Scientific Sources & Embroidery

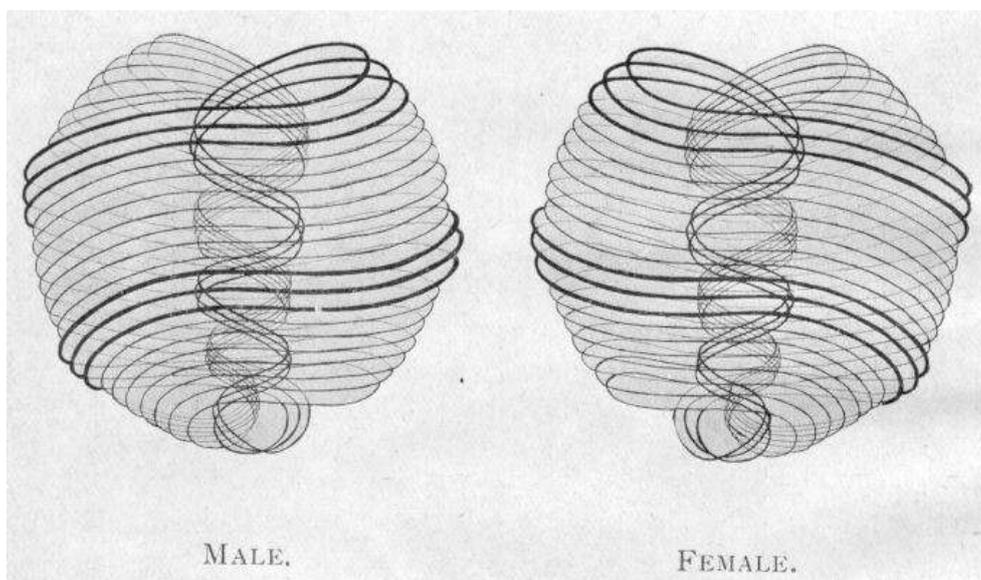
Some of the nutty ideas of Babbitt and the Occult Chemists are traceable to naive perceptions of conventional contemporary science.

For example in the 1860s **Lord Kelvin** had been suggesting that an atom could be understood as a "**vortex**" in the "ether".[T] Of course Babbitt's "spirillae" are reminiscent of the windings of **electromagnetic coils**, and his "torrents" look like Faraday's lines of force.

Having "seen" atoms, Besant and Leadbeater were in a position to confirm that "A fairly accurate drawing is given in Babbitt's *Principles of Light and Colour*, p. 102" [the above figure], but they went on to claim:

The illustrations there given of atomic combination are entirely wrong and misleading, but if the stovepipe run through the centre of the single atom be removed, the picture may be taken as correct, and will give some idea of the complexity of this fundamental unit of the physical universe. [This is somewhat confusing because Babbitt was drawing the atom, while at high astral resolution they were seeing anu within the atom] [OC1 p. xiv]

Besant and Leadbeater added a "twist" to Babbitt's atom by publishing pictures of mirror-image (enantiomeric) "Male" and "Female" (or "positive" and "negative") anu in 1909. [OC1 p. 5]



Mrs. Besant had been intensively involved with chemistry during the period 1878-1883, when, in her early thirties, she was one of the first female students and assistants in London University. At this time [van't Hoff](#)'s recent proposal of mirror-image carbon compounds was a topic of intense discussion. [N1 pp. 176-182]

In another leap of imagination the Occult Chemists claimed that the mirror-image anu :

are alike in everything save the direction of their whorls and of the force which pours through them. In the one case force pours in from the 'outside,' from the fourth-dimensional space, and passing through the atom, pours into the physical world. In the second, it pours in

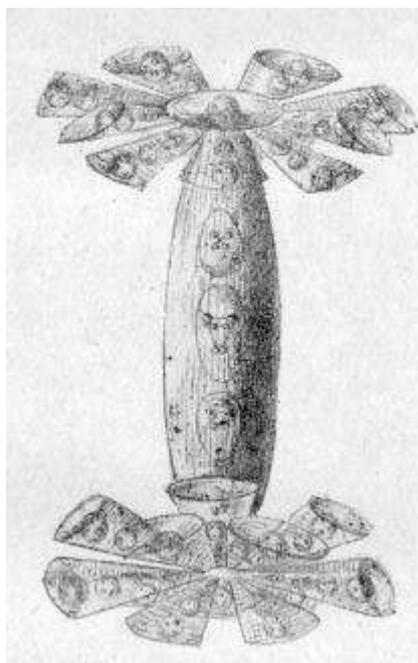
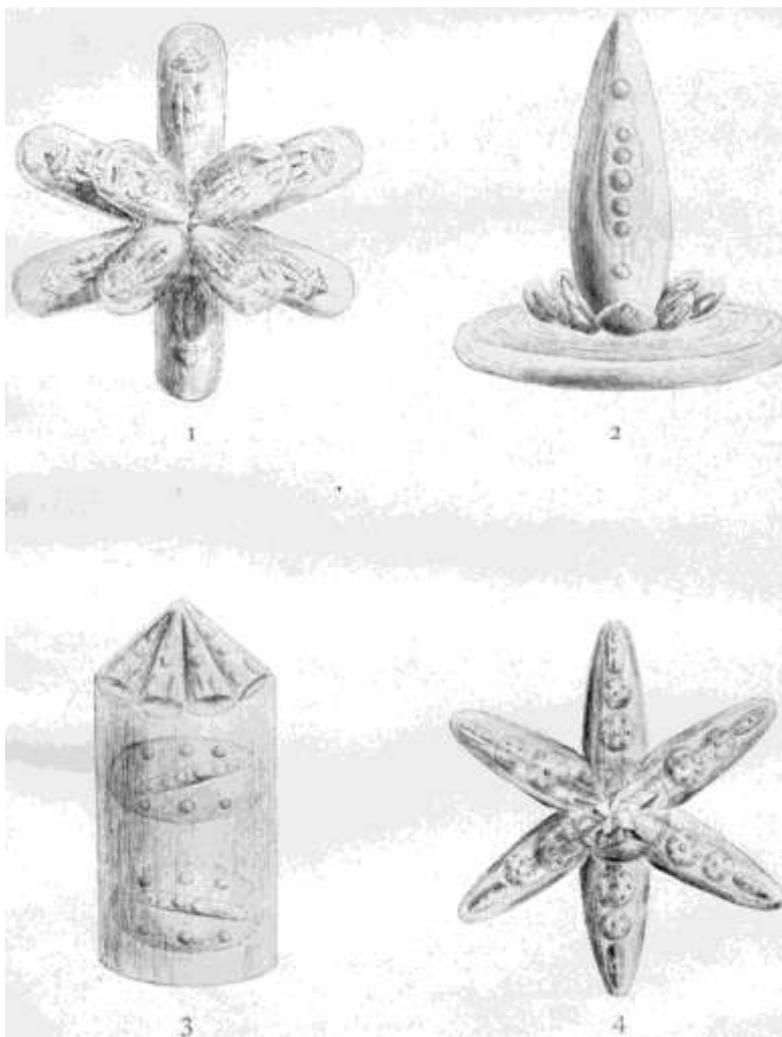
from the physical world, and out through the atom into the 'outside' again, i.e., vanishes from the physical world. [OC1, 5]

