

ATOM AND

The Pauli/Jung Letters 1932-1958



Edited by C. A. Meier
with a preface by Beverley Zabriske

ARCHETYPE

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The **Pauli/Jung** Letters, 1932-1958

Edited by C. A. MEIER

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CHRONOLOGIES

of the Lives of C. G. Jung and Wolfgang Pauli

C. G. JUNG (1875-1961)

- 1875 Born 26 July in Kesswil, Kanton of Thurgau, a citizen of Basel. Parents: Dr. Paul Achilles Jung (1842-1896), clergyman, and Emilie Preiswerk (1848-1923).
- 1879 Takes up residency in Kleinhüningen, near Basel. Primary- and secondary-school education in Basel.
- 1895-1900 Medical studies and final examination in Basel.
- 1900 Second assistant at the Burghölzli, the cantonal mental institution and psychiatric clinic of the University of Zürich.
- 1902 Promoted to first assistant.
Dissertation, *Zur Psychologie und Pathologie sogenannter occulter Phänomene* [tr., On the Psychology and Pathology of So-called Occult Phenomena].
- 1902-1903 Winter semester. Attends the lectures of Pierre Janet in Paris.
- 1903 Marriage to Emma Rauschenbach (1882-1955), from Schaffhausen.
- 1903-1905 Volunteer doctor at the Zürich psychiatric clinic. Experimental works on normal and pathological word associations, together with their physiological attendant symptoms. Development of the complex theory, published in *Diagnostische Assoziationsstudien* [tr., Studies in Word-Associations].
- 1905-1909 Senior staff physician at the Zürich psychiatric clinic. Runs a polyclinic course on hypnotic therapy. Research into the psychology of dementia praecox, published as *Über die Psychologie der Dementia Praecox* [tr., The Psychology of Dementia Praecox].
- 1905-1913 Lecturer [*Privatdozent*] in psychiatry on the medical faculty of the University of Zürich. Lectures on psychoneuroses and psychology of the primitives.

CHRONOLOGY

- 1907 Meeting with Freud in Vienna.
- 1909 Leaves the clinic because of the pressure of private consultations and psychotherapeutic cases. Sets up private practice in Küsnacht-Zürich as specialist in psychotherapy.
- Invitation to the twentieth anniversary of the founding of Clark University, Worcester, Mass. Lectures there on the Association Method and receives an honorary doctorate.
- Editor of the Bleuler-Freudian *Jahrbuch*es für *psychologische und psychopathologische Forschungen* [Yearbook for Psychological and Psychopathological Research].
- 1911 Founds the Internationale Psychoanalytische Gesellschaft [International Psychoanalytical Association] and becomes its president.
- 1912 *Wandlungen und Symbole der Libido* [tr., *Psychology of the Unconscious: A Study of the Transformation and Symbolisms of the Libido*, 1916]. Critical examination of the Freudian libido theory.
- Invitation to give lectures at Fordham University, New York, (published as *Versuch einer Darstellung der psychoanalytischen Theorie* [tr., *The Theory of Psychoanalysis*]). Awarded an honorary doctorate of law.
- 1913 Final breakaway from the Freudian movement. Names his own psychology "Analytical Psychology," later also known as "Complex Psychology."
- 1917–1918 Commander of the interned British prisoners of war in Chateau d'Oex.
- 1917 Begins research into the problem of types and the links with the individuation process (*Psychologische Typen*, 1921 [tr., *Psychological Types*, 1923]) and into the nature of the collective unconscious and its connection with consciousness. (*Die Beziehungen zwischen dem Ich und dem Unbewussten*, 1928 [tr., "The Relation Between the Ego and the Unconscious"]).
- 1921 Publication of *Psychologische Typen*.
- 1924–1925 Visits the Pueblo Indians in Arizona and New Mexico to study primitive psychology.
- 1925–1926 Research trip to the Elgony on Mount Elgon, Kenya, British East Africa.

- 1929 *Das Geheimnis der goldenen Blüte* [tr., *The Secret of the Golden Flower*], with Richard Wilhelm.
- 1930 Honorary Chairman of the Deutschen Ärztlichen Gesellschaft für Psychotherapie [German Medical Association for Psychotherapy].
- 1932 Awarded the Literature Prize of the City of Zürich.
- Starts the Correspondence with Pauli*
- 1933 President of the Internationalen Allgemeinen Ärztlichen Gesellschaft für Psychotherapie [International General Medical Association for Psychotherapy] and editor of the *Zentralblattes für Psychotherapie und ihre Grenzgebiete* [Central Journal for Psychotherapy and Its Borderlands].
- Resumes academic lectures, this time at the optional subject department of the ETH in Zürich. *Modern Psychology*.
- 1934 Appointed member of the Kaiserl. Leopold.-Karolin. Deutschen Akademie der Naturforscher [German Academy of Researchers].
- 1935 Founds and presides over the Schweizerischen Gesellschaft für praktische Psychologie [Swiss Association for Practical Psychology].
- Appointed professor at the ETH in Zürich.
- 1936 Lectures at the Tricentenary Celebration at Harvard University, Cambridge, Mass. on "Factors Determining Human Behavior." Receives an honorary doctorate of science.
- 1937 At Yale University, New Haven, Ct., gives the 1937 Terry Lectures, *Psychology and Religion*.
- Invited to the twenty-fifth anniversary celebrations of the University of Calcutta, India. Receives the honorary degree of doctor of letters (D.Litt.) from the Hindu University of Benares.
- Honorary degree of doctor of science (D.Sc.) from the Muslim University of Allahabad.
- 1938 Honorary degree of doctor of law from the University of Calcutta.
- Honorary member of Indian Science Congress Association in Calcutta.

CHRONOLOGY

- 1938 Honorary degree of doctor of sciences (D.Sc.) from Oxford University.
- 1939 Appointed Honorary Fellow of the Royal Society of Medicine in London.
Chairman of the Curatorium of the Lehrinstitutes für Psychotherapie [Teaching Institute for Psychotherapy] in Zürich.
- 1940 Resigns from the ETH in Zürich.
- 1944 Ordinarius Professor in Basel.
Honorary member of the Schweizerischen Akademie der Wissenschaften [Swiss Academy of Sciences]. Serious illness.
- 1945 Honorary doctorate of letters from the University of Geneva on the occasion of his seventieth birthday.
Eranos lecture: "Zur Psychologie des Geistes" ["On the Psychology of the Spirit"].
- From 1946 on, Originally Compiled by A. Jaffé*
- 1946 *Psychologie und Erziehung* [Psychology and Education]. *Aufsätze zur Zeitgeschichte* [Essays on Contemporary History]. *Die Psychologie der Übertragung* [The Psychology of the Transference]. Eranos lecture, "Der Geist der Psychologie" ["The Spirit of Psychology"].
- 1948 Opening of the C. G. Jung Institute in Zürich. *Symbolik des Geistes* [Symbolism of the Spirit]. Eranos lecture, "Über das Selbst" [On the Self] (published 1949).
- 1950 *Gestaltungen des Unbewussten* [Forms of the Unconscious].
- 1951 *Aion*, Jung's portion of the book in GW/CW 9ii. Eranos lecture, "Über Synchronizität" [On Synchronicity].
- 1952 *Symbole der Wandlung* [tr., *Symbols of Transformation* (exp. and reworked version of *Wandlungen und Symbole der Libido*, 1912)]. Another serious illness. *Antwort auf Hiob* [tr., *Answer to Job*].
- 1953 First volume to appear of the English edition of the *Collected Works*, Bollingen Series 20, New York, *Psychology and Alchemy*, CW 12.
- 1954 *Von den Wurzeln des Bewusstseins* [From the Roots of Consciousness].
- 1955 Honorary doctorate in Natural Sciences from the ETH in

Zürich. *Mysterium Coniunctionis*, 2 vols. GW/CW 14. 27 November, death of wife.

- 1957 Starts work on *Erinnerungen, Träume, Gedanken* [tr., *Memoirs, Dreams, Reflections*] in collaboration with A. Jaffé, published in 1962. *Gegenwart und Zukunft* [Present and Future].

End of Correspondence with Pauli

- 1958 *Ein moderner Mythos. Von Dingen, die am Himmel gesehen werden.* [tr., *Flying Saucers: A Modern Myth of Things Seen in the Sky*].
- 1960 First volume of the Swiss edition of the *Gesammelten Werke* [Collected Works], vol. 16, "Praxis der Psychotherapie."
Awarded honorary citizenship of Küsnacht-Zürich on the occasion of his eighty-fifth birthday.
- 1961 "Approaching the Unconscious," written in English, in *Man and His Symbols*, 1968.
6 June, dies at his home in Küsnacht after a brief illness.

WOLFGANG PAULI (1900–1958)*

- 1900 Born in Vienna, 25 April, and "baptized according to the rites of the Roman Catholic Church" on 13 May.
- 1918 Shortly after graduating from the Döbling Gymnasium in Vienna, he publishes his first scientific paper on general relativity (1919).
Enrolls for the winter semester at the Ludwig-Maximilian University in Munich.
- 1921 Completes his studies with a dissertation on the hydrogen molecule ion H_2^+ (1922) with Arnold Sommerfeld.
Publishes the "Relativity Article" (1921).
In the winter semester, Pauli becomes the assistant of Max Born at the Physics Institute of the University of Göttingen.
- 1922 In the following summer, semester Pauli moves to the Physics Institute in Hamburg as assistant to Wilhelm Lenz, whom he had befriended in Munich.

* From C. P. Enz and K. von Meyenn, *Wolfgang Pauli Das Gewissen der Physik* (Braunschweig: Vieweg, 1988), pp. 515–18.

CHRONOLOGY

- 1922 In June, he goes to Göttingen, where Bohr is giving his famous lectures on atomic physics. It is here that Bohr invites him to spend the academic year in Copenhagen, beginning in the winter semester of 1922.
- Becomes occupied with the theory of the anomalous Zeeman effect.
- 1923 Habilitation (university lecturing qualification) in Hamburg.
- In November, while working on a lecture on the quantum theory (1929), Pauli discovers the exclusion principle (1925).
- 1925 Because of work on his major reference work on quantum theory (1926) Pauli's time is almost completely taken up, so that he participates only indirectly in the significant progress achieved in summer by Werner Heisenberg with his matrix mechanics.
- In the winter, Pauli calculates the hydrogen spectrum with the aid of quantum mechanics, thus achieving general recognition for the new formalism. He also violently opposes the "rotating electron" of Uhlenback and Goudsmit, which he regards as regression back into the old pre-quantum mechanics way of thinking.
- 1926 Pauli is awarded the title of professor.
- 1927 Pauli sets up a general program for the development of a quantum electrodynamic, which mainly involves the participation of Pascual Jordan and Werner Heisenberg.
- In May, Pauli publishes his unrelativistic spin theory, in which he introduces the so-called Pauli matrices.
- The dispute over the correct interpretation of the quantum theory reaches its climax and temporary conclusion in September during the Volta celebrations in Como, and in October at the Fifth Solvay Congress in Brussels.
- 1928 For the summer semester, Pauli is appointed Professor of Theoretical Physics at the ETH in Zürich, a position he is to hold—with interruptions—until the end of his life.
- 1929 Publishes the first joint work with Heisenberg on the foundation of the general quantum-field theory.
- 1930 Trip to Russia, where he takes part in a congress in Odessa during July and August.

In December, first unofficial reference to his neutrino hypothesis in his letter to the "radioactive ladies and gentlemen."

- 1931 First International Nuclear Physicists Congress in Zürich.
 Trip to the United States in summer. On the return journey, Pauli attends the Nuclear Physicists Congress in Rome, where Enrico Fermi first hears of the neutrino hypothesis.

In October, Pauli is awarded the Lorentz medal in Leyden.

- 1932 Work on the reference book on wave mechanics (1933).

Starts the Correspondence with Jung

- 1933 At the Seventh Solvay Congress in October, after Heisenberg's paper, Pauli gives his first public report on his neutrino hypothesis.

- 1934 In April, Pauli travels to London, where he marries Franca Bertram.

In July, together with his assistant Viktor Weisskopf,* he presents the so-called anti-Dirac theory.

In October, he takes part in an international physicists congress in London and Cambridge.

- 1935 In March, lectures on relativistic quantum theory (1936) in Paris at the Institut Henri Poincaré.

In the winter semester of 1935-1936, Pauli takes his second trip to the United States. Lectures and seminars at Princeton and a visit to Berkeley.

- 1937 Takes part in the Congress for Nuclear Physics in Moscow.

- 1938 In March, lecture tour to Cambridge and Leyden.

- 1939 Papers with his assistant Markus Fierz on general relativistic field equations for particles with any spin.

In summer, Pauli prepares a report on the state of elementary particle physics for the Solvay Congress planned for autumn. This report leads to two publications later (1940) and (1941).

* Viktor F. Weisskopf, born 1908, assistant to Pauli 1933 (Wolfgang Pauli and Viktor F. Weisskopf jointly published *Über die Quantisierung der skalaren relativistischen Wellengleichung* [On the Quantization of the Scalar Relativistic Wave Equation]); after the war, he was professor of physics at MIT until 1974. From 1961 to 1965, he was General Director of CERN.

CHRONOLOGY

- 1940 Together with his wife, Franca, Pauli leaves Switzerland and for the duration of the war is a visiting professor at the Institute for Advanced Study in Princeton. While most of the American physicists are occupied with "war physics," Pauli, in the immediate vicinity of Einstein, is able to carry on with basic research.
- Papers on the meson theory of nuclear forces (1946).
- 1941 In the summer semester, Pauli becomes a visiting professor at the University of Michigan.
- 1942 Lectures at Purdue University.
- 1945 Awarded the Nobel Prize (1946).
- Pauli takes over the publication of *Physical Review* for two years.
- 1946 In January, Pauli is granted American citizenship.
- In March, visits Schrödinger in Dublin and returns to Switzerland.
- Resumes lectures at the ETH in Zürich in the summer semester.
- Participates in the first major postwar international congress in Cambridge (1947).
- Travels to Stockholm in December to deliver the Nobel Lecture (1947).
- 1948 Lectures at the Psychological Club in Zürich, 28 February and 6 March 1948: "*Der Einfluss archetypischer Vorstellungen auf die Bildung naturwissenschaftlicher Theorien bei Kepler*" [tr., "The Influence of Archetypal Ideas on the Scientific Theories of Kepler"] (see Appendix 6).
- Participates in the Eighth Solvay Congress on elementary particles (1948).
- 1949 Pauli receives Swiss citizenship on 25 July.
- Conference on the fundamentals of quantum statistics in Florence (1949). Trip to America in winter.
- 1950 Conference on elementary particle physics in Paris (1952).
- 1951 Trip to America in spring. On his return, Pauli travels to Lund in May.