The visual appeal of the Babbitt-Besant-Leadbeater atom-anu has given it a measure of permanence. It has cropped up recently not only in many a fringe science web page (for example one where it is called the "[Compton Radius Vortex](#)"), but also in a series of publications where it is proposed as the structure for subquarks.[P2]

In addition to 20 schematic diagrams prepared by "Raja", Besant and Leadbeater's 1909 book included more realistic drawings of individual atoms prepared by "two Theosophical artists, Herr Hecker and Mrs. Kirby". [OC2 p. 18]

Below is shown sodium, which contains 418 anu as dots within "bodies" within "funnels", "globes", and a "connecting rod". [OC2 p. 18]

To the right are shown (1) iron - 1008 anu, (2) lithium - 127 anu, (3) helium - 72 anu, and (4) neon - 360 anu. [OC2 p. 30]



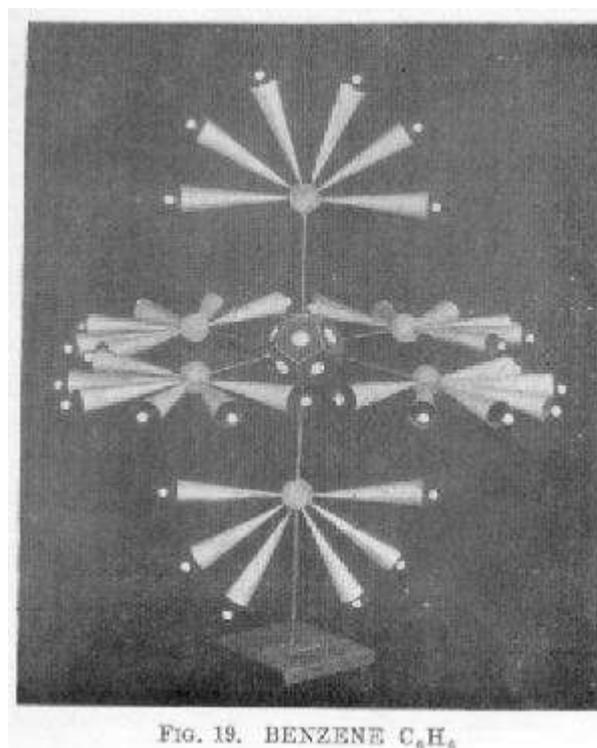
Molecules & Salts

Like conventional chemists, the Occult Chemists studied molecules as well as atoms. Like them, they were eager to understand bonding in the aromatic hydrocarbons. Thus in 1924 Jinarajadasa asked,

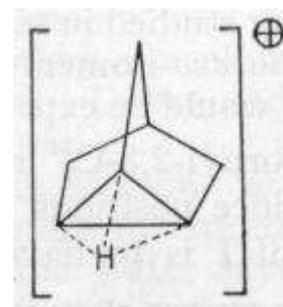
Of the four valencies [of carbon], three are satisfied, one by Hydrogen, and two by two Carbons. But what has happened to the fourth valency? [J3 p. 55]

They also built physical models, such as the model of benzene (right) constructed at Adyar in 1924. Like the [conventional chemists](#), they had reservations about their models. As Jinarajadasa warned,

We must remember that no models can even adequately represent the reality, since first the distances between ultimate physical atoms and between groups of them and their relative sizes cannot be correctly represented in any model, and secondly each funnel which looks solid is not solid at all but only a whirlpool of force created by the ultimate atoms as they revolve. [J p. 56]



There is circumstantial evidence that Jinarajadasa still maintained some sort of touch with recent mainstream chemical research near the end of his life. In 1952 he mailed an unsolicited copy of his new third edition of *Occult Chemistry* from Madras to the home of Professor J. D. Roberts an organic chemist at M.I.T. The book arrived without a word of explanation, but the reason it was directed to Roberts may be that the previous year he had proposed unusual cation structures, like "nortricyclonium" (right), and coined the word "[nonclassical](#)" to describe them. [R2] Here was a conventional chemist with an open mind!

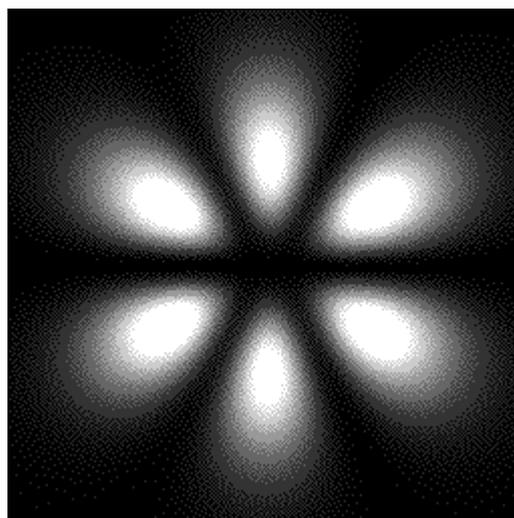


The Occult Chemists studied **salts** as well as molecules. Click here to see their visualization of [Sodium Carbonate](#).

Retrospective Scientific Evaluation

Now at the close of the 20th Century, as at the close of the 19th, **popular culture is awash in the paranormal**. What of today's conscientious but naive chemistry student, who is being taught on the basis of the authority of a text or a lecturer, rather than on the basis of direct evaluation of experimental evidence? To this student the clairvoyant atomic pictures of Besant and Leadbeater may seem as plausible as the atomic orbital diagrams of a conventional chemistry text. Why not? In truth they are equally far-fetched, in the sense that most textbooks neither discuss orbitals realistically nor support them with physical (or theoretical) evidence.

It is not trivial to supply simple, direct evidence to prove that a 4f-orbital (right) is any more realistic than Besant and Leadbeater's Figure 4 for the neon atom, which it resembles. Some models from conventional science, such as Kelvin's vortex atom of 1867 [T], or G.N. Lewis's cubic octet atom of 1902 [L1], or current string theory [1c], might seem no more firmly rooted in experiment or confirmed theory than the atoms of Babbitt and the Occult Chemists. **How is the student to learn how to distinguish the work of responsible scientists from that of crackpots and charlatans?** This is arguably the most important lesson that most students should learn from the study of science.



The ultimate test of an experiment is its repeatability, and that of a theory is its power of prediction. [2a] An active human mind cannot resist making observations and seeking to relate them. Life is full of enough coincidences to suggest all sorts of subtle relationships. Such delightful connections are a principal source of the charm and kooky verisimilitude that characterize the novels of writers like Kurt Vonnegut. But connections among past observations are not in themselves science. They become science by being carried into the future through repetition of observations, especially by disinterested or even hostile observers, and through testing of theoretical predictions with new observations under altered conditions [2b]. A theory is scientifically validated not when some of its predictions are borne out, but when *All* of them prove true. An indispensable element in the development of a scientific theory is its refinement on the basis of well-chosen, critical tests until the *All condition* seems to be satisfied. *All* can be a very large number, so most theories remain only provisionally verified, but they gain acceptance and stature in proportion to the number and variety of their predictions that have been confirmed [2c]. Of course confirming a prediction that is vague, ambiguous, routine, or trivial does not count for much, nor can a theory be refuted by unreliable experimentation. There are myriad examples where careless or naive experiments have given incorrect results, or where insufficient allowance has been made for experimental error. Becoming a mature scientist involves developing good taste about the levels of reliability of individual theories and experiments. Often in paranormal "science" predictions that have been confirmed are found to have been ambiguous, and unambiguous predictions have remained untested or have been ignored when the test has failed.

No one else has reported successfully repeating the clairvoyant atomic observations of Besant and Leadbeater. Despite Besant's assertion that "*many should ... be able to test our observations*", even Jinarajadasa, who collaborated on this research for 38 years, claimed only to be a recorder and supplier of samples, never an observer. On the contrary, atomic

structures determined and confirmed by a variety of independent techniques of conventional science look nothing like what the Occult Chemists claimed to see.

The Occult Chemists did make **unambiguous predictions** of previously undiscovered elements. Occultum, at. wt. 3; Metargon, 42; Kalon, 169.66, and Meta-Kalon, 172) **have not been verified by experiment**, despite Crookes's suggestion that "*their work would be useful at least in suggesting to scientists the kind of elements they might still discover in the as yet unfinished periodic table.*" [N2 p. 52] [3] Supporters have claimed unimpeachable proof of the reliability of the Occult Chemists from the fact that, before isotopes had been reported by conventional chemists, they reported Meta-Neon, 22.33, the second most abundant isotope of Neon.[P2c p. 14][3a] But the *All* condition is hardly satisfied, because the two Xenons they reported are the *least* abundant of the 7 natural Xenon isotopes between masses 128 and 136. Although their Meta-Krypton, 83.66, is the most abundant of the 5 natural Krypton isotopes between 80 and 86, their original Krypton, 81.3, does not exist.

As science Occult Chemistry fails both crucial tests.

Crackpots or Charlatans?

In the introduction to *Occult Chemistry* (1909) Mrs. Besant modestly wrote:

An observer's duty is to state clearly his observations; it is for others to judge of their value, and to decide whether they indicate lines of research that may be profitably followed up by scientists. [OC1 p. 1]

Experimental x-ray diffraction and spectroscopy, and quantum mechanical calculations which have been amply justified by cross checking with a great variety of experimental techniques, have yielded a consistent picture of the atom that is completely different from that of the Occult Chemists. Near the end Jinarajadasa was backing and filling in his argument that the physicists' pictures might have been distorted by the electric and magnetic fields of their experiments. In his view "*the occult investigators and the physicists are working from two sides of a great [mountain] range*", still he felt "*sure that some day in the future they will meet.*"[OC3 p. 6] Though a true believer can never be converted, it is long since clear to any fair-minded observer that conventional and occult chemistry will never meet, because Besant and Leadbeater were totally wrong. **They were plainly not seeing atoms.**[1c]

However deluded they may have been, **one can ask whether they were faithful in truthfully reporting what they thought they saw.** Were they innocent, earnest crackpots or cynical mountebanks?

Chemist Anthony Butler has given a charitable interpretation of the motivation of Besant, Leadbeater and Jinarajadasa,

With their fanciful descriptions, did they set out to deceive a gullible public? I think this is unlikely and quite out of character for Annie and her companions. She may have been wayward and impetuous but never dishonest.

The explanation must be one of collective self-deception. In a state of semitrance, the normal inhibitory processes in the brain were modified and a suggestion of one of the group,

probably based on scientific knowledge, was taken up and embroidered by others. Without the scientific knowledge we have today to act as a check, the process could continue with greater and greater flights of fancy. [B7 p. 42]

Many of his contemporary Theosophists did not view Leadbeater so charitably:

[When a former Theosophist] *"looked at the collection of books Leadbeater had in his personal library, he said to himself, 'He has read all the ancient histories of practically every civilization in the world. No wonder he could fit Krishnamurti's past lives into these histories.'* That confirmed his scepticism about Leadbeater's powers of clairvoyance". [K, [Chapter 3](#)]

Further skepticism about Leadbeater's character is evident in documents from the notorious Leadbeater Affair of 1906-1908, the same period when he was observing atoms and preparing the first edition of *Occult Chemistry* for publication. [\[3b\]](#)

Unknowingly the Occult Chemists left quantitative evidence suggesting that, from the beginning, at least Leadbeater or Jinarajadasa, and perhaps Besant or all three, cynically intended to deceive.