- 1952 Publication of the Kepler work (C. G. Jung and W. Pauli, in *Naturerklärung und Psyche* [tr., *The Interpretation of Nature and the Psyche*, 1955].
 Summer school in Les Houches (1952).
 In the winter semester, Pauli embarks on a long trip to India.
 Visits Homi Jehangir Bhabha in Bombay.
- 1953 Lectures on nonlocal field theories in Turin.
 Attends a physics conference in Sardinia in spring.
- 1954 Visits America in spring. Internationale Philosophen-kongress in Zürich (1957).
- 1955 Pisa Conference (1956) in June.
 In July, Pauli chairs the conference to mark the fiftieth anniversary of the Theory of Relativity in Berne (1955).
 In November, Pauli accepts an invitation to hold lectures in Hamburg.
- 1956 Visits America. Announcement of the proof of the existence of the neutrino in June during the CERN symposium.
- 1957 Announcement of the parity violation in January.
 Conference in Rehovot, Israel, in September (1958).

End of Correspondence with Jung

- 1958 Trip to America in spring. Lectures in Berkeley on quantum field theory and makes visit to Max Delbrück in Pasadena.
 And then to Brookhaven.
 Awarded the Max Planck Medal in Berlin in April (in absentia).
 Flies back to Zürich in June and participates in the Eleventh Solvay Congress.
 Dispute with Heisenberg about the spin theory of elementary particles during the CERN Conference at the end of June.
 In August, participates in the summer school in Varenna (1958).
 20–22 November: Visits Hamburg and receives an honorary doctorate from the university.

CHRONOLOGY

1958

On 15 December, Pauli dies in the Red Cross Hospital in Zürich after a short illness. On 20 December, the funeral is held in the Fraumünster in Zürich, in the presence of large number of mourners from Switzerland and abroad.

LEXICON OF TERMS

in Psychology and Physics

PSYCHOLOGY

amplification — The augmentation of what are initially incomprehensible dream contents (figures, motifs, etc.) with parallel material (whenever possible from the same cultural level of the dreamer) from mythology, religion, folklore, and so on, to provide a better understanding.

anima (*Latin*) — The name for frequently recurring dream or fantasy figures of women (in men) who have a strange, mysterious, or numinous quality. They represent the feminine part of the man's psyche, which is relatively unknown because it has hitherto been unconscious.

archetype — An intrinsically abstract predetermined formal factor of the psychic life; to a certain extent, the psychic representatives of the instincts, which is why, at all times and in all places, the archetypes manifest themselves in identical fashion in so-called archetypal images (cf. religious symbols) or archetypal patterns of behavior.

attitude (*type*) — Meaning introversion or extraversion: in general, people tend mainly to treat the external object as important (extraversion) or are more interested in the subject (introversion) and his reactions.

dream — Spontaneous manifestation of the unconscious in the form of images. Often stands in a compensatory or complementary relationship to the conscious situation of the dreamer.

functions — Jung distinguishes four basic functions of consciousness: thinking/feeling and intuition/sensation, which form two pairs of opposites and thus fit into a cross-shaped ordering system. Usually, one of the four is dominant and thus well differentiated (main function), whereas its opposite function is poorly developed or remains unconscious ("inferior function"). These functions are often represented by specific colors: blue = thinking, red = feeling, green = sensation, yellow = intuition.

individuation — A state finally achieved through a gradual process of analytical work, in which the four functions are in relatively harmonious balance. It is the ultimate objective of the individuation process or the harmonious wholeness of the personality.

- libido* — Psychic energy, dynamic force as such. Can be understood as basic instinct or its symbolism. Is divided up into several distinctive drives, such as sexuality, etc.
- mandala* (Sanskrit) — Schematic figure in the shape of a circle, with a square inside or outside this circle and four segments (sometimes four colors).
- participation mystique* — An expression coined by the French philosopher and sociologist Lucien Lévy-Bruhl (1857–1939), Paris, Sorbonne. In his works *Les fonctions mentales dans les sociétés inférieures* (1919) and *La mentalité primitive* (1922), it is a generally widespread feeling among “primitives” about the “magic” connection to an object, also to a person. Jung uses the term for us, too.
- quaternity* — The four functions represented as wholeness.
- self* — Center of the integrated personality (consciousness and unconsciousness). Potentially preexistent. Expresses itself figuratively, for example, in the shape of a cross or a center with concentric circles (mandala). Often appears figuratively as *imago dei*, the image of God.
- shadow* — Name for dream or fantasy figures of the same sex as the dreamer, with unpleasant, dubious characteristics, thus representing an unconscious aspect of the personality that is difficult to accept. Devilish when embodying absolute or objective evil. Can also be helpful when these negative characteristics might actually be useful.
- symbol* — Metaphorical or literal expression (among others) for a situation that is only partially known and rationally comprehensible but which has an irrational component. It represents a product of collaboration between consciousness and unconsciousness and is an object of fascination.
- synchronicity* — Jung’s term for phenomena that coincide in time and space for which there is no causal explanation but which have a clear meaningful connection. They can occur between psyche and psyche, telepathically to a certain extent, as well as between psyche and physis—i.e., outside, in physical reality (psychokinetically). Allow me to give an example of the latter, as told to me by Pauli: P was sitting alone at the window in the Café Odeon, pondering over his inferior function (feeling-color red). There was a large, unoccupied car parked outside the café. P. could not take his eyes off it, and then it suddenly caught fire and burst into flames (“Pauli effect”).
- unconscious* — Large complex of contents of the total psyche of the whole personality, which usually remains unconscious. A distinction must be made between the personal unconscious, which might also be conscious

but is suppressed or forgotten, and the collective unconscious, of which we are really not aware and which mainly manifests itself in archetypal images or situations.

PHYSICS

Algol — The Demon Star of the Arabs. Second brightest, variable star in the constellation Perseus, consisting of three stars rotating around a common center; these three stars eclipse one another with a period of 2.9 days.

antiparticle — The “charge-reflected”—i.e., **charge conjugated**—version of a particle, with otherwise identical characteristics. Neutral particles may be their own antiparticles.

atom — Smallest particle, which cannot be destroyed or changed in a chemical reaction, consisting of an **atomic nucleus** and an **atomic shell**.

atomic nucleus — Center of the **atom**, in which the predominant mass A and the positive electrical charge Z are concentrated. The diameter of the nucleus is approximately 100,000 times smaller than that of the atom.

atomic shell — Built up of **electrons**, which obey Pauli’s Exclusion Principle of W. Pauli, arranged in concentric shells.

automorphism, Automorphy — Isomorphic representation of a mathematical entity (usually a “group”) onto itself.

charge conjugation — Reflection operation, which reverses the sign of the charge of a particle, transforming it into its **antiparticle**.

classical physics — The physics developed before quantum physics, in which all quantities change continually, causally, and deterministically.

cobalt — Chemical element with charge $Z = 27$, whose stable **isotope** has the mass $A = 59$.

complementarity — A concept formulated by Niels Bohr after 1924 that describes a mutually exclusive opposition, rather than a contradictory one, between two physical quantities, or, more generally, between two qualities, the exclusivity being based on the fundamental impossibility of precisely measuring both at the same time.

complex numbers — Solving quadratic (and higher) equations calls for an imaginary entity $i = \sqrt{-1}$, with the aid of which the complex numbers are defined as $x + iy$ with any real values x and y .

cosmic rays — High-energy atomic and subatomic particles that irradiate from the cosmos. The problem of their origin and high energy has not been fully solved. At sea level, 75 percent are secondarily generated muons.

Co-58, Co-60 — Radioactive isotopes of the element cobalt ($Z = 27$) with 31 ($A = 58$) or 33 ($A = 60$) neutrons.

CPT theorem — The product of the operations charge conjugation C , parity P , and time reversal T is according to this fundamental theorem an invariant of local relativistic field theories. Proofs by G. Lüders (1954), W. Pauli (1955), and R. Jost (1957).

differential and integral calculus — The differential of a function $f(x)$ is the limit of the difference in the function values for a vanishingly small interval of x . The integral is the limit of the sum of differentials. Calculus was created by G. W. Leibniz (1684, 1686) and I. Newton (1687).

electric dipole — A directed line segment (vector), associated with two electrical charges $+e$ and $-e$ and the arrow connecting them.

electrodynamics — Theory of electrical and magnetic phenomena and their propagation in space and time, summarized in the Maxwell equations.

electromagnetism — Phenomena described by electrodynamics.

electron — The lightest particle, carrying a negative elementary charge and with spin $\frac{1}{2}$, which constitutes the atomic shell and is the carrier of the electric current and the negative radioactive betadecay.

electron shells — See atomic shell

energy level — Discrete value of the energy in a bound, localized atomic state.

energy quanta — To explain the characteristics of thermal radiation, Max Planck postulated in 1900 that the transmission of energy between radiation and matter occurs in multiples of a basic unit (quantum). This hypothesis was consequently fully confirmed and has since become the basis of quantum mechanics.

ether — Element in the heavenly sphere of Plato; the wind guiding the planets according to Descartes; a state of tension in the electrical field of Faraday. "Through the postulate of relativity, ether as a substance has been removed from physical theories, since there is no point in speaking about being stationary or in motion with respect to ether if this cannot basically be ascertained through observation" (Pauli, "Theory of Relativity," §2).

field — A concept introduced by Faraday around 1830, in which the force acting on a conceptual pointlike body with unit charge is assigned to a point in space-time. While it originally related to electric charges, the concept has been generalized since Einstein to apply to forces whose sources are of a nonelectrical nature.

field of force — See **field**

fine structure — A consequence of the spin of the electrons, which, under the influence of a nuclear charge, gives rise to fine spectral doublets. It can be an effect of the special theory of relativity ("relativistic doublets") or the screening of the nuclear charge Z by internal electron shells ("screening doublets") (Pauli, "Quantum Theory," no. 34).

frequency of oscillations — The number of oscillations per unit of time.

group — Mathematical structure G with the properties of multiplication (for any two elements a, b belonging to G , the product ab also belongs to G), associativity (three elements a, b, c belonging to G fulfil the relation $a(bc) = (ab)c$) and the inclusion of the identity as an element. A group can be considered as a generalization of the concepts of "number" and "numerical multiplication."

H-atom — Hydrogen atom consisting of a **proton** as nucleus and an **electron** as atomic shell. Its diameter is approx. 0.00000001 mm.

half-life period, half-life — Period in which half of the nuclei of a radioactive substance decays.

isomorphism, isomorphy — Single-valued representation of one mathematical structure onto another—i.e., the inverse of the representation exists and is single-valued. In a **group**, the representation of a product of two elements is the product of the representations of these elements.

isotope — The charge Z of a nucleus is carried by Z protons; its mass A is shared by these and $(A-Z)$ neutrons. The isotopes of an element differ in their masses A , whereas the chemical properties are defined by the same charge Z .

isotope separation — As isotopes vary in mass, they can be separated by means of a mass spectrometer.

magnetism — Phenomena comprising both the action of the force of a magnet as well as its material cause.

microphysics — Collective name for the physics of atomic and subatomic systems described by **quantum mechanics**.

molecular beam — Structures consisting of several **atoms** generated through acceleration.

momentum — Defined by the product of mass and velocity of a particle.

multiplet — Whereas the "coarse" multiplet structure (doublet, triplet, etc.) of atomic **spectral lines** is resolved only in a magnetic field, the **fine structure** doublets are present without field.

muon, mu-meson, μ — Heavy electron with 207 times greater mass than a single electron?, which decays with a half-life period of approximately one millionth of a second, into an electron and two neutrinos.

natural system — A term used frequently by Pauli for the periodic system of chemical elements (correspondence, 1924; "Quantum Theory," 1926; lecture, 1952). It was established by D. Mendelejew in 1869 and explained by Pauli's Exclusion Principle.

negatron — Synonym for electron.

neutrino — "Little neutron" (from Italian via E. Fermi), postulated by W. Pauli to explain the energy deficit during beta decay (see radioactivity) of a radium isotope ($A = 222$) into the chemical element radon ($Z = 86$); "they could be electrically neutral particles, which I will call neutrons, which exist in nuclei, which have spin $\frac{1}{2}$ and which obey the Exclusion Principle" (letter of Pauli on 4 December 1930). The existence of the neutrino was confirmed only in 1956. Neutrinos play a crucial role in the energy budget of the stars.

neutron — Neutral version of the proton with a 0.1 percent larger mass. The isolated particle decays with a half-life period of about ten minutes into a proton, an electron, and an antineutrino.

nuclear reaction — Artificially induced radioactivity irradiated by atomic or subatomic particles.

nucleus — See atomic nucleus

oriented nucleus — In 1924, Pauli postulated the existence of a nuclear spin of the nucleus. If this is not zero, the nuclei can be directed parallel to a magnetic field, i.e., oriented.

parity — A reflection operation that turns a right-handed coordinate system into a left-handed one.

photon — Light quantum, a particle with zero mass and spin 1. It is the complementary interpretation of light waves.