Quantitative Evidence of Skulduggery

Already in 1895, when they had counted 18 anu in Hydrogen, 290 in Oxygen, and 261 in Nitrogen, the Occult Chemists were aware that division by 18, to give 1 for Hydrogen, would give 16.11 and 14.5 for Oxygen and Nitrogen, respectively. They noted:

The respective numbers of ultimate atoms contained in a chemical atom of these two bodies are thus seen to closely correspond with their accepted weight numbers. [OC1 p. xvii; Modern chemical values for O and N are 15.88 and 14.01, respectively, for H = 1]

As they added more and more elements to their collection, the correspondence between 1/18th of the number of anu and the atomic weights of orthodox chemistry persisted. Within the set of 57 elements reported in 1909 the root-mean-square (rms) deviation between the clairvoyant values and the 1905 "International List" of orthodox chemistry is only 0.8 amu (atomic mass unit), or 14 anu. **The rms deviation from more accurate modern atomic weights is larger**, 1.0 amu, suggesting that the observers may have been aiming to match a somewhat dated list.

It is difficult to know what list they may have been consulting. Presumably some of their "observations" were made before the 1905 International List was available to them. The Occult Chemists point out, with a devastating naiveté that is almost charming in view of their obvious dry-labbing:

*These [1905 chemical] weights differ from those hitherto accepted, and are generally **lighter than those given in earlier textbooks.** It is interesting to note that **our counting endorses the earlier numbers**, for the most part, and we must wait to see if later observations will endorse the last results of orthodox chemistry, or confirm ours.* [OC1 p. 4]

A critic might see this as an attempt to regain composure after having gone on the record prematurely with values chosen to match the outmoded data. Not surprisingly, later

observations have "*endorsed the last results of orthodox chemistry*", with an rms deviation of 0.9 amu from the 1905 List, vs. 1.0 from the Occult Chemists' values.

Someone might try to defend the honesty of the Occult Chemists by proposing the following scenario:

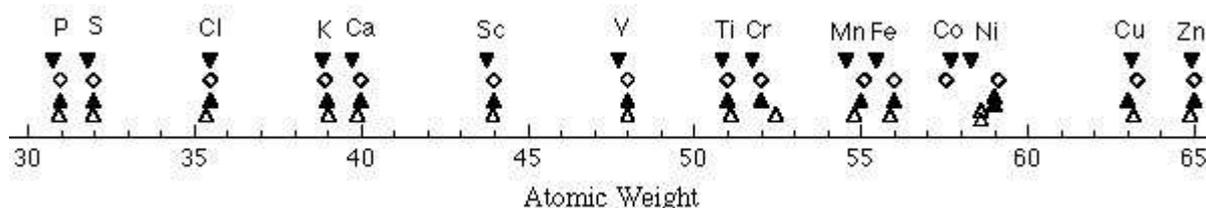
Believers in the paranormal are not accustomed to the necessity of satisfying the [All](#) condition. They would likely be satisfied with verification of a few among a host of predictions.

Even in conventional science it is well known that one can achieve impressive agreement between two long lists of unrelated numbers (for example a set of observable frequencies in a complex infrared spectrum and a longer list of possible frequencies calculated by a naive computer program). The method is simply to arrange the two sets in decreasing order in adjacent columns and associate nearest neighbors between the columns, attributing gross discrepancies and the excess of calculated peaks to unobservability of some experimental peaks.

Thus the Occult Chemists might be excused for conceiving a random set of atomic pictures and associating them with elements known to chemistry on the basis of their effective atomic weights (number of amu / 18). They might well have been innocent in discarding, as too misty, a subset of their pictures that did not agree with known atomic weights. [\[4\]](#)

Their own accounts undercut the suggestion that the Occult Chemists innocently associated each chemical element with the nearest weight in a random series of observations. Although they often claimed to see atoms in the absence of a physical sample, even more often they expressly chose samples containing the atoms they wished to add to their list. For example, they regularly used pure metals supplied by Crookes. In 1907 Jinarajadasa took Leadbeater to the Dresden Museum to glance at specific mineral samples containing unobserved elements, so that he could form mental pictures which subsequently "*he was able at leisure to evoke by clairvoyance*". [OC3 p. 3]

To dispose definitively of the exculpatory scenario proposed above, one may compare their reported atomic weights not with the 1905 International List that they presented in their publications, but with weights from "**earlier textbooks**" they might have consulted in Dresden when Leadbeater was making his observations. For the elements Phosphorus through Zinc the following graph compares the **atomic weights "observed" by Leadbeater and Besant (shown as open diamonds)** with three atomic weight scales from conventional chemistry. The **upper triangles** show the International List of 1905, quoted in *Occult Chemistry* [OC1 p. 3]. The **lower open triangles** come from a table in **Lothar Meyer's 1884 text** [M3 p. 140]. The **lower filled triangles** come from another of Meyer's tables, where some values were rounded to integers. [M3 p. 191]



Obviously **Leadbeater's diamonds are far from randomly distributed** with respect to any of the three chemical atomic weight scales. They agree suspiciously well with the textbook values that Meyer rounded (lower filled triangles). **For 10 of the 15 elements the agreement with Meyer's rounded values is exact.** A search through other contemporary chemistry textbooks might well turn up a table which agrees even more closely with the findings of the Occult Chemists (for example one with a weight for cobalt that differs from that for nickel).

One can assess this nonrandomness statistically. The range from 30 to 65 amu spans 35 amu or $35 \times 18 = 630$ anu. Within this range there are 15 elements in Meyer's list. Thus the chance of randomly choosing a number of anu that corresponds exactly to the atomic weight of one of these elements is $15 / 630 = 0.0238$. In making 15 such guesses the expectation value of the number of exact hits is $15 \times 0.0238 = 0.36$. One would have to guess $1 / 0.0238 = 42$ times to expect to get even one exact hit. The Occult Chemists reported 10 hits! **To expect 10 hits they would have had to guess 420 times and discard 405 as unreliable.** Even the most naive observer would consider failure to report this many discards to be grossly dishonest, so one can safely dismiss the excuse of innocent guessing.