Planck constant/quantum of action — The universal constant h introduced by M. Planck to explain thermal radiation; it has the dimension of action (energy \times time).

ponderomotoric effect — The force exerted by a magnetic field on an electrical conductor.

positron — Antiparticle of the electron.

probability laws — The form of law in quantum physics, not valid for individual observations, as in classical physics. Quantum phenomena manifest themselves rather in classical measuring apparatuses that can be

"inspected by many and not influenced by the observing subjects. In this sense, they appear to the observers as objective reality, regulated by probability laws" (Pauli, "Phänomen und physikalische Realität").

proton — Stable subatomic particle with positive elementary charge 1 and spin $\frac{1}{2}$, which together with the neutron forms the atom nuclei.

psi, ψ — Symbol introduced by E. Schrödinger for the wave function (probability amplitude) in wave mechanics.

quantum mechanics — Formalism introduced by Werner Heisenberg in 1925 for quantum physics in the particle interpretation, in analogy to classical physics, with the quantities of classical particle mechanics being replaced by noncommuting operators (matrices).

quantum physics — Twentieth-century physics, dealing with the atomic and subatomic phenomena that cannot be apprehended by everyday intuition and thus necessitate the introduction of new concepts such as **energy quanta** and the fundamental uncertainty of measured values. A quantum is an indivisible, discrete entity of a physical quantity such as energy, which in earlier physics was regarded as continuous.

radioactive decay — See **radioactivity**

radioactivity — Phenomenon of the emission of (positive) alpha-, (positive or negative) beta-, and (neutral) gamma rays in the spontaneous decay of **atomic nuclei**. Alpha rays are made up of helium nuclei (two protons and two neutrons); negative beta rays are electrons; positive ones are positrons; gamma rays are high-energy photons.

radium decay — Radioactive decay of the isotopes of the element radium ($Z = 88$).

reflection symmetries — Symmetry operations with the special characteristic that their twofold application creates an identity. Examples are **parity**, **time reversal**, and **charge conjugation**.

relativity physics — A theory established by Einstein, the kinematics of which mix space and time coordinates (Special Relativity theory, 1905). In the General Relativity theory (1916), massive bodies play the role of sources that locally deform the space and time continuums, giving rise to a "metric field."

Riemann surface — Functions $f(z)$, such as $\sin z$, $\log z$, etc., reveal their full characteristics only when one allows z to be a **complex number** $x + iy$. The functions then become complex, $f(x + iy) = u + iv$, so that they can be seen as a mapping of the complex plane onto itself. As the functions are generally multivalued, with a degree of n , one introduces n "leaves" of the x,y -plane, moving from one leaf to the next by circling a singularity of

the function. The leaves thus connected at their singularities are called a Riemann surface after the mathematician G.F.B. Riemann. It has a fundamentally different topology from the plane, which causes the function to be single-valued.

scattering — Particles or waves radiating into a field of force (generated, for example, by an atomic nucleus) are diverted by it—i.e., scattered.

space reflection — See *parity*

space-time continuum — A concept introduced by H. Minowski in 1908 joining space and time, which in relativity physics cannot be separated.

spectral line — The spectrum of a source of radiation is the resolution of the emitted radiation according to frequencies (*spectroscopy*). For visible light, this dispersion produces the colors of the rainbow. The spectrum radiated by an atom consists of sharp lines, which are explained by *quantum mechanics*.

spectrograph — Apparatus that registers the spectroscopic frequencies.

spectroscopy — Experimental technique for resolving radiation according to frequencies. Of special historical interest for *quantum physics* are the line spectra of atoms.

spin — The inherent angular momentum of a particle.

statistical correspondence — The concept of correspondence between atomic spectral lines and the light frequencies generated by classical movement, formulated by Niels Bohr after 1916, was generalized by Pauli in his essays on the statistical connection between the complementary "ideas of the discontinuum (particle) and the continuum (wave)."

test body — See *field*

thermoelectricity — Phenomena in which electrical quantities (voltage, current) and thermal quantities (temperature, heat) are connected.

time reversal — Reflection symmetry that reverses the direction of time—i.e., interchanges past and future.

topology — In its set theoretical form (as opposed to its algebraic form), topology is concerned not with distances and angles but only with the properties (e.g., connectivity) of the neighborhood of spatial points.

uncertainty relations, indeterminacy relations — Inequalities formulated by W. Heisenberg in 1927, which state that the product of the measurement uncertainty of two *complementary* observables cannot be smaller than $h/4\pi$ where h is the Planck constant.

valence — The number of valence electrons, by means of which two elements combine chemically. In the case of a polar bond, these electrons

are exchanged; in a covalent bond, they are shared. The covalent bond is often represented by **valence lines**.

valence lines — See **valence**

wave mechanics — A theory formulated by Erwin Schrödinger in 1926 for **quantum mechanics** in the wave representation, which is **complementary** to the particle view. Schrödinger also demonstrated the equivalence of wave and quantum mechanics.

weak interactions — Forces that define the **radioactivity**, in contrast to the “strong interactions,” which bind **protons** and **neutrons** together in the atomic nucleus. The forces of electromagnetism, by way of contrast, are of intermediate strength.

world formula — Nonlinear **wave mechanics** equation for particles with spin $1/2$ with internal symmetry, combining left- and right-handed particles and **antiparticles**. This equation was established by W. Heisenberg in the hope that it describes all existing particles; toward the end of 1957, it formed the basis of the last collaboration between him and Pauli. In the spring of 1958, this formula appeared in the world press, to Pauli’s great regret.

The first part of the book is devoted to a general introduction to the subject of the history of the English language. It discusses the various influences that have shaped the language over the centuries, from Old English to Modern English.

The second part of the book is devoted to a detailed study of the history of the English language. It covers the period from the Norman Conquest to the present day, and discusses the various changes that have taken place in the language over this period.

The third part of the book is devoted to a study of the history of the English language in the United States. It discusses the various influences that have shaped the American English dialect, and the ways in which it has developed over time.

The fourth part of the book is devoted to a study of the history of the English language in the British Isles. It discusses the various influences that have shaped the British English dialect, and the ways in which it has developed over time.

The fifth part of the book is devoted to a study of the history of the English language in the Indian subcontinent. It discusses the various influences that have shaped the Indian English dialect, and the ways in which it has developed over time.

The sixth part of the book is devoted to a study of the history of the English language in Africa. It discusses the various influences that have shaped the African English dialect, and the ways in which it has developed over time.

The seventh part of the book is devoted to a study of the history of the English language in the Pacific region. It discusses the various influences that have shaped the Pacific English dialect, and the ways in which it has developed over time.

The eighth part of the book is devoted to a study of the history of the English language in the Caribbean. It discusses the various influences that have shaped the Caribbean English dialect, and the ways in which it has developed over time.

JUNG AND PAULI

A Meeting of Rare Minds

BY BEVERLEY ZABRISKIE

Readers of the Swiss psychiatrist C. G. Jung are more familiar with Wolfgang Pauli's unconscious than with his waking life and achievement. Through Jung's *Psychology and Alchemy*—an exposition of “the problem of individuation” and “normal development . . . in a highly intelligent person”—depth psychologists have known the Nobel laureate's dreams, not his professional genius. Meanwhile, the scientists who continue Pauli's pursuit of the nature and composition of the material universe know little of the quantum physicist's depth exploration of his unconscious, his fascination with the interface of matter with psyche, and his collaboration with Jung in probing connections that appear to be acausal.

In turn, many who know Jung's studies of psychic phenomena are not so at ease with his development of the parallels between psychic process and the material matrix in which the mental is embedded. For those who lack Jung's scientific background and grasp, his claim of an empirical method, his pursuit of the metaphors of alchemy, and his evocation of analogies in physics to psychic mechanisms have seemed far-fetched, tangential, difficult, or unnecessarily encumbering. Yet Jung persisted in pursuing the physical and meditative experiments of the alchemists and in perusing the findings of contemporary scientists. Throughout his career, Jung argued that his work would carry the gravitas of the relevant and enduring only if it had both a place in the history of thought and a context in the modern disciplines.

This collection of letters between Jung and Pauli offers insightful information about a relationship that was valuable for both analytical psychology and quantum physics, two realms of investigation that at first seem to have no point of contact. Historically, physical science and religion have focused, from different perspectives, on the sources of the universe and its inhabitants. Religion and psychology, in a similar fashion, have had overlapping concerns about the nature of existence. Science traditionally seeks the most fundamental, objective, and universal facts by confirming and measuring external reality through experiments. Psychology, however, while presuming both norms and anomalies in its dynamic descriptions and differential

diagnoses, is concerned primarily with subjective experience and individual apprehension.

As psychology describes psychic contents with psychic means, psyche is subject and object, medium and message, source and goal; there is no point of observation outside the human psyche. Physics, by contrast, pursues material reality both via and, to the greatest degree possible, beyond the human experience, but it also uses the mental medium in both its conceptions and inventions. While it utilizes impersonal and unvalenced measures, the questions and thus the proofs originate in and are dependent on the human mind. In this sense, our grasp of the universe is essentially anthropic. Also, as a contemporary Nobel laureate, the particle physicist Steven Weinberg, reminds us, "we cannot require that all experiments should give sensible results," because "by definition there is no observer outside the universe who can experiment on it."¹

The letters between Pauli and Jung reveal two large minds in a twenty-six-year correspondence about fields of expertise that, it could be argued, saw the most extensive developments in the Western intellect in the twentieth century. Each scholar was intent on moving the boundaries between the known and unknown in his own tradition. Each had the imagination to cross the lines within, beyond, and between their disciplines in order to search for the links between the observable and the unknowable. Each, too, had the humility essential to look for precedents in the past, as well as the arrogance necessary to risk speculation about the future.

Each thinker was concerned with the effect of the particular and specific on the universal. Jung's concern was individual experience: the psyche's perception and conception, emotion, and imagination regarding inner and outer realities. He focused on the individual's psychic development as it interrelated with recurring, and thus collective, predispositions and representations of human experience. He was especially curious about the ways in which images produced by the psyche become unprovable but assumed beliefs. Pauli sought to prove theories about the nature of the tiniest particles in the ever-extending energy patterns of the material universe and to find the formulas and means of measurement that would reveal the universe's past, present, and future. While focusing on the most fundamental elements in the world's makeup, as a quantum theorist Pauli was also alert to the effect of the particular presence of the observer on what is observed.

COMPLEMENTARITIES

Jung (1875-1961) and Pauli (1900-1958) met in 1930, when Pauli, in life distress and psychic despair, sought out Jung for direction in attending to his emotional and psychological pain. While never Pauli's analyst, Jung re-

¹ Weinberg 1994a, p. 48.

viewed thirteen hundred of Pauli's dreams and studied a selection from the first four hundred of these. Over years of contact, the younger man's knowledge penetrated and influenced Jung's thought.

In 1952, Jung and Pauli published a juxtaposition of their ideas in *The Interpretation of Nature and the Psyche*. In their work, they crossed paths on complementary vectors.

As the phenomenal world is an aggregate of the processes of atomic magnitude, it is naturally of the greatest importance to find out whether, and if so how, the photons (shall we say) enable us to gain a definite knowledge of the reality underlying the mediative energy processes. . . . Light and matter both behave like separate particles and also like waves. This . . . obliged us to abandon, on the plane of atomic magnitudes, a causal description of nature in the ordinary space-time system, and in its place to set up invisible fields of probability in multidimensional spaces.²

Pauli? No, Jung.

Division and reduction of symmetry, this then the kernel of the brute! The former is an ancient attribute of the devil. . . . If only the two divine contenders—Christ and the devil—could notice that they have grown so much more symmetrical!³

Jung? No, Pauli, in a letter written a year before his death to Werner Heisenberg, a lifelong friend and colleague.

By the time that Jung met Pauli, he had been deeply affected and "tremendously impressed" for nearly three decades by William James. In *Principles of Psychology*, James posited coexisting and possibly split modes of consciousness—the "upper self" and the "under self"—which even while mutually unaware of and ignoring each other have complementary effects on each other. In *The Varieties of Religious Experience*, James wrote of the "field" that, despite the indeterminacy of its margins, guides attention and behavior.⁴ Jung adopted the Jamesian notion of psychic fields and the language regarding the complementary nature of the constituents of the psyche. When he was a psychiatrist at the Burghölzli clinic, trying to grasp the import of the striking images produced by disturbed patients, Jung began to find precedents for them in mythology, philosophy, religion, alchemy, and the historical notions of the natural sciences. At first compelled by the contents of these images, Jung became consistently more concerned with the process in and for which the psyche produced them. He postulated that dreams and autonomous fantasies were the complementary conceits by which the psyche attempts to retrieve or complete its knowledge in pursuit of greater consciousness and, in cases of imbalance or damage, to reestablish equilibrium and heal internal splits.

² Jung 1947, par. 438.

³ Heisenberg 1971, p. 234.

⁴ Card 1991b, pp. 52–53.

James also perceived and named the complementarity between physical and depth-psychological fields, and

drew attention to the correspondence of the concept of field in physics with the newly formulated psychological concept of the subconscious. It is thought that physicist Niels Bohr also borrowed from James the term complementarity, with which Bohr formulated the Principle of Complementarity that characterized his philosophy of nature.⁵

As a professor at Zurich's Eidgenossische Technische Hochschule (ETH), a leading university in the sciences, Jung was exposed to current theory. He saw psychology as an empirical science of observation, exploration, and ongoing reformulation. Throughout his life, he remained convinced that just as matter is in a constant process of redefinition, so too must psyche and spirit be continuously redefined. The development of Jung's thought and that of physics in the first half of the twentieth century are both complementary and symmetrical. In the studies on the association experiment that Jung published in 1904 to 1906 with Franz Riklin, he described psychological complexes as knots of psychic energy, each with its own agenda, charge, and resonance. The existence of these fields in the personal unconscious relativized the consciousness and autonomy of the ego.

In 1905, Albert Einstein's *annus mirabilis*, "while also working out the quantum theory of light and a theory of the motion of small particles in fluid, Einstein developed a new theory of space and time, now called the special theory of relativity."⁶ Jung recalled that he had met Einstein in the "very early days when [he] was developing his first theory of relativity. . . . His genius as a thinker . . . exerted a lasting influence on my own intellectual work."⁷ In the Tavistock lectures, Jung remembered, "I pumped him about his relativity theory. I am not gifted in mathematics. . . . I went fourteen feet deep into the floor and felt quite small."⁸ In 1928, when Jung received the German translation of a Chinese alchemical treatise called "The Secret of the Golden Flower" from Richard Wilhelm, he felt immediate sympathy with the Chinese notion of time as a continuum in which certain qualities manifest relatively simultaneously in different places. In his 1929 essay on the "Golden Flower" and his 1930 Wilhelm memorial, Jung made reference to what he would call synchronicity as a parallelism of events that cannot be explained causally. Jung's reading of alchemy took him into a deep study of "all kinds of opposites" and, as he wrote twenty-five years later, led eventually to his understanding of the unconscious as a process.

In *Dreams of a Final Theory*, Weinberg observes that Einstein's 1915 special theory of relativity "fit in well with a dualistic view of nature: there are

⁵ Ibid.