One can extend the statistical analysis by noting that the standard deviation, sigma, for the number of hits is given by

$$\text{sigma} = (\text{Probability of hit} * \text{Probability of miss} * \text{Number of guesses})^{1/2}$$

Let us very generously suppose that the Occult Chemists might innocently have discarded 3/4 of their observations without thinking to mention that they had done so. There would then have been 60 guesses to identify 15 elements within this interval, so that

$$\text{sigma} = (0.0238 * 0.9762 * 60)^{1/2} = 1.18$$

The number of hits reported (10) exceeds the number expected ($60 \times 0.0238 = 1.43$) by $8.57 / 1.18 = 7.26$ standard deviations. **The random chance of having 10 hits in 60 tries is less than 1 in 10,000,000,000,000 (ten trillion).** The obvious conclusion, with a degree of confidence tantamount to certainty, is that consciously or subconsciously **at least some of the Occult Chemists tailored the number of anu they "observed" to 18 times the atomic weight in the textbook they consulted.** Manufacturing the data did not require difficult mathematics, but, especially for the complicated atoms, it is not plausible that it could have been carried out subconsciously. [\[4b\]](#) It thus seems certain that at least some of the Occult Chemists must have been cynically intending to deceive when in their joint publication they wrote,

"it was impossible for us to know how the various numbers would result on addition, multiplication and division, and the exciting moment came when we waited to see if our results endorsed or approached any accepted weight." [OC2 p. 19]

Who Did It?

Bishop Leadbeater was often accused of fraud, [\[5\]](#) and he was the first and most productive observer of atoms. Before each session it would not have been difficult for him to devise and memorize structures with the appropriate number of anu for the elements he would be "seeing". It might be significant that when he was shown mineral samples in the Dresden Museum in 1907, he decided to store the images mentally for subsequent analysis. Perhaps

some of these elements took him by surprise, and it would obviously take time to formulate a structure with the right number of anu. If Leadbeater made a mistake, his protégé Jinarajadasa (M.A. *Cantab.*), as the recorder charged with counting anu and dividing by 18, would have been in a position to make adjustments [OC3 pp. 3,6]. Though Leadbeater could have cheated alone, it is certainly possible that teacher and protégé connived during the experiments.

What of Mrs. Besant?

Even though three failures to pass the London University examination in practical chemistry ten years earlier had kept her from receiving the B.Sc. degree [6], Annie Besant was clearly the scientific brains of the Occult Chemistry operation. She was probably correct in attributing her failure in the exams to the fact that *"there was one examiner in the University who told her beforehand that however brilliantly she might do the papers which were set, he would not pass her, because he had a strong antipathy towards her atheism and to certain of her activities for the masses, which he considered immoral"* [N1 p. 182] [7]. Indeed in 1880 she had taken top honors in scientific subjects in the South Kensington Branch of the University, where she had a very close involvement with her unscrupulous [8] chemistry instructor, Dr. Edward Bibbins Aveling. [N1 pp. 173-177]



E. B. Aveling (1851-1898)

It is not obvious whether Mrs. Besant would prefer to be remembered with respect to her role in Occult Chemistry as a cynical deceiver or an innocent dupe. Although she was a courageous pioneering feminist, her biographer wrote, *"she was extremely susceptible to outside personal influences, particularly of a masculine nature"*. [N2 pp. 11, 461-4] [9]

Mrs. Besant wrote the beginning of *Occult Chemistry* in the first person, but she devoted little of her time to this activity and might be reluctant to share the blame with her collaborators. Indeed, for the 3rd edition Jinarajadasa inverted the order of posthumous authors to give Leadbeater top billing. In addition to a backbreaking schedule of public lecturing in various languages on four continents, Mrs. Besant bore numerous organizational responsibilities, and carried out an herculean writing program. *Occult Chemistry* was one of her 26 collaborative titles, besides more than 370 sole-author books and pamphlets, and innumerable articles [W p. 351, N2 p. 460] [10]. At various times she edited 12 different periodicals. She produced at least 6 English translations, including one of a 359-page German text. During a lecture tour to Australia in 1895, the same year as the initial atomic observations, she translated the *Bhagavad Gita* from Sanskrit, a language she had studied for less than two years. [11]

Although Bishop Leadbeater's behavior made him controversial within the Theosophical Society, he remains an honored figure (Western visitors to International Headquarters are still housed in the [Leadbeater Chambers](#)). Annie Besant reigned as the Society's President for 35 years until her death in 1933, and Jinarajadasa in turn served as President from 1945 until his own death in 1953. [N2 pp. 456-7]



In view of the Theosophists' motto (right) and their avowed

objective of encouraging the study of science, they might have hoped for better from their leaders.

In the unauthorized 274-page biography *Mrs. Annie Besant, a Modern Prophet*, lapsed Theosophist Theodore Besterman wrote,

the various episodes in the picaresque romance of Theosophy are often so plainly ludicrous that long before one comes to the climax one finds it hardly possible to summon up any moral indignation at the spectacle of such wholesale folly and deception. [B5 p. 234]

Lessons

From beginning to end *Occult Chemistry* is a tale of deception and gullibility, so in most ways it is not particularly edifying. Still, it provides some worthwhile lessons.

Recognizing the prevalence in the late 19th century of ideas like Babbitt's and the Occult Chemists' makes one more sympathetic toward Hermann [Kolbe](#) and more understanding of his scathing and misguided criticism (1877) of structural organic chemistry in general and of young van't Hoff's ideas in particular.

More importantly, *Occult Chemistry* provides an object lesson in the necessity of treating surprising reports with healthy skepticism. Most scientists, like other humans, tend to assume the good faith, if not always the good sense, of those who report new phenomena. Students must be aware that reporters can be dishonest like Leadbeater, as well as misled or deceived by Nature, or their fellows, as were [Crookes](#), [Lodge](#), and perhaps Besant. While there may be parts of the human experience where there is no substitute for faith, understanding our physical world is not one of them. Repetition of experiment, formulation and testing of unambiguous predictions, and honest analysis of probabilities are better guides in scientific matters.

Annie Besant's career in chemistry certainly reinforces Pope's admonition that "a little learning is a dangerous thing." Fondness for the vocabulary and glitz of science without an understanding of its experimental basis is a recipe for disaster.

The current popularity of the paranormal does not speak well for our system of science education. Too many citizens fail to appreciate standard science and how overwhelmingly the balance of experimental evidence has tilted in its favor over the past two centuries.

The Occult Chemists have not been alone in asserting scientific concepts on the basis of authority, rather than testing clearly formulated theories on the basis of experimental evidence. Science students at all levels should be encouraged to ask "How do you know?" and to insist on sensible answers. Too often curricular demands to cover a large body of material are used to excuse shoddy logic and intellectual sleight-of-hand. Time must be made available to provide students sufficient detail to illustrate the logic and power of real science in carefully chosen cases. Only then can they be captivated by genuine science and empowered to recognize and avoid bad science and "paranormal" nonsense.

The Wheel of Life

By far the most valuable single source on Mrs. Besant and her circle is her definitive 902-page biography [N1,N2]. Its author, Arthur H. Nethercot, Professor of English at Northwestern University, became entranced by the story of "the unbelievable Annie" during his studies of G.B. Shaw [N1 p. vii]. It is impossible to resist observing that Professor Nethercot was born in 1895, the year in which Leadbeater and Besant first used clairvoyance to achieve direct observation of individual atoms, and that he died in 1981, just as Binnig and Rohrer, IBM physicists in Zurich, were developing [Scanning Tunneling Microscopy](#) (STM), the first really general technique for direct imaging of individual atoms. Of course skeptics would fail to see these coincidences as sufficient evidence for rotation of the *Wheel of Life* [V p. 221]. If so, the Occult Chemists might triumphantly point to the July, 1996 issue of the *IBM Journal of Research and Development*, which was entirely devoted to STM, the technique that within months would earn the IBM researchers the Nobel Prize in Physics. The Preface to this issue, while signed by IBM vice president Praveen Chaudhari, was actually ghosted by Arthur H. Nethercot, the physicist son of Mrs. Besant's biographer.[C1][12].

Acknowledgements

My attention was drawn to this subject by the intriguing 1991 paper of [Dr. Anthony R. Butler](#) (Chemistry, St. Andrews).[B7]

For information and helpful comments I am grateful to Mr. George Green (Apapka, FL), Dr. York H. Dobyns ([PEAR](#)), Dr. Arthur Nethercot (Bellingham, WA), Gladney Oakley, and Professors J. A. Berson (Yale), Norvin Hein (Yale), J. D. Roberts (Caltech), and Shirish Shah (Notre Dame of Maryland).

Dedication

This account is dedicated to the memory of Professor [Paul D. Bartlett](#) (1907-1997), who took the time to help the author appreciate science through physical-organic chemistry. About 40 years ago Bartlett stated his objection to the then-popular term '**nonclassical ion**' in a letter to J. D. Roberts using the following language:

As you may know, the lazy and perishable term 'nonclassical ion' has always given me a pain in the neck, and this feeling has not diminished with the years. The only relevant definition of 'classical' in the simple Webster is:

Of or pertaining to a coherent system, embodying principles and methods accepted as authoritative in application to the arts, sciences, and literature; specifically, of or pertaining to the ancient Greeks and Romans or places made famous by their deeds or writings.

There is bound to be trouble when a term borrowed from a frozen culture which had its recognized authorities is bent to the purpose of science, where the chief intellectual task is to look at evidence, not at authorities. The term 'non-classical' is self-exhausting; once you have used it you have implied that everything is either classical or nonclassical, that there's something important, if not permanent about this classification - and, the next thing you know, 200 researchers at a Mechanisms Conference are listening to an argument as to which things are which without having agreed that anything is either. I much prefer the language of the scientist in which a piece of work or an idea is classical when it has been admitted to the

all-time hall of fame, along with Fischer's classical work on sugar stereochemistry, Ladenburg's classical, though erroneous, hypothesis of the structure of benzene, and the classical debunking of Baeyer's classical strain theory. [R1 p.373]

But Bartlett was no dogmatist. Ultimately he admitted that "After protesting for years against the inappropriate name "nonclassical ions," I have been overruled by general usage and am employing the term because of its extreme familiarity." [B3 p.v]

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Notes (cited in the text as clickable numbers in square brackets)

[1] Theosophy is a branch of religious philosophy that focusses on mystical or occult experiences. For more than a century it has been associated with the [Theosophical Society](#), which, though never numerous, played a significant role in reviving interest in Buddhism and Hinduism in both East and West. American membership peaked at 8,500 in 1927.[M4 p.99] By 1995 it was 4225. A very recent example of Theosophy's influence, and the attendant controversy, is the role of Dora Kunz, long-term President of the American Section, in developing [Therapeutic Touch](#). TT is popular in many nursing schools and purports to provide healing through manipulation of a patient's "aura", but it was debunked by the 6th grade science project of Emily Rosa, a 11-year-old from Loveland, Colorado, as described in her coauthored [1998 paper](#) in *Journal of the American Medical Association*. Today, April 17, 1999, the *New York Times* carried an obituary notice of Mary Lutyens, a writer and Theosophist who, as a 15-year-old, had been present with her mother, Leadbeater, Mrs. Besant, and Raja, when their protegé Krishnamurti first spoke in the voice of the "World Teacher" marking the "beginning of a New Age, a new civilisation, as has occurred five times already in the Aryan race -- in Central Asia, Egypt, Persia, Greece, and Palestine". [N2 p. 373-4]

[1a] Note that only conceptual shrinkage is invoked, not actual physical shrinkage.

[1b] The Sanskrit अणु appears at the beginning of अणवः स्कन्धाश्च ॥ २५ ॥, which, as the

number between vertical lines (danda) at the end shows, is the 25th Sutra (or verse) from the Chapter V of "*Tattvarthadhigama Sutra*", the first Sanskrit work on Jaina philosophy (2nd Century A.D.) and an important Jain scripture. It contains only two words "Anavah skandhashcha", literally "anu and skandha". Modern commentators have translated and elaborated this verse as "(Matter exists in the form of indivisible elementary particles and their combinations," [J1, 177] or "(Matter has 2 chief forms:) atom and molecule." [J2 119] In these commentaries the dozen rather vague sutras of Chapter V that deal with matter have been read to equate "anu" with the atom of modern science and "skandha" with the molecule. In their attempt to force much of modern physics and chemistry into the procrustean bed of these ancient sutras, 20th century commentators, some of who were not as skilled in classical Sanskrit as they were eager to establish links to conventional science, also equate "parmanu"

with subatomic particles.[J1 pp. 177-182, J2 pp. xvii, 109 ff.] The very finest form of matter, "karma," binds the soul, which must be liberated from its infection to achieve nirvana or "moksha".[M2 p. 79] Telepathy and clairvoyance, including of the very small, play important roles in Jain philosophy.[M2 pp. 144-148] Among the resonances between Theosophical Society and Jainism note that the Society's syncretic seal (shown above) includes the swastika. This is a symbol of well-being in Jainism and other Indian religions. In fact the name derives from Sanskrit words for "good", "being", and "related to".