⁷ Jung 1974, p. 109.

⁶ Weinberg 1994, p. 98.

⁸ Jung 1968, par. 140.

particles, like the electrons, protons, and neutrons in ordinary atoms, and there are fields, like the gravitational or the electromagnetic field."⁹ Just five years later, the twenty-one-year-old Pauli, rather than feeling "fourteen feet deep into the floor," published his own critique of this relativity thesis. Einstein wrote:

No one studying this mature, grandly conceived work could believe that the author is a man of 21. One wonders what to admire most, the psychological understanding for the development of ideas, the sureness of mathematical deduction, the profound physical insight, the capacity for lucid systematic presentation, the complete treatment of the subject matter, or the sureness of critical appraisal.¹⁰

In 1926, using his classmate Heisenberg's matrix mechanics, Pauli produced a quantum-mechanical calculation of hydrogen energy levels. It was an "exhibition of mathematical brilliance, a sage-like use of Heisenberg's rules and the special symmetries of the hydrogen atom. . . . No physicist alive was more clever."¹¹ Pauli thus validated quantum mechanics, most simply described as "the study of the behavior of atoms and their constituents. Quantum is the Latin word for so much or bundle, and mechanics is the old term for the study of motion. Quantum mechanics is the study of the motion of things that come in little bundles"—in contrast to a relativity theory based on the assumption of point particles.¹²

By age twenty-eight, Pauli held the chair of theoretical physics in Zurich. With Bohr and Heisenberg, he arrived at a new philosophy for subatomic matter. In 1929, Pauli and Heisenberg presented a field theory of physics that elided the distinction between matter and force. They described both particles and forces as manifestations of a deeper level of quantum fields in which "not only photons but all particles are bundles of energy in various fields . . . electrons are bundles of the energy of the electron field; neutrinos are bundles of the energy of the neutrino field; and so on."¹³

Meanwhile early in his career during his short but intense relationship with Freud, Jung had struggled with a sexually based drive theory. By the time he spoke at Harvard in 1932, Jung had identified at least five kinds of drives: hunger, activity, sexuality, creativity, and reflection. But he gradually came to conceive of "libido as a psychic analogue of physical energy, a more or less quantitative concept, which should not be defined in qualitative terms . . . [nor in] the prevailing concretism of the libido theory." He later recalled to Aniela Jaffé: "I wished no longer to speak of the instincts of hunger, aggression, and sex, but to regard all these phenomena as expressions of psychic energy." He said:

⁹ Weinberg 1994, p. 141.

¹¹ Weinberg 1994, p. 69.

¹³ Weinberg 1994, pp. 171-72.

¹⁰ Peat 1991, p. 15.

¹² Hazen and Trefil 1992, pp. 65-66.

In physics, too, we speak of energy and its various manifestations. . . . The situation in psychology is precisely the same. . . . We are dealing primarily with energy, with measures of intensity, with greater or lesser quantities . . . in various guises. If we conceive of libido as energy, we can take a comprehensive and unified view . . . such as is provided in the physical sciences by the theory of energetics. . . . I see man's drives as various manifestations of energetic processes . . . forces analogous to heat, light, etc.¹⁴

Jung's notion of the archetypes of the collective unconscious implied, so to speak, a supercharge, an "overplus," of energy emerging from those "fields" of interrelated experience that the human psyche is predisposed to find significant. For Jung, archetypes are not structures but "habitual currents of psychic energy," "systems of readiness for action." Pauli refers to them as "statistical laws with primary probabilities." These exist before and beyond the only personal data of the individual time-and-space-bound ego and so further relativize it. Late in his life, Jung remarked in a filmed interview that Einstein "first started me off thinking about a possible relativity of time as well as space and their psychic conditionality. More than thirty years later, this stimulus led to my relation with the physicist Professor W. Pauli and to my thesis of psychic synchronicity."¹⁵

PAULI AND JUNGIAN ANALYSIS

In his physics, Pauli sought a unified field. But his personal life was one of fragmentation and dissociation. Within one year, his mother poisoned herself in reaction to his father's involvement in an affair, and Pauli plunged into a brief marriage with a cabaret performer. At thirty, he turned to Jung for help.

Jung, in his 1935 lectures at the Tavistock, offered the following example of dreams effecting change:

I had a case, a university man, a very one-sided intellectual. His unconscious had become troubled and activated; so it projected itself into other men who appeared to be his enemies, and he felt terribly lonely because everybody seemed to be against him. Then he began to drink in order to forget his troubles, but he got exceedingly irritable and in these moods he began to quarrel with other men. . . and once he was thrown out of a restaurant and got beaten up.¹⁶

Jung saw that "he was chock-full of archaic material, and I said to myself: 'Now I am going to make an interesting experiment to get that material absolutely pure, without any influence from myself, and therefore I won't touch it.'" He referred Pauli to Dr. Erna Rosenbaum, "who was then just a

¹⁴ Jaffé 1965, pp. 208-9.

¹⁵ Jung 1974, p. 109.

¹⁶ Jung 1968, par. 402.

beginner. . . . I was absolutely sure she would not tamper." Pauli applied the same passionate brilliance to his unconscious as to his physics. In a five-month Jungian analysis, Pauli recorded and spontaneously illustrated hundreds of his dreams. "He even invented active imagination for himself. . . . He worked out the problem of the *perpetuum mobile*, not in a crazy way but in a symbolic way. He worked on all the problems which medieval philosophy was so keen on."¹⁷ For three months, "he was doing the work all by himself, . . . for about two months, he had a number of interviews with me. . . . I did not have to explain much." Jung believed Pauli "became a perfectly normal and reasonable person. He did not drink any more, he became completely adapted and in every respect normal. . . . He had a new center of interest." Jung had thirteen hundred of Pauli's dreams as the basis for his research into alchemical symbolism in a modern psyche. "At the end of the year I am going to publish a selection from his first four hundred dreams, where I show the development of one motif only."¹⁸

The physicist F. David Peat believes Jung's assessment of Pauli's state after his termination with Dr. Rosenbaum was too positive. Pauli's new "reasonableness" didn't last, and later he again drank excessively.

While Pauli's work aimed toward a "psychophysical monism," his intense inner tensions seemed to manifest physically in the so-called Pauli Effect, when his mere presence caused laboratory equipment to explode or fall apart.¹⁹ His internal "monotheism" and his sharp critical acumen and tongue earned him the titles "scourge of God," "the whip of God," and "the terrible Pauli." Even in the midst of personal disarray, Pauli kept his stance as a scientist of such rigor that he was called "the conscience of physics." Asked whether he thought a particular physics paper was wrong, he replied that was too kind—the paper was "not even wrong."²⁰ Heisenberg's account of a 1927 conversation reveals that, in his youth, Pauli was concerned about the distinctions between knowledge and faith.²¹ Heisenberg saw that behind Pauli's

outward display of criticism and skepticism lay concealed a deep philosophical interest, even in those dark areas of reality or the human soul which elude the grasp of reason. And while the power of fascination emanating from Pauli's analyses of physical problems was due in some measure to the clarity of his formulations, the rest was derived from a constant contact with the field of the creative and spiritual processes for which no rational formulation as yet exists.²²

For Pauli, the creativity of science included considerations of the psyche. In science, he subscribed to the quantum uncertainty theory that the

¹⁷ *Ibid.*, par. 403

¹⁹ van Erkelens 1991, p. 41.

²¹ Heisenberg 1971, pp. 82–91.

¹⁸ *Ibid.*, pars. 404–6.

²⁰ Weinberg 1994, p. 257.

²² Heisenberg 1974, p. 30.

position and presence of the observer changes the perception and reality of what is observed. To that thesis—that one cannot measure the wave and the particle at the same time—he added a psychological dimension, observing that insofar as the scientist must opt to know “which aspect of nature we want to make visible . . . we simultaneously make a sacrifice, . . . [a] coupling of choice and sacrifice.”²³

Pauli demonstrated the value of intuition to science’s empiricism. As Weinberg recounted,

physicists in the early 1930’s were worried about an apparent violation of the law of conservation of energy when a radioactive nucleus undergoes the process known as beta decay. In 1932, Wolfgang Pauli proposed the existence of a convenient particle he called the neutrino, in order to account for the energy that was observed to be lost in this process. The elusive neutrino was eventually discovered experimentally over two decades later. Proposing the existence of something that has not yet been observed is a risky business, but it sometimes works.²⁴

In a metaphysical leap, Pauli referred as well to “forms belonging to the unconscious region of the human soul” and stated that “the relation between a sense perception and Idea remains a consequence of the fact that both the soul and what is known in perception are subject to an order objectively conceived.”²⁵ He acknowledged that he had realized in a dream that the quantum-mechanical conception of nature lacked the second dimension, which he found provided by the archetypes of the unconscious.

It seems, however, that he could not find his way to the uncertainty, the “choice and sacrifice” that allows for reparation within analysis. While Pauli knew “that a truly unified view must include the feeling function, since without feeling there is no meaning or value in life, and no proper acknowledgment of the phenomenon of synchronicity,” M.-L. von Franz said that he later sought only a “philosophical discussion of dreams”:

He wrote to me . . . [and] made it clear that he did not want analysis; there was to be no payment. I saw that he was in despair, so I said we could try. The difficulties began when I asked him for the associations which referred to physics. He said, “Do you think I’m going to give you unpaid lessons in physics?” . . . He wanted something, but he didn’t want to commit himself. He was split.²⁶

Van Erkelens speculates that Pauli would have had to submit to a transference and to a deeper Eros than “his inner urge to develop a unified view of matter and spirit.” For whatever reasons, von Franz and Pauli were not able

²³ Heisenberg 1974, pp. 35–36.

²⁵ Heisenberg 1974, pp. 31–32.

²⁴ Weinberg 1994, pp. 196–97.

²⁶ Sieg 1991, p. 56.

to achieve the relational bond that holds and contains explosive emotional material and so allows surrender to one's unconscious and to a suffered analytic relationship.

Jung and Pauli corresponded and later met, not for analysis but for a comparison of ideas—Pauli pursuing Jung's synchronicity thesis and Jung fostering Pauli's understanding of the archetypal and collective factors in the psyche. Through their contact, William James's two fields, to which both Jung and Bohr had been attracted, come together again. Von Franz writes that the

notion of complementarity introduced by Niels Bohr to provide a better explanation for the paradoxical relationship between waves and particles in nuclear physics can also be applied to the relationship of conscious and unconscious states of a psychic content. This fact was discovered by Jung, but it was particularly elaborated by Wolfgang Pauli.²⁷

QUANTUM SCIENCE AND ALCHEMY

"Quantum mechanics and special relativity are nearly incompatible," writes Weinberg, "and their reconciliation in quantum field theory imposed powerful restrictions on the ways that particles can interact with each other."²⁸ In Peat's view, Pauli's insight was "that, at the quantum level, all of nature engages in an abstract dance" and is divided into two groups, "according to whether they engage in an antisymmetric or a symmetric dance." This was the basis for a major theoretical contribution, the Pauli exclusion principle, indicating the strongest taboos and most powerful restrictions on the ways particles behave. His "notions of symmetry within the quantum domain" explain why particles with the same energy are always apart from each other. "This exclusion of particles from each other's energy space . . . arises out of . . . the abstract movement of the particles as a whole." It is then "the underlying pattern of the whole dance [that] has a profound effect on the behavior of each individual particle."²⁹ Simply put, two electrons in an atom can never have the same set of quantum numbers. One electron's presence keeps another electron with the same quantum numbers from getting too close, causes electrons in an atom to stack up in a series of energy levels, and prevents electron stacks from collapsing into the lowest-energy quantum state. Only so many electrons fit into a single orbit before quantum numbers duplicate. So the Pauli rule requires that if there is one more electron than can be accommodated in an atomic orbit, that electron must be in a separate orbit. This breakthrough in technical understanding loops back to alchemy, as the exclusion principle offers the basis for the structure of the

²⁷ von Franz 1992, pp. 245–46.

²⁸ Weinberg 1994, p. 142.

²⁹ Peat 1987, p. 16.

periodic table of chemical elements. This in its turn informs science's realization of the alchemical goal.

It was not until the Twentieth Century and the atomic age that men were enabled to change the elements into one another. Such processes of metallic transmutation consist in changing the number of protons in the atomic nucleus of the basic elements. If iron is to be changed into gold, 53 protons must be added to its nucleus of 26 protons, if it is to be transformed into the element of gold which carries 79 protons in its nucleus.³⁰

SYMMETRY

There is another subtle and profound link between the intuitive if clumsy probings of alchemy and Pauli's work, based on his use of symmetry and its effects. Symmetry is a roving and variable concept, used and applied differently to objects, categories, and laws in various fields, including aesthetics, mathematics, and physics. It may describe symmetries of things—faces, crystals, cubes of salt—as well as internal symmetry principles that “impose a kind of family structure on the menu of possible particles,”³¹ and “the symmetries that are really important in nature . . . the symmetries of laws which state ‘that when we make certain changes in the point of view from which we observe natural phenomena, the laws of nature we discover do not change.’ So the “symmetry principle is simply a statement that something looks the same from certain different points of view.”³² But in the mathematics relevant to Pauli, “a symmetry isn't a thing; it's a transformation. Not any old transformation, though, a symmetry of an object is a transformation that leaves it apparently unchanged.”³³ Symmetry also states that all elements of a system can undergo transformations—rotation or reflection in a mirror—without being fundamentally altered and so “has become the epitome of truth and beauty.”³⁴ Symmetry is implicit in such alchemical dictums as “For there is one stone, one medicine, to which nothing from outside is added, nor is it diminished, save that the superfluities are removed.” It is more explicit in the motto “as above, so below; as within, so without.”

The alchemists imaginally and physically aimed toward succeeding stages of conjunctions between pairs, couplings, and asymmetric symmetries, both in physical experiments and in psychic attempts to achieve inner balance. Their intent was to provide the purest, perfect, most inclusive physical substances, as well as internal integration. Their motive was to replicate or imitate the original oneness, when all was potential in the mind of the creator, before it dispersed into the four directions, four elements, and discrete forms.

³⁰ Fabricius 1989, p. 8.

³² *Ibid.*, pp. 136–37.

³⁴ Horgan 1994, p. 99.

³¹ Weinberg 1994, p. 154.

³³ Stewart and Golubitsky 1992, p. 28.

The alchemists worked toward symmetries of all kinds of opposites to reach both backward and forward toward the one. Symmetries in physics operate with varying degrees of sophistication and complexity in Newton's mechanical relativity, in Einstein's space-time relativity, and in quantum mechanics. From the perspective of current physics, Weinberg writes, Heisenberg's and Pauli's quantum-field theory is "on the track of something universal—something that we call the laws of nature . . . [a] theory that rigidly will allow us to describe the forces—gravitational, electro-weak, and strong—that actually as it happens do exist."³⁵

The alchemists played with their sulphurs, mercuries, and salts to reintegrate elements and to provide themselves with imagery on which to meditate as they sought equilibria between soul, spirit, and body. Particle physicists now deal with thousands of numbers involved in the properties of the elementary particles known to date. While the conscious intent is entirely physical and not psychological, the symmetry principle carries on the search for "the beauty of simplicity and inevitability—the beauty of perfect structure, the beauty of everything fitting together, of nothing being changeable, of logical rigidity."³⁶

From Jung's perspective of the psyche's tendency toward an ordering, mandalic pattern of compensation, it follows that in the attempt to deal with inner fragmentations Pauli, as a scientist, was deeply drawn to the notion of a unifying principle. For Pauli, symmetry was the archetypal structure of matter. Just as the alchemists looked for the substratum of reality beneath matter, he came to the view that the elementary particles were not themselves the ultimate level of reality. As he became more familiar with alchemy as a psycho-physical unity, Pauli saw the same *lumen naturae*, the light of nature, or the "spirit in matter," glimpsed by Paracelsus and Jung. "Rather than seeking the ultimate level of nature in terms of elementary particles, Pauli believed that the material level is the manifestation of something deeper, an *Unus Mundus* that is also the domain of symmetry," where mind and matter, religion and science originate.³⁷

During his fifties, Pauli concluded that in order to develop a unified framework for modern physics and depth psychology, "besides physics, psychology, and a neutral language, a fourth element is needed—Eros."³⁸ He went so far as to define physical knowledge as the meeting place of inner psychological images and outer facts.³⁹ This accords with the view that it is "the self-same reality which, looked at from within and from without" is described by alchemy, depth psychology, and physics, as "we largely concern ourselves with the same subject, that unknown living factor . . . the animating power in matter which for want of a better name we now call the unconscious."⁴⁰

³⁵ Weinberg 1994, p. 147.

³⁷ Peat 1988, pp. 16–17.

³⁹ von Franz 1992, p. 13.

³⁶ *Ibid.* p. 149.

³⁸ van Erkelens 1991, p. 43.

⁴⁰ *Ibid.*, p. 169.

In his domain, Jung came to see the psyche as one force containing multiple perspectives, "a multiplicity within unity." He increasingly saw psychic energy as a large field from one source, with two complementary but not incompatible conduits, the conscious and the unconscious. These exist between the subjective and objective, emerging from a mind-matter continuum that can only partially observe itself, which Jung came to call "psychoïd." Just as Pauli perceived physical knowledge as the meeting place of inner psychological images and outer facts, Jung extended from his psychic end into the spectrum of matter. The inclusion of subjectivity in quantum observation was seen as complementary to Jung's assertion of "the objective reality of the archetypes."⁴¹ Jung credits C. A. Meier for the insight regarding "the parallelism of psychological and physical explanations" through which relations of complementarity are seen to exist not only within psychology and physics but also between them in "a genuine and authentic relationship of complementarity as well."⁴²

From 1946 onward, Jung further differentiated his concept of the archetype as transconscious—that is, as beyond psychic integration and thus psychoïd. It is also transpsychic insofar as "not purely psychic but just as much physical in nature." As the unknowable structuring element in the collective unconscious, it also arranges the registering of acausal events.⁴³ Matter and mind are both objective and subjective, complementary in their structure and, at the psychoïd level, reflective of each other. Further, as he wrote in his last major work, "we do not know whether what we on the empirical plane regard as physical may not, in the Unknown beyond our experience, be identical with what on this side of the border we distinguish from the physical as psychic. . . . They may be identical somewhere beyond our present experience." He also anticipated further research: "Microphysics is feeling its way into the unknown side of matter, just as complex psychology is pushing forward into the unknown side of psyche. Both . . . have yielded findings . . . and both have developed concepts which display remarkable analogies."⁴⁴

SYNCHRONICITY

In their joint volume, Jung and Pauli presented the synchronicity principle. It presumes that indestructible energy has a dual relationship to the space-time continuum: on the one hand, there is the constant connection through effect—that is, causality; and on the other, there is an inconstant connection through contigence, equivalence, or meaning that is itself synchronicity.⁴⁵ For a physicist, equations are not objectively accurate reflections of

⁴¹ Card 1991b, pp. 53–54.

⁴⁴ Jung 1968, par. 765–68.

⁴² Jung 1947, par. 439.

⁴⁵ von Franz 1992, p. 218.

⁴³ Jaffé 1968, p. 7.

material reality but structurally accurate relationship-connections. For Jung, synchronicities are meaningful only when an individual experiences them. This creates another "relationship of complementarity between the occurrence or cessation of synchronistic phenomena and the relative state of unconsciousness or consciousness of the individual who experiences it."⁴⁶

Synchronistic events are inconstant, sporadic, and arbitrary, for they are dependent upon an excited archetypal situation in the observer. In an accidental but meaningful perception of a coming together of inner and outer events—of making or perceiving a connection between the inwardly experienced and the outwardly perceived—there is usually a felt sense of participating in "acts of creation in time." This is similar to the sensibility of religions based on individual experience of the manifest, such as the ancient Egyptian and the Native American.

For Peat, Pauli's "discovery of an abstract pattern that lies hidden beneath the surface of atomic matter and determines its behavior in a non-causal way" links the Pauli principle to the physical basis of synchronicity:

Just as Einstein added time to space to produce the much deeper concept of space-time, so Jung proposed completing causality by adding a non-causal link. Certain patterns, he argued, are linked in nonmechanical ways to form a "causeless order." . . . its patterns are meaningful and are echoed in both mind and matter.⁴⁷

Concerning the nonpsychic "psychoid sphere" that "forms a bridge to matter," Jung associated acausal orderedness with the quantum-physics engagement of momentum and energy without "classical determination of a precise location in space and time."⁴⁸ His formulation of the interaction between the unconscious and conscious follows the alchemical conceit of the *coniunctio*. He identified its imagery of king and queen in the poses of intercourse as suggestive of the alternating positions of the conscious and unconscious. This may be seen as a psychic analogy to the proposition in uncertainty theory that wave and particle are in constant juxtaposition, though only one can be perceived and measured at one time. In this comparison, the movements of the unconscious into consciousness are like waves of psyche manifesting at nodal points as particles of consciousness.

ANALOGY AND METAPHOR

It might be said that, whereas the Freudian metaphors of psychodynamics are of the nineteenth-century mechanical genre, the Jungian perspective, through alchemy and particle physics, adds sixteenth- and twentieth-century metaphors. The genetic interpretations of the reductive approach

⁴⁶ Card 1991b, p. 54.

⁴⁷ Peat 1991, pp. 17–18.

⁴⁸ Card 1991a, p. 27.

are consonant with a Newtonian world of cause and effect. When the unconscious is perceived as preceding and antedating the ego and capable of compensatory comment on what is experienced consciously, the ego exists in space-time relativity. When the complexes are vital stimuli in compulsive instinct, overwhelming emotion, archetypal identification, we can conceptualize fields of quantum bundles. But are these analogies valid beyond use as fanciful metaphors?

A psychological theorist, Julian Jaynes, questions the relevance of psychology's use of scientific metaphor. He refers to "a delusion in our reasoning" and a "huge historical neurosis. Psychology has many of them. And one of the reasons that the history of science is essential to the study of psychology is that it is the only way to get out of and above such intellectual disorders."⁴⁹ He argues that

each age has described consciousness in terms of the images of its external gestalt. In the golden age of Greece, when men traveled about in freedom while slaves did the work, consciousness was as free as that . . . an enormous space whose boundaries . . . could never be found out. . . . Augustine among the caverned hills of Carthage was astonished at the "mountains and hills of my high imaginations," "the plains and caverns of my memory."⁵⁰

Jaynes refers to the first half of the nineteenth century as "the age of the great geological discoveries. . . . This led to the popularization of the idea of consciousness as being in layers." Then, "in the middle of the nineteenth century, chemistry succeeded geology as the fashionable science, and consciousness . . . was a compound structure that could be analyzed in the laboratory. . . . As the steam locomotives chugged their way, . . . the subconscious becomes a boiler of straining energy." He then notes that "when the astonishing successes of particle physics were being talked of everywhere," when "the solidity of matter was being dissolved into mere mathematical relationships in space," this seemed to psychologists like the same unphysical duality as the relationship of individuals conscious of each other.⁵¹

In contrast to Jaynes's critique, Arthur Koestler sees that "all decisive advances in the history of scientific thought can be described in terms of mental cross-fertilization between different disciplines."⁵² (And for the cultural critic George Steiner, "even the illicit metaphor, the term borrowed though misunderstood, may be an essential part of a process of reunification. It is very probable that the sciences will furnish an increasing part of our mythologies and imaginative reference."⁵³ Even Jaynes admits that the

⁴⁹ Jaynes 1990, p. 7.

⁵² Koestler 1964, p. 35.

⁵⁰ *Ibid.*, p. 2.

⁵³ Steiner 1969, p. 35.

⁵¹ *Ibid.*, pp. 3-4.

"concepts of science are all . . . abstract concepts generated by concrete metaphors. In physics we have force, acceleration (to increase one's steps), inertia (originally an indolent person), impedance, resistance, fields, and now charm."⁵⁴

"What I have argued so far is this," writes Steiner.

Until the seventeenth century, the sphere of language encompassed nearly the whole of experience and reality; today it comprises a narrower domain. It no longer articulates or is relevant to all major modes of action, thought, and sensibility. Large areas of meaning and praxis now belong to such non-verbal languages as mathematics, symbolic logic, and formulas of chemical or electronic relation.⁵⁵

And conversely, the physics, mathematics, and astronomy sections of bookstores now carry such titles as *The God Particle: If the Universe Is the Answer, What is the Question?*; *The Mind of God*; *Fearful Symmetry: Is God a Geometer?*

For Jung, "the common background of microphysics and depth psychology" is as much physical as psychic, and so is "neither, but rather a third thing, a neutral nature which can at most be grasped in hints since in essence it is transcendental."⁵⁶ Pauli sought "to find a new language that could make the hidden dimension in nature accessible to the intellect . . . neutral with respect to the distinction between psyche and matter . . . from the physical and mathematical symbols . . . in his dreams." He alluded to the self as the "radioactive nucleus," and in a 1950 letter to Emma Jung he described synchronistic phenomena as "radioactivity."⁵⁷

SYMMETRY AND ASYMMETRY

While he believed physics was in transition toward fuller understanding, Pauli's own attachment to symmetry came nearly to dominate the Self. Von Franz believes he had come "to believe in symmetry as a form of god," as stable and unchanging. Pauli held that symmetry—also called "evenhandedness" in broad analogy to the bilateral symmetry of the human body—structured the basic forces in nature. When it was theorized that the weak interactive force violated left-right symmetry, Pauli offered to bet a very high sum, declaring "I do not believe that." After the new thesis was proved, Pauli offered a restatement: "I am shocked not so much by the fact that the Lord prefers the left hand as by the fact that he still appears to be left-right symmetric when he expresses himself strongly. . . . Why are strong

⁵⁴ Jaynes 1990, p. 50.

⁵⁶ Jung 1943, par. 768.

⁵⁵ Steiner 1969, pp. 44-45.

⁵⁷ See Letter 44.

interactions right-and left-symmetric?"⁵⁸ Twelve years after Pauli's Nobel Prize, the 1957 award went to Tsung-Dao Lee and Chen Ning Yang for demonstrating that if the universe were reflected in a mirror, the behavior of weak interaction would not be the same. Pauli was also disappointed when his symmetry-based unified theory of elementary particles was not well received. Pauli withdrew, perhaps because of his disappointment or perhaps because of illness, and in 1958, this man who spoke of the "radio-activity" of the self died of rapidly advancing cancer.

Despite the fundamental difference between physics and psychology, in their meeting of the minds Jung and Pauli reconnected the meditative and scientific strands in serious alchemy, as well as the complementarities that emerged from William James's philosophy. They linked ancient questions and modern theories and experiments, the interior search of reflective depth psychology and the outward gaze of scientific inquiry.

Von Franz believes that "if we try all the same to meet, it is for the reason that in its fringes, where psychology reaches over to other fields of science, there should exist—if possible—no fundamental contradictions. A psychology which does not keep pace with the findings of other sciences seems to me no good."⁵⁹ We may easily be carried away by broad analogy, but despite the seemingly magical in mythologies and the peculiarities of the alchemical opus, their intuitions about the origins and potential of matter for transmutation have been realized with elaborate technology. "The scorn of late nineteenth century scientists for the alchemists was noticeably absent after the discovery that transmutation of elements does take place in nature."⁶⁰

But even a nonscientific mind, "sunk" like Jung's, by the mathematics of contemporary science, may find resonance with the fluidity of process described in modern biology, brain research, chemistry, astronomy, and theoretical physics. What are some of the "findings" with which to "keep pace"?

The alchemists imagined progressive integration through conjunctions between pairs that were both like and unlike; a current thesis holds that "matter and antimatter are not mirror images of each other but instead exhibit a subtle asymmetry."⁶¹ Scientists posit that without asymmetry, the universe would not exist: Had the big bang spawned precisely the same amounts of matter and antimatter, they would have annihilated each other on contact. Aristotle and western alchemists posited four elements: earth, air, fire, and water: today, scientists refer to four forces: gravity, electromagnetism, the strong force that keeps protons and neutrons gripped, and the weak force from which comes nuclear decay (electromagnetism and the weak force join in the electro-weak force). The alchemists mused on feminine salts and masculine sulphurs connected by mercurial sparks; modern

⁵⁸ Stewart and Golubitsky 1992, p. 181.

⁶⁰ Crosland 1992, p. 32.

⁵⁹ von Franz 1992, p. 288.

⁶¹ Horgan 1994, p. 103.

theories refer to the electro-weak and quantum-chromodynamics of the strong force, made up of quarks (a term taken by another Nobel physicist, Murray Gell-Mann, from Joyce's *Finnegans Wake*), held together with "gluons." Called a "gauge theory," this is posited on symmetry, for which many particle physicists is "the epitome of truth and beauty." The alchemists imagined a goal of achieved integration that would mimic the original unity. In science's search for fundamental unity, some scientists attempt to conjoin forces plus gravity in quantum-gravity theories that would finally fuse quantum mechanics and general relativity.

Scientists posit that for every particle known to exist there is a complementary particle yet to be discovered. In the revolutionary theory of supersymmetry, fermions (particles which constitute matter) and bosons (which transmit forces) are seen to share deep symmetries. Thus, each known particle may have a relatively massive supersymmetrical partner (or "sparticle") and is dependent on "the coupling constants" that are measures of strength of the forces. "In supergravity theory, particles that transmit gravity, known as gravitons, have supersymmetrical partners called gravitinos."⁶²

Supercolliders necessary to achieve a unified theory would need to be one thousand light-years circumference (the solar system being one light-day around) and thus would be immeasurably larger vessels than the alchemical retorts. And yet the modern terms in the search for the *prima materia* are "quaintly" akin to the alchemical language of synthesis in descriptions of reunions of coupled energies imagined as sun and moon, king and queen, dog and bitch.

Alchemists linked the levels of reality through the doctrine of "signatures" and through imagined correspondences. Analysts peer into the psyche for hidden connections between forms of experience, behavior, and relativizing links between conscious and unconscious. Physicists fantasize about superstrings, which in a sense encircle the universe and generate all forces in nature—gravity strings pictured as inhabiting twenty-six dimensions. Their vibrations are said to give rise to quantum properties that "can merge and separate, like interacting particles; their geometric nature lends itself to being made relativistic."⁶³ Alchemists rivaled each other to transform lesser metals into gold and to approach the understanding of the "unus mundus" through their meditations on the opposites in powerful attraction and repulsion. As I write in the summer of 1999, competing, powerful accelerators are in a hot and tight race to find "The God Particle," the Higgs boson which as "the universal giver of heft" is believed to endow all the constituents of matter with mass. The Higgs would be very heavy for a boson, but it could as light as 109 billion electron-volts—somewhat less than the weight of an atom of silver. Its creation requires a collision of two

⁶² *Ibid.*, p. 102.

⁶³ Stewart and Golubitsky 1992, p. 255.

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ordinary particles; through multiple colliding particles, the Higgs mechanism might explain the specific masses of individual particles.

From 1946 on, Jung called the transconscious archetype psychoid—that is, transpsychic insofar as “not purely psychic but just as much physical in nature.”⁶⁴ They contain all the collective patterns for conceptualizing human experience, including those “phenomenological contents of the mind” that Jung recognized as exhibiting certain *apparently* lawful archetypal patterns.

In his thesis of “frozen accidents,” the complexity theorist and Nobel physicist Murray Gell-Mann, discoverer of quarks, the elementary particles of the atomic nucleus, approaches in the physical world what Jung broached through his apparently lawful psychic archetypes.

The effective complexity of the universe is . . . a concise description of its regularities. . . . [It] receives only a small contribution from the fundamental laws. The rest comes from the numerous regularities resulting from “frozen accidents.” Those are chance events of which the particular outcomes have a multiplicity of long-term consequences, all related by their common ancestry.⁶⁵

Gell-Mann argues:

The consequences of some such accidents can be far-reaching. The character of the whole universe was affected by accidents occurring near the beginning of its expansion. . . . The long-term consequences of such an event may take on the character of a law, at any but the most fundamental level. A law of geology, biology, or human psychology may stem from one or more amplified quantum events, each of which could have turned out differently.⁶⁶

Jungians see archetypes as “contaminated” by and inseparable from one another. Nonsymmetry physicists speak of cellular automata, in which the state of each cell is determined by the state of its immediate neighbors, or of “loop-space theory.”⁶⁷ The physicist David Bohm speaks of an unknowable holomovement or flow of an explicate and implicate order, in which wave functions are physical, like classical force fields, guiding particles. In his theory, the positions of all particles and the quantum-mechanical wave function can be calculated with certainty, whereas the older theory is non-deterministic.⁶⁸ Some theorists find Bohm’s scheme more approachable than the “superpositions” of quantum mechanics, which deal with mysteries as nonfacts and in which the wave functions that represent the states of physical systems are mathematical objects.⁶⁹ The nonlinear dynamics of

⁶⁴ *Ibid.*, p. 102, and Jaffé 1972, p. 7.

⁶⁶ *Ibid.*

⁶⁸ von Franz 1992, pp. 251–52.

⁶⁵ Gell-Mann 1995, p. 134.

⁶⁷ Horgan 1994, p. 104.

⁶⁹ Albert 1994, pp. 58–67.

so-called chaos theory—in which deterministic causes can have random effects and which deals with irregularities and apparent absences of pattern—offers its own seductive and compelling analogies.

As I write, the number of elements of the periodic table named and “created” is approaching 120. Physicists have also found Gell-Mann’s so-called top quark, the last of six fundamental building blocks of nature. Like the alchemist’s elusive scintillas and Goethe’s shattered homunculus of Faust’s “Aegean Festival,” they are “captured” for only a fraction of a second.

Physicists and astrophysicists are gaining on the precise nature of Pauli’s elusive neutrinos. Like the arcane mercurial sparks, as they scarcely interact with normal matter they are detected only in high-precision accelerators or traced with a powerful telescope trained on distant galaxies. Only in 1999, sixty-seven years after Pauli insisted on their reality, has their presence and mass been determined, in Japan. As an alchemist said, “There are fiery sparks of the World-Soul, that is, of the light of nature, dispersed or scattered in and through the fabric of the great world into all the fruits of the elements everywhere.”

Both as an inner process and as an outer endeavor, alchemy was focused on reaching the *unus mundus* through the mysterious conjunctions of the soul-spirit-body with the world as it was at the beginning of time. One alchemist asked, “Why speak ye of the manifold matter? The substance of natural things is one, and of one nature that which conquers all.” Modern physics and astronomy are not concerned with the introverted or the non-material spectrum. They are in quest of theories that “hold out the promise of illuminating the fiery birth of the universe, when a single supreme force may have briefly reigned, [and] . . . are also known as theories of everything.”⁷⁰ One alchemist wrote, “The sparks were already in the chaos, the *prima materia* at the beginning of the world.”

Pauli pursued the symmetries. The Chinese spoke of the yin and the Receptive in the Tao. The ancient Egyptians honored the goddess Maat as an extended grid against which all could be measured and balanced. The Navajo imagine Changing Woman, who, with her bundles, re-creates creation in space-time. Modern mathematicians write, “Yes, God is a geometer. But never forget: She’s better at it than we are.”⁷¹

Heisenberg noted Pauli’s reference to the “theologians to whom I stand in the archetypal relation of a hostile brother,” but he nonetheless continued “in his wrestlings with the One.” Pauli declared that if neither rationalism nor mysticism was powerful enough,

nothing else remains but to expose oneself in one way or another to these intensified oppositions and their conflicts. Precisely by doing so, the inquirer can also more consciously tread an inner path to salvation. . . . I

⁷⁰ Horgan 1994, pp. 97–98.

⁷¹ Stewart and Golubitsky 1992, p. 269.

consider the ambition of overcoming opposites, including also a synthesis embracing both rational understanding and the mystical experience of unity, to be the mythos, spoken or unspoken, of our present day and age.⁷²

CONNECTION AND DIVERGENCE

Pauli was concerned with science, philosophy, and religion throughout his life. Speaking from his doubt that human societies could live with sharp disinctions between science and faith, the young Pauli believed that "it's all bound to end in tears. . . . The central order is part of the subjective as well as the objective realm, and this strikes me as being a far better starting point."⁷³ A few months before he died, Pauli told the Gnostic scholar Gilles Quispel that while he could accept "the God of the Gnostics. . . . I could never accept the existence of a personal God. No such Being could possibly endure the suffering of humanity." According to Quispel, Pauli, in searching for a meaning to his life while confronting his death, came to reassert his Jewish tradition.⁷⁴ Perhaps Pauli's need for symmetry did not allow him to embrace a reality of subtle asymmetry or broken symmetries. But Pauli still stands as a central figure in the history of science and, through his partnership with Jung, in the history of psychology. As a modern poet writes:

I drag myself too often to those whose work it is
to calm those devastations of the surface
which are, like coincidences,
the visible traces of untraceable principles.
A physicist said that, not a medium.⁷⁵

Jung did not repudiate the wisdom accumulated before the Age of Enlightenment, nor see psychology as a field unto itself, derived only from the observation of personal symptom and behavior. He looked back to tribal myth, to classical mythology, to gnosticism, to alchemy, for intuitive theories of everything. He looked out to physiology and chemistry, mathematics and physics. He found a place where his psyche was at rest, in the "grand unified theory" of the *unus mundus*.

Pauli was also drawn to this unity but seemed not to have found psychic peace. Pauli did not expect that the concepts of the unconscious would "go on developing within the narrow frame of their therapeutic applications, but that their merging with the general current of science in investigating the phenomena of life is of paramount importance for them."⁷⁶

⁷² Heisenberg 1974, pp. 37-38.

⁷³ Heisenberg 1971, pp. 83-84.

⁷⁴ Pagels 1988, p. 326, as cited in Rossi 1989, pp. 7-8.

⁷⁵ Levine 1994, p. 70.

⁷⁶ Jaffé 1972, p. 43.

According to von Franz, Pauli concluded "Jungian psychology should be transformed into a philosophy."⁷⁷ Here Jung and Pauli diverged. Jung saw psychic libido as related to mana, "meaning," and the feeling function. This is "the specific value but also the limitation of psychology. . . . The vagueness of meaning forces us to go beyond science . . . to myth. That inevitably leads to antinomies and an obscuring of scientific clarity . . . because we have to deal with the human individual as a whole." Ultimately, then, "the meaningful but rather vague language of myth is in [Jung's] view more appropriate to the description of psychological facts."⁷⁸ Correspondingly, David Bohm believed that "images are important . . . a key bridge between the older emotional brain and the more intellectual neocortex."⁷⁹

In their attempts to link emotion and intellect, intuition and perception, image and concept, Jung and Pauli placed themselves in the long line of those humanistic and speculative philosophers and those reflective and protoscientific experimenters who imagined underlying interconnections—of "sympathies," "correspondences," "signatures"—among the various constituents of the universe. They would comfortably participate today in the discourses among scientists of many traditions.

Pauli and Jung—despite their asymmetry in the realm of the feeling connection to matters psychological—shared a sensibility both with theorists at the frontier and the alchemists of old. Jung valued the voluntary sacrifice for the sake of personal transformation that alchemy had in common with the Mysteries. Pauli recognized that, in contradistinction to alchemy, the observer in physics is not himself transformed, because "the 'gift of sacrificing' is not a part of himself, but a portion of the external world." But now neuroscientists such as Gerard Edelman further the psychological and existential queries about the observers: Are they things; why can they refer to and categorize other things; and what occurs "when we ourselves observe observers":

Einsteinian and Heisenbergian observers, while embedded in their own measurements, are still psychologically transparent. Their consciousness and motives do not have to be taken into account to practice physics. The mind remains well removed from nature.⁸⁰

He proposes that

matter itself may be regarded as arising from processes of energy exchange. In modern science, matter has been reconceived in terms of processes; mind has not been reconceived as a special form of matter. That mind is a special kind of process depending on special arrangements of matter is the fundamental position I will take.⁸¹

⁷⁷ Sieg 1992, p. 56.

⁷⁸ von Franz 1992, p. 289.

⁷⁹ Bohm 1988, p. 26.

⁸⁰ Edelman 1992, p. 11.

⁸¹ *Ibid.*, p. 6.

Mathematicians ask whether symmetries are intrinsic patterns of nature or artifacts of human perception. And they answer that the human brain, as part of nature, obeys nature's laws and thus may have evolved to detect the patterns that are "really present."⁸²

One physicist believes that "everyday we need new approaches to build new images of nature." Yet another states, "Converting science into liturgy would be depressing." Meanwhile, the "study of the history of science does not require a moral justification, but if it did, it might be to teach humility."⁸³ And a contemporary Nobel laureate notes that even "quantum field theory is not secure. . . . We are not likely to know the right answers until we are close to knowing the answers."⁸⁴ Jung adds his prognosis, "What demands psychology will make on the other natural sciences, and on physics in particular, only the future can tell."⁸⁵

The mathematical "way out" of the obstacles to Pauli's symmetry-based theory, "which the disparity among the four forces presents[,] has to do with interactions taking place at higher energies which change the strength and ranges of the forces." The "way out" of the dilemma about the interactions between matter and psyche at higher energies requires the persistence, the awareness, and the wonder about invisible patterns shared by Jung and Pauli with the alchemists of old and the scientists at the frontier.

Jung once wrote that when future generations read our psychology, they would wonder if we knew what we meant. He and Pauli both gloried in the possibilities of the human mind and also remained aware that all human understanding must remain open to question. They might well speak the lines from a contemporary English play, *Copenhagen*, in which the character of Niels Bohr says to the character of Werner Heisenberg:

We put man back at the centre of the universe. . . . It starts with Einstein. He shows that measurement, on which the whole impossibility of science depends—measurement . . . [is] a human act, carried out from a specific point of view in time and space, from the one particular viewpoint of a possible observer. Then, here in Copenhagen in those three years in the mid-twenties we discover that there is no precisely determinable objective universe. That the universe exists only as a series of approximations. Only within the limits determined by our relationship with it. Only through the understanding lodged inside the human head.⁸⁶

⁸² Stewart and Golubitsky 1992, p. 259.

⁸⁴ Weinberg 1994, p. 173.

⁸⁶ Frayn 1998, pp. 73-74.

⁸³ Crosland 1992, p. 32.

⁸⁵ Jung 1955-1956, 14 par. 775.

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TRANSLATOR'S NOTE

Given the breadth of intellect for the two correspondents, the translation of these letters was never going to be anything less than a daunting task. I was, however, fortunate enough to be able to call upon a group of people who, in their different ways and with their different skills, were able to help me overcome many of the problems that arose. My thanks go to Dr. Sonu Shamdasani, of the Wellcome Institute in London, and John Granrose, Emeritus Professor of Philosophy at the University of Georgia at Athens and, at the time of writing, Director of Studies at the Jung Institute in Zürich. They read the first draft and allayed any misgivings I might have been harbouring with regard to the approach that I had adopted. Their comments and encouragement were much appreciated. Additional thanks to Dr. Shamdasani for his suggestions concerning the revision and augmentation of the editorial apparatus.

Special thanks go to Professor Bruce Patterson of the Physics Department at the University of Zürich. With unfailing good humour and enthusiasm, he proofread those passages in the translation that deal specifically with physics, skillfully transforming the clumsy and sometimes wildly inaccurate terminology of my schoolboy physics into a language altogether more polished and professional.

The laborious task of cross-referencing and making corresponding changes and extensions to the footnotes was undertaken by Dr. James Donat. He set about this task with admirable attention to detail.

My final thanks go to Mr. Ulrich Hoerni of the Jung Estate for his meticulous reading of this translation and his valuable suggestions.

Traduttore, traditore—translators are betrayers. Never have I been more aware of the import of these words than with the translation of this correspondence. However, had I given a literal, word-for-word rendering of the German sentence structures, I doubt whether the results would have made palatable reading. What I have endeavoured to do is to allow myself a certain freedom of expression and yet retain the spirit of the original letters and of the personalities of the writers.

Jung and Pauli were major figures of the twentieth century. In their correspondence we see aspects of their characters that do not emerge in their books. It is my hope that this translation will make Jung and Pauli—both as individuals and in their relationship—more accessible to the wider audience of the English-speaking world.

EDITORIAL NOTE

Springer Verlag, which published the German edition of this correspondence in 1992, also produced, in 1995, an English translation of the German articles by Pauli that are referred to in these letters. It appeared under the title, *Wolfgang Pauli, Writings on Physics and Philosophy*, edited by Charles P. Enz and Karl von Meyenn, translated by Robert Schlapp.

References to Jung's works are more complicated, because he often cites early German editions that are not easily accessible to us today. However, the *Collected Works of C. G. Jung* (CW) have been made available to us in English, in an edition that parallels *Die Gesammelten Werke von C. G. Jung* (GW) in most volumes, using numbered paragraphs.

The compiling principle of these collected editions was to include Jung's most recent version of a given text, which often meant incorporating revisions, enlargements, and title changes from the original works cited in these letters. Here, in an attempt to bridge the English- and German-speaking worlds two generations removed from the original Jung references, every effort has been made to cross-reference, by volume and paragraph number, the older editions with those that appear in the GW/CW. This was not done in the German edition of 1992.

As this edition does, the German edition of this volume included numbered footnotes to the letters (the bulk of which were written by Pauli), with C. A. Meier's notes given in alphabetical order at the end of each letter. Both note systems contained bibliographic details of varying degrees of completeness. Here, a full bibliography of cited works has been included at the end of the volume, thus making it unnecessary to include all the original reference details in the notes. Cross-references have simply been added to Meier's notes, some of which have been revised. A few footnotes and endnotes have been added, and they are demarcated by symbols (*, †, etc.). When cross-references have been added to the Pauli notes and letters themselves, they appear within square brackets. In addition, at the top of each letter, Meier used square brackets to indicate the letter number, where the letter was written, and the method of writing—handwritten, typewritten, or typewritten with handwritten notes in the margins. The only other intentional change in the appearance of the original text is superficial: book titles and foreign words (Latin and French) have been italicized.

A shortcoming of the German edition is that no attempt was made to match pagination references within the original letter to the printed text. This has been done here by adding bracketed references.

Every effort has been made to give the English version of this volume the form of the German. This includes the irregularities in the manner of recording dates, abbreviations, et cetera. This also includes the German titles of works cited, followed by English translations in square brackets, sometimes with GW/CW information added.

Ascona, Switzerland

JAMES DONAT

James Donat studies at the C. G. Jung Institute in Zürich and at the Wellcome Institute, and has coedited volumes of the *Eranos Yearbook*.

ABBREVIATIONS

App.	Appendix
B.S.	Bollingen Series (published 1943-1969 by Pantheon Books, New York; thereafter by Princeton University Press)
CERN	Council Européen pour la Recherche Nucléaire (Geneva), now renamed Organisation Européen pour la Recherche Nucléaire
CW	<i>The Collected Works of C. G. Jung</i> , Bollingen Series 20. References are to paragraphs.
ed., edn.	edited, edition
ETH	Eidgenössische Technische Hochschule (Federal Technical College), Zürich
exp.	expanded
<i>Interpretation</i>	<i>The Interpretation of Nature and the Psyche</i> , by C. G. Jung (tr. R.F.C. Hull) and W. Pauli (tr. Priscilla Silz), B.S. LI, 1995. For full entry see p. 237.
<i>Jung Letters</i>	<i>C. G. Jung Letters</i> , selected and ed. by Gerhard Adler and Aniela Jaffé, tr. R.F.C. Hull, 2 vols., Bollingen Series 95, 1973, 1975
Jung, <i>Synchronicity</i>	Jung essay in <i>Interpretation</i>
Jung, <i>Synchronizität</i>	Jung essay in <i>Naturerklärung</i>
<i>Naturerklärung</i>	<i>Naturerklärung und Psyche</i> , ed. C. A. Meier, Jung-Institut Zürich, vol. 4, 1952. For full entry see p. 237.
n.d.	undated
par(s).	paragraph(s)
Pauli, "Kepler"	Pauli essay in <i>Interpretation</i>
Pauli, "Theorien bei Kepler"	Pauli essay in <i>Naturerklärung</i>
rev.	revised
tr.	translation, translated by
liv	

t.s.	typescript
unpub.	unpublished

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29. The Role of the Mobile Phone	1
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32. The Role of the Time	1
33. The Role of the Energy	1
34. The Role of the Information	1
35. The Role of the Knowledge	1
36. The Role of the Power	1
37. The Role of the Wealth	1
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39. The Role of the Education	1
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FOREWORD

*nemo igitur Vir Magnus sine aliquo
adflatu divino umquam fuit.^a*

—CICERO

To the gentle reader

The compiling of this correspondence, which extended for over a quarter of a century, was no easy task. Our collection consists of the eighty extant letters: thirty-nine by Pauli and thirty-one by Jung. The appendixes contain more writings by the two authors that, although they come from this period, cannot be given exact dates. The fact that this collection has been compiled virtually in its entirety is due to a number of institutions and individuals, to whom I here express my deepest thanks. Mention must be made first and foremost of the *Erbengemeinschaft C. G. Jung* (Zürich) and the Pauli Committee at CERN (Geneva), which granted permission to publish these letters. The research carried out by Dr. Beat Glaus, director of the C. G. Jung Archives and the Pauli Archives at the Eidgenössische Technische Hochschule (ETH) in Zürich, which he made available to me so readily, was particularly valuable. My gratitude also goes to the ETH administrators, the Psychology Fund and the Dr. Donald C. Cooper Fund, each of which made vital contributions to the production of this book. Sincere thanks are due to Mrs. A. Schultze and Mrs. K. Weinmann for their conscientious and painstaking work on the manuscript, as well as to Prof. J. Fröhlich of the Institute for Theoretical Physics at the ETH, who made it possible for these two women to do their work.

And my special thanks also go to my two physics advisers, Charles P. Enz (Geneva) and Markus Fierz (Küsnacht) for their willing and patient cooperation.

All these happy circumstances have come together to make possible this edition of correspondence between two men who were among the greatest in their fields. This confrontation of giants, as it were, still makes a deep impression on the reader, all the more so because the two disciplines—physics and psychology—seem to be so far apart and yet, as emerges clearly here, they have much in common in their basic principles. Even as long ago as 1935, I pointed this out in my contribution to the *Festschrift* for Jung's

* Schopenhauer, "Essay on Spirit Seeing . . .," p. 267.

sixtieth birthday, and in so doing was fortunate enough to arouse Jung's genuine interest in theoretical physics.^b Since then, much has been written on this subject, but unfortunately it has rarely been approached with the same scholarly conscientiousness that Pauli and Jung devoted to it. Many other physicists, without even realizing it, fall victim to their unconscious, with the consequence that in their fantasies they "install physics on the throne of metaphysics."^{*} Someone else who managed to keep a remarkably clear head while studying the "background" to scientific research was the mathematician Jacques Hadamard (1865–1963), whose work [*An Essay on The Mathematician's Mind: The Psychology of Invention in the Mathematical Fields* (1945)] is particularly relevant here. Hadamard takes as his starting point the lectures of Henri Poincaré. He did not know Pauli or Jung, nor did they know him.^c

Pauli is the great exception in his field, in that he was able to make a clear distinction between the conscious and the unconscious. His efforts to understand his dream symbols, while still keeping in mind the subject of physics, are nothing short of paradigmatic in their scrupulous integrity. What is particularly praiseworthy is the caution with which Pauli applies Jung's "amplification method." One cannot help admiring his courage, honesty, and attention to detail. When it came to work of this nature, Pauli was in a very fortunate position in Zürich, for at the university and the ETH he could call on a number of highly qualified advisers from all branches of science. This was a major factor in Pauli feeling so much at home there; he loved "his Polytechnic" dearly and was happy to return after the war. Later, however, this happiness was destroyed when the concept of the conservation of parity was shattered. He felt betrayed in his love of symmetry, but his peace of mind was gradually restored as he buried himself in his work.^d

I must ask the reader always to bear in mind that these letters were never intended for publication and that some of them were written more than fifty years ago. They are now being published first and foremost because they are of major significance not only for the worlds of physics and psychology but also for the history of science itself, philosophy (especially epistemology), and theology. It should also be borne in mind that Jung was twenty-five years older than Pauli and thus was probably a "spiritual father figure" to him.

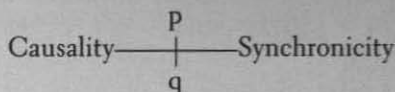
Perhaps we could express it as follows:

$$\frac{(W + P) \cdot (C + G + J)}{2} = 1$$

A second reason why I feel these letters should be published is that it is a way of revering the memory of two great friends.

It was not until he was in Zürich that Pauli came into contact with psychology. His first major achievement, the exclusion principle, belongs to an earlier period (1925, Nobel Prize 1945). His analysis in Zürich was in 1931–1934, but he was involved in regular discussions with Jung from 1932 onward. It was during the period of their correspondence that the concept of the neutrino hypothesis was postulated (and later confirmed),* but there is little mention of this in the letters; his enormous creativity seems to have manifested itself in the field of physics quite separately from in psychology.

This impressive seriousness was obviously a factor in how he tackled his psychological problems as well. Consequently, the interested reader will not be completely spared the task of having to look at those works of Jung quoted by Pauli and by Jung himself in the correspondence. This also applies to Pauli's work on Kepler,^c which, not without good reason, was published together with Jung's work on synchronicity.^f The two authors had several discussions on the principle of synchronicity, evidence of which is the quaternio, for which Pauli was largely responsible:



In this context, I would like to remind the reader of what Jung wrote in a letter on 25 Feb. 1953:

Professor Einstein was my guest on several occasions at dinner. . . . It was Einstein who first started me off thinking about a possible relativity of time as well as space, and their psychic conditionality. Over 30 years later, this stimulus led to my relation with the physicist Professor W. Pauli and to my thesis of psychic synchronicity.^g

So even in those days physics was exerting a mild form of influence on Jung's thinking. Although the significance of Bohr's concept of complementarity is revealed clearly in the discussion, it is still worth finding out more about it from the two articles by Bohr in which he comments on its relevance to biology and psychology.^h

Gerard Dorn's formula of the *unus mundus*, which Jung found so fascinating, is actually a synonym for the "general idea of synchronicity" and is thus its precursor.

For no reason that we know of, the correspondence came to an abrupt end. It would be reasonable to assume that having gone as far as they could

* The existence of the neutrino was first postulated by Wolfgang Pauli in the early 1930s to account for the conservation of energy in the beta-decay process, but the particle was not actually detected until 1956.

in understanding the basic principles of their disciplines, they both came to the conclusion that from then on they could only go on alone. On which note: *Vivant sequentes!*¹

Zürich, 1 May 1991

THE EDITOR

NOTES

^a "Thus was no man ever great except he have a touch of the divine." Cicero, *Concerning the Nature of the Gods*, 2, 167a.

^b "Moderne Physik—Moderne Psychologie," in *Die kulturelle Bedeutung der Komplexen Psychologie* [The Cultural Significance of Complex Psychology], pp. 349–62, Berlin, Julius Springer Verlag, 1935. Not tr. into English.

^c My thanks to Karl von Meyenn for pointing this out.

^d Cf. his essay, "Die Verletzung von Spiegelungs-Symmetrien in den Gesetzen der Atomphysik" tr., "The Violation of Reflection Symmetries in the Laws of Atomic Physics," in Pauli, *Writings on Physics and Philosophy*, pp. 183–92.

^e Pauli, "Theorien bei Kepler"; also in Pauli, *Collected Scientific Papers*, vol. 2, pp. 1023–1114; tr., Pauli, "Kepler"; same tr. in Pauli, *Writings on Physics and Philosophy*, pp. 219–79.

^f Jung, "Synchronizität" tr., Jung, "Synchronicity"; also in CW 8, pars. 816–968. In CW 8, 2d ed., 1969, the tr. is revised.

^g See Jung's letter to Dr. Carl Seelig (1894–1962), in Jung, *Letters*, vol. 2, pp. 108–9.

^h In *Die Naturwissenschaften* 21:13 (31 March 1933), pp. 245–50; and as "Licht und Leben—noch einmal," in the same journal, 50:24 (December 1963): 225–27.

ⁱ The original letters, as well as Pauli's private library, are in the Pauli Archive in CERN (Geneva); Jung's original letters are in the Jung Archive at the ETH in Zürich and in his library in Küsnacht.



W. Pauli, 1953. Copyright CERN, Geneva, Switzerland.





C. G. Jung at Eranos, 1935. Photo courtesy William McGuire.



The Correspondence

The Corporation

1J*

Dear Professor,

[Küsnacht] 4 November 1932
[Typewritten carbon copy]

Unfortunately I completely forgot that I have to go to Vienna next Monday and will thus be unable to receive you. I have now put you down for the same time, 12 o'clock, on Monday, 14 November.

With best wishes,

Yours sincerely, [C. G. JUNG]

2J

Dear Professor,

[Küsnacht] 5 May 1933
[Typewritten carbon copy]

Unfortunately the 12 o'clock session next Monday is already booked, and so I cannot see you until Thursday (11 May) at 12 o'clock.

With kind regards,

Yours sincerely, [C. G. JUNG]

3J

Dear Professor,

[Küsnacht] 19 October 1933
[Typewritten carbon copy]

I think it will be best for you if we resume our customary Monday sessions. The first Monday after 1 November would be 6 November, and I shall expect you at 12 o'clock as usual.

With best wishes,

Yours sincerely, [C. G. JUNG]

4J

Dear Professor,

[Küsnacht] 2 November 1933
[Typewritten carbon copy]

Please find enclosed the Niels Bohr clipping,[†] which I would kindly

* See Letter 6.

† Niels Henrik David Bohr, Danish physicist, born in Copenhagen on 7 October 1885, where he spent the major part of his life and career and where he died on 18 November 1962. Combining Ernst Rutherford's model of the atom with Max Planck's quantum theory, Bohr created his

request you to return in due course. Many thanks for sending me the Bohr article "Licht und Leben" [Light and life].^a

Yours sincerely, [C. G. JUNG]

^a Bohr, "Licht und Leben"; also "Licht und Leben—noch einmal"; provided by Aage Bohr.

5J*

Dear Professor,

[Küsnacht] 28 April 1934
[Typewritten carbon copy]

My best congratulations on your marriage.^a I am very pleased that you have arrived at this conclusion.

With best wishes,

Yours sincerely, [C. G. JUNG]

^a To Franca Bertram, in London. [See Letter 29.]

own atomic model in 1913, which was improved only slightly by modern quantum theory and for which he won the Nobel Prize for Physics in 1922. After two further years in Manchester, Bohr was appointed professor at the University of Copenhagen, where he founded the Institute for Theoretical Physics, where all the eminent young theoreticians of the day spent some time: H. A. Kramers, O. Klein, Pauli, Heisenberg, and many more. Bohr expanded his atomic model through the idea of the shell structure, which was given a solid basis in 1925 by Pauli's Exclusion Principle. The development of the new quantum theory was given a decisive impulse by Bohr's Correspondence Principle, which states that the traditional, classical description of atomic systems is correct in the limiting case of large quantum numbers. Bohr played a major role in this development. He stressed the indivisibility and individuality of quantum phenomena. He also coined the philosophical concept of complementarity, which expresses the fundamental duality of quantum physical observation, which at any one time selects one of two mutually exclusive aspects of a single phenomenon. From 1936 on, Bohr concentrated on the study of nuclear reactions, which he sought to explain through the "droplet model," and this acquired central importance in the theory of nuclear fission (Bohr and Wheeler 1939). Bohr applied the epistemological concepts that he had developed in quantum theory to the problem of "Light and Life." He was also constantly preoccupied by the basic questions of human knowledge and wrote three treatises on the subject: *Atomtheorie und Naturbeschreibung*, *Atomic Physics and Human Knowledge*, and *Essays 1958–1962 on Atomic Physics and Human Knowledge*.

Pauli was a lifelong friend of Bohr and was invited to his institute on several occasions.

^a In the German edition of this book, Letter 29 was misdated to 1939. (The original does not have a year indicated on it.) It has been left in its numerical place, though chronologically it follows this letter.

6J*

Dear Professor,

Küsnacht-Zürich, 22 May 1934
[Typewritten carbon copy]

Would you please inform me at once whether it is convenient for you if we change our appointment next Monday to 11 o'clock.[†] I have to leave at 1 o'clock for Paris and so it would be impossible for me to meet you at 12 o'clock.

With best wishes,

Yours sincerely, [C. G. JUNG]

7P

Dear Dr. Jung,

Zürich 7, 26. X. 34
[Handwritten]

Since you conjured up the spirits of theoretical physics in "Seele und Tod" [Soul and Death],^a your paper concerning the interpretation of so-called parapsychological phenomena, these spirits now seem to be gradually convening.

Jordan's essay, a copy of which is enclosed, was sent to me for appraisal by the publisher of the journal *Die Naturwissenschaften*.^b He has certain misgivings about its publication, not because of the actual contents but because there is a risk that all sorts of incompetent people might get involved in the discussion. However, this danger could possibly be mitigated by the addition of an appropriate editorial note to the essay.

As for the author, P. Jordan,^c I know him personally. He is a highly intelligent and gifted theoretical physicist, certainly one to be taken seriously. I do not know how he came to be involved with telepathic and related phenomena. However, it may well be that his preoccupation with psychic phenomena and the unconscious in general is due to his personal problems. These manifest themselves particularly in the symptom of a speech defect (stuttering), which almost made it impossible for him to pursue his career; this could have led to a certain fragmentation of his intellectual activities (he even feels that in his specialized field he has "run out of luck"). He seems to be familiar with some of Freud's writings, but probably not with yours.

I would be interested to hear your opinion on the contents of the essay, especially as Jordan's ideas seem to me to have a certain connection with

* See Letter 30.

† See Letter 30, which was misdated 1939 in the German edition of this book. Chronologically, it follows Letter 6. According to research by the editors, Erna Rosenbaum saw Pauli for five months, after which Pauli had self-analysis for three months. Jung then took over analysis for two years.

your own. In the last section of the essay in particular, he comes very close to your concept of the collective unconscious. Do not be put off by the word "positivistic"; it is unlikely that J's ideas have anything to do with any philosophical system, and I would suggest that he replace the word "positivist" with "phenomenological." I do have certain misgivings about the picture (p. 12), according to which the conscious should be located as a "narrow borderline area" to the unconscious. Might it not be preferable to advocate the view that the unconscious and the conscious are complementary (i.e., in a mutually exclusive relationship to each other), but not that one is part of the other?

Of course, I shall be happy to refer your works to the author. Please forgive me for taking up your time by asking you for a (brief) written comment on the essay, but it may be of interest to you, even if there is nothing new in it for you. (By the way, I do not need to have the copy returned.)^d

With regard to my own personal destiny, it is true that there are still one or two unresolved problems remaining. Nevertheless, I feel a certain need to get away from dream interpretation and dream analysis, and I would like to see what life has to bring me from outside. A development of my feeling function is, of course, very important to me, but it does seem to me that it could come about gradually through life itself, with the passage of time, and cannot emerge solely as the outcome of dream analysis. Having given the matter much thought, I have come to the conclusion that I shall not continue with my visits to you for the time being, unless something untoward should arise. —With my deepest thanks for all your trouble, I remain

Yours sincerely, W. PAULI

^a In *Europäische Revue* 10:1 (4 April 1934): 229–38; then in *Wirklichkeit der Seele* [Reality of the Soul], 1934, pp. 212–30; tr. CW 8, pars. 796–815.

^b Arnold Berliner was the editor of *Die Naturwissenschaften*. Jordan's article, "Über den positivistischen Begriff der Wirklichkeit" [On the Positivist Notion of Reality]. A better title would be "Über den phänomenologischen, etc." [On the phenomenological, etc.]

^c Pascual Jordan (1902–1980), theoretical physicist, Rostock, Hamburg (where he succeeded Pauli, with whom he published jointly). Planck Medal 1942. Gauss Medal. He was interested in biology and parapsychology; cf. his *Verdrängung und Komplementarität* [Repression and Complementarity], Hamburg, 1947.

^d See Jung's letter to Jordan of 10. XI. 34, in Jung, *Letters*, vol. 1, pp. 176–78.

8J^a

Dear Professor,

[Küsnacht] 29 October 1934.
[Typewritten carbon copy]

Please accept my sincere thanks for kindly sending me Jordan's essay. I believe that this essay should be published, as it deals with the actual shift of the physical approach to the psychological sphere. This essay was inevitable. It was inevitable that the systematic investigation of the unknown center of the atom, which has led to the conclusion that the observed system is also a disturbance caused by the observation, would show that the essence of the observing process will be perceptible in the disturbance caused by the actual observation. To put it more simply, if you look long enough into a dark hole, then you perceive what is looking in. Hence, this is the principle of perception in Yoga, which derives all perception from the absolute emptiness of consciousness. This method of cognition is thus a special case of the introspective exploration of the psychic in general.

With regard to Jordan's reference to parapsychic manifestations, spatial clairvoyance is of course one of the most obvious phenomena to represent the relative nonexistence of our empirical image of space. Taking this argument further, he would also necessarily have to bring in temporal clairvoyance, which would represent the relativity of the image of time. Naturally, Jordan looks at these phenomena from the physical point of view, whereas I do so from the psychic point of view—specifically from the fact of the collective unconscious, as you have correctly noted, which presents a layer of the psychic in which individual distinctions of consciousness are more or less extinguished. However, if individual consciousnesses in the unconscious were extinguished, then all perception in the unconscious would occur as in one person. Jordan states that a sender and a receiver in the same conscious "space" observe the same object at the same time. One could just as easily turn this statement around and say that in unconscious "space," sender and receiver are one and the same perceiving object. As you can see, my point of view as a psychologist would be that of the perceiving subject, whereas the physicist expresses himself from the standpoint of the common space in which two or more observers find themselves. Carried to its ultimate conclusion, Jordan's approach would lead to the supposition of an absolute unconscious space in which an infinite number of observers are looking at the same object. The psychological version would be: In the unconscious there is just one observer, who looks at an infinite number of objects.

If you wish to draw Jordan's attention to my writings, may I perhaps recommend that, in addition to the essays you have already quoted, you also mention the one in the same volume on "Das Grundproblem der gegen-

wärtigen Psychologie" [The Basic Problem of Contemporary Psychology] (p. 1).^b With regard to the collective unconscious there is in the earlier volume, *Seelenprobleme der Gegenwart* [Soul Problems of the Present],^c an essay in which I go into this subject in some depth, namely "Die Struktur der Seele" [The Structure of the Soul] (p. 144). I would be obliged if I could hold on to Jordan's essay for a while.

By the way, it has just occurred to me that on the subject of time relativity there is a book by a student of Eddington, Dunne, *An Experiment with Time*,^d in which he deals with temporal clairvoyance in a similar way to how Jordan deals with spatial clairvoyance. He postulates an infinite number of time dimensions that more or less correspond to Jordan's "intermediary stages." I would be very interested to hear how you respond to these arguments of Dunne's.

I also thank you for the news of your well-being and hope you continue to make progress.

With best wishes,

Yours sincerely, [C. G. JUNG]

^a This letter has already been published, in the translation of R. F. C. Hull. See Jung, *Letters*, vol. 1, pp. 174–76.

^b In *Wirklichkeit der Seele*, pp. 1–31; tr., slightly rev. "Basic Postulates of Analytical Psychology," CW 8, pars. 649–88.

^c In *Seelenprobleme der Gegenwart*, pp. 144–75; tr. "The Structure of the Psyche," CW 8, pars. 283–342.

^d John William Dunne (1875–1949). Regarding the multidimensionality of time, see his *Experiment with Time*; cf. also his book *The Serial Universe*, pp. 148–54. Jung later refers to the "Volcano dream" of Dunne (*An Experiment in Time*, p. 34ff.), in his 1952 essay on "Synchronicity," CW 8, pars. 852–53.

9 P

Dear Dr. Jung,

[Zollikon-Zürich] 22-VI-35
[Handwritten]

Over a period of time I have accumulated several notes about products of the fantasy, and I cannot think of anything better to do with them than to send them to you. On the one hand it seemed a pity just to leave them lying in a drawer, and on the other hand I certainly have no wish to take up any of your time; unlike in the past, I do not feel the need for medical consultation at the moment. However, as you once expressed a certain interest in how things would develop with me, and as the material is perhaps of some interest to the psychologist, I shall send it to you. It is, of course, entirely up to you what you do with it, and I am not expecting to hear from you on the subject in the near future.

You will find that it contains, on the one hand, indications of all sorts of ideological conflicts—and those I shall have to sort out by myself as far as I can—and on the other hand there are close links with those controversial and so-called parapsychological areas that are not easily accessible. The fantasies often assumed their own peculiar character by using physical terminology very familiar to me (such as “isotope separation,” “fine structure,” “reciprocity between self-induced rotation and orbit,” “resonant bodies,” “radioactive nucleus,” etc.), to express analogies with psychic facts that I can only vaguely surmise. There are a few drawings from last year that do not fit into this envelope. Should you be interested, I could send these as well in due course.

In conclusion, I should like to thank you for all the trouble you have taken with me. At the moment I am feeling very well, and if things remain as they are I shall be content. I have been invited to America for the winter semester, and my wife and I are looking forward very much to the trip.

With best wishes,

Yours sincerely, W. PAULI

10J

Dear Professor,

[Küsnacht] 24 June 1935

[Typewritten carbon copy]

Many thanks for kindly sending me your material, which I have added to your file. It was most welcome as I am particularly interested in how the process continues with you. I would be grateful if you would send me the additional drawings as well, whenever convenient.

In the summer of 1936 I have to go to America as well, to Harvard University.^a Winter in America is as unpleasant as summer, but I hope you will have a good time there.

Greetings and best wishes,

Yours sincerely, [C. G. JUNG]

^a To deliver a lecture at the Harvard Tercentenary Celebration, 16–18 September 1936, published as “Psychological Factors Determining Human Behavior” CW 8, pars. 232–62.

11 P

[Zollikon-Zürich] 4-VII-1935

Dear Prof. Jung,

[Handwritten]

Many thanks for your last letter. Here then are the notes that go with the material you have already received. There are three largish drawings and a sketch. The latter is a typical example of the misuse of physics terminology, which asserted itself rather intrusively from the unconscious with a certain degree of persistence. It is probably a sort of free association in analogies, to be seen as a preliminary stage of conceptual thinking.

With best wishes,

Yours sincerely, W. PAULI

12 J

[Letter of 21 September 1935 is missing.]

13 P

The Institute for Advanced Study, School of Mathematics
Fine Hall, Princeton, New Jersey 2. x. 35

Dear Professor Jung,

[Handwritten]

Your interesting letter of 21.IX only reached me yesterday;^a I had already left Zürich