[1c] One individual who has published on theoretical physics [P1] still stoutly, and apparently seriously, defends the realism of the 'micro-psi' vision of the Occult Chemists. In several recent publications Stephen M. Phillips claims that the anu observed by Besant and Leadbeater were actually 'subquarks', thus supporting his own version of the theory that quarks have substructure. He explains the difference between the observed 'micro-psi atom' (MPA) and conventional atomic and nuclear models by supposing that the clairvoyant's "micro-psi vision ... caused for some reason a pair of atomic nuclei of that element to collide with sufficiently high energy for either subquarks or quarks inside them to become free momentarily... As this plasma cooled, new forms of quark matter crystallized and interacted strongly, forming a quasi-nuclear system of many types of stable constituents, bound together by electromagnetic and strong forces to create the MPA." [P2a p. 511] As Y. H. Dobyns of Princeton Engineering Anomalies Research pointed out in his referee report, "This is an invalid mode of argument. By accepting apparent successes as given, while explaining away failures by invoking new phenomena *for which there is no other positive evidence*, one can support any theory whatsoever." [D1 p. 528]

[2a] So broad a generalization begs for exception. That a good experiment must be literally reproducible is not obvious, or even necessarily true. Often, as in quantum mechanics, one is dealing with probabilities rather than with deterministic prediction. Chemists traditionally have had the luxury of working with properties averaged over an enormous numbers of molecules influenced by variables that are modest in number and relatively easy to control. Under these conditions statistical fluctuations are negligible on a percentage basis, so under controlled reaction conditions reproducibility is guaranteed. Thus chemists tend to place a higher premium on literal reproducibility than do physicians or wildlife biologists. But even in chemistry there can be difficulty in reproducing experiments when one deals with small numbers. One example involves nucleating growth of an unstable crystal polymorph.[D2] Another involves direct observation of nanoscale surface structures by scanning probe microscopy.

[2b] A future observation could involve a past event. For example, on the basis of previous finds in paleontology a new find might be predicted. Making such a find would be a future observation even though it involved an event that occurred long ago.

[2c] One school of thought seems to hold that experiments can only confute a theory, never confirm it. Such a system is logically consistent, but in holding all of natural science to a level of proof possible only in mathematics or abstract logic, it fails to describe science as it is practiced by the vast majority of productive scientists.

Of course, refuting a theory by experimentation supposes that the experimental results are reliable. There are myriad examples where careless or naive experiments have given incorrect results or where insufficient allowance has been made for experimental error.

[3] **Sir William Crookes** (1832-1919), who discovered the element thallium, made fundamental contributions to the study of cathode rays, and invented the x-ray tube, was a Fellow of the Theosophical Society as well as of the scientific Royal Society, and he supplied some of the samples for Leadbeater's studies.[N2 p. 51, OC3 p. 2] He served as President of the British Association for the Advancement of Science, a reputable organization whose members have first claim to being called "scientists", because the word was coined in 1834 to describe them.[O] Crookes concluded his 1898 inaugural address as President of the British Association by mentioning his simultaneous presidency of the Society for Psychical Research and discussing the promise of telepathic research, which "*does not yet enlist the interest of the majority of my scientific brethren*". [C2 p. 447]

Crookes was not alone. Professor [Sir Oliver Lodge](#) (1851-1940), contributor to the invention of radio and pioneer in medical x-rays, chairman of the Physics Department at Liverpool, principal of Birmingham University, and himself President of the British Association, was a firm [believer in telepathy](#) and described communicating through a medium with his son who had been killed in World War I.[L2]

Like Crookes, Lodge served as president of the [Society for Psychical Research](#), founded in 1884. A list of other notable presidents includes British Prime Minister Arthur Balfour (1848-1930), Cambridge physicist Lord Rayleigh (1842-1919), Harvard psychologist and philosopher William James (1842-1910), and more recently Duke parapsychologist J. B. Rhine (1895-1980). Gladstone, Ruskin, and Tennyson were early members.[N1 p. 194]

At the dawn of the 20th century, when matter-penetrating rays and wireless communication were new and poorly understood by conventional science, telepathy and spiritualism did not seem implausible to these serious individuals, though their views were not shared by many conventional scientists.

[3a] Their connection with Crookes may conceivably have provided a source of prepublication speculation by conventional scientists about the existence of isotopes.

[3b] A substantial file of documents relevant to the Leadbeater Affair at <http://www.nellie2.demon.co.uk/webdoc4.htm> ceased to be readily available during the summer of 1999, when the server disappeared from the world wide web. Nethercot provides a narrative of the Affair. [N2 pp. 84-98] As of summer 2009 some documents are again available at the following sites: [Source 1](#) ; [Source 2](#) ; [INDEX](#)

[4] The Occult Chemists did **not** discard all elements unknown to chemistry. To their credit they took the risk of reporting eight new (and still undiscovered) elements. In 1895 they might not have realized what a risk they were taking with Helium, of which Jinarajadasa wrote:

The fourth gas with atomic weight 3 was thought to be Helium, of which much had been said in the newspapers of 1894, following its discovery by Ramsay. It was only when the atomic weight of Helium was finally announced as 4, that the gas observed with weight 3 was realized as obviously a different gas. Later it was given the name of Occultum. [OC 3 p. 2]

[4b] It might reasonably be suggested that "Given the malleability and suggestibility associated with trance states, it is entirely plausible that Besant and Leadbeater did in fact 'see' the number of anu they expected to see, *because* they expected it." That is, rather than consciously cheating, they *subconsciously* adjusted the number of anu to 18 times an atomic weight they already knew.

Consider whether it is plausible that the Occult Chemists could innocently and subconsciously have tailored their atom of gold to have the proper number of anu, if, as they state, all (conscious) arithmetic was carried out after the observed structure had been recorded.

At the upper left of their Plate VII [OC1, p. 24] is shown an entire atom of gold. Within it are complicated substructures of five kinds, *a-d*, which are detailed in the rest of the plate. Each of the four *a* substructures within the "central body" of gold contains 84 anu within twelve bodies of two kinds. Each of the 16 "circling groups", *b*, in two orbits around the central globe contains 33 anu in bodies of two kinds. The daisy-like structures top and bottom are identical, each has a central "ovoid" with one *c* and two *ds*, and each has 12 *e* "funnels". Each *c* contains 101 anu; each *d*, 38; and each *e*, 97.

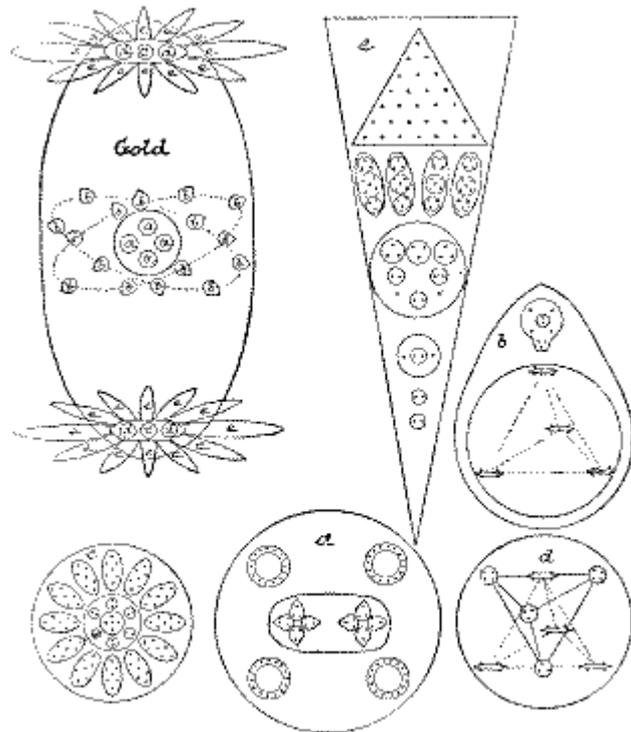


Plate VII.

Click for an [enlarged view](#)

There can be no question of subconscious manipulation of familiar subtotals, because none of the five substructures *a-e* had been observed with identical structure or number of particles in other atoms.

The subconscious arithmetic for $4a + 16b + 2*(c+2d+12e)$ would have had to be something like the following:

$$4 * (4 * 15 + 8 * 3) +$$

$$\begin{aligned}
& 16 * (4 * 6 + 9) + \\
& 2 * (12 * 7 + 6 * 2 + 5) + \\
& 2 * 2 * (4 * 4 + 4 * 6) + \\
& 2 * 12 * (28 + 4 * 11 + 3 * 3 + 6 * 2 + 4)
\end{aligned}$$

Most importantly, it was not just a question of keeping a subconscious running total, since the Occult Chemists would have had to adjust occupancies as they described the substructures in order to achieve the proper total. For example, had they finished their observation with the structure of *e*, the discrepancy to be corrected would have had to be an integral multiple of 24. Since this is unlikely to have occurred for many atoms, they would usually have needed to correct earlier errors in observation by subconsciously untangling a highly knotted skein.

[5] Leadbeater was damned with faint praise at a 1922 Theosophical convention in Sydney, Australia. In speaking to defend the Bishop from charges of perversion, Jeddu Krishnamurti, the youth he and Mrs. Besant were training up to be the new "World-Teacher", suggested that Leadbeater's clairvoyance might be doubted, but not his purity.[N2 p. 321] Among many other Theosophists with similar reservations were Ernest Wood [N2 p. 193] and U.G.Krishnamurti. [[K above](#)]

[6] Almost 40 years later the denial of her B.Sc. would be redressed in her own mind by the award of an honorary doctorate, the second to be granted by Hindu University, which she herself had founded in 1898.[N2 p. 321]

[7] Since this preceded Mrs. Besant's days of trade unionism, the immoral activity was probably her advocacy of birth control,[B4] which resulted in the landmark case of *The Queen v. Charles Bradlaugh and Annie Besant* [N1 pp. 107-130], or possibly her attempts to help her partner Bradlaugh (1833-1891) take his seat in Parliament which had been denied him, despite election and reelection, because, as an atheist, he was judged incapable of taking the oath of office on the Bible.[N1 pp. 159ff.] After six years and three more reelections he was ultimately seated in 1886.

[8] When Aveling's wife left him because of cruelty, he took up with Mrs. Besant for 5 years, dropping her for Eleanor Marx, daughter of Karl Marx. After dominating Eleanor for 15 years, and arranging to get his hands on her substantial inheritance from Friedrich Engels, he used his pen name to marry an amateur stage actress less than half his age. When Eleanor discovered this fact 10 months later, she committed suicide [B2]. In *The Doctor's Dilemma* (1906) G. B. Shaw used Aveling as the model for a character who "*was the most entire and perfect scoundrel, the most miraculously mean rascal, the most callously selfish blackguard that ever made a wife miserable*"[S p. 188]. Aveling personally produced 40% of the collaborative first English translation of *Das Kapital, Vol. I* [M1]. He was presumably less

active as a chemist, since from 1873 to 1885 his name does not appear in the *Journal of the Chemical Society* of London either as a member or as the author of any paper published or abstracted.

[9] In 1894 there was a power struggle in the Theosophical Society between its two surviving American founders, Colonel Henry S. Olcott and William Q. Judge. At this time Mrs. Besant found among her papers a note in red crayon on rice paper, the same medium through which the third founder, the late Madame Blavatsky, had been accustomed to receive communications from other worlds. It stated "Judge leads right. Follow him and stick." Despite this blatant Americanism, Mrs. Besant apparently believed that the note came from its signatory, "[Master Koot Hoomi](#)", an etherial inhabitant of another plane sometimes resident in Tibet, rather than having been planted by Judge. [N2 p. 28]

[10] As of 1999, 98 of her works are still listed in *Books in Print*, mostly from Theosophical and occult publishers. For example, the 1999 catalogue of the Theosophical Publishing House lists 30 of her works and 23 of Leadbeater's. One among myriad examples of Mrs. Besant's indefatigable nature is that during a 21-day period in her 80th year she delivered 56 lectures in England, Germany, Holland, Denmark, Norway, Sweden, Finland, Poland, Czechoslovakia, Austria, Hungary, Switzerland, and France.[N2 p. 393] On returning to England from her first trip to India 33 years earlier she did admit to fatigue saying, "Lecturing is trying, and during the four months I spent in India, I have just given 121 set lectures to audiences varying from 600 to 6000 natives." [N2 p. 24]

[11] Although of little use to serious scholars, Mrs. Besant's 168-page translation enjoyed brisk sales and was often awarded as a prize to Hindu students [N2 p. 45]. It is still in print in its 7th edition from the Theosophical Publishing House.

[12] *N.B. this evidence is non-scientific* because it involves exclusively past observations and makes no testable prediction for the future.

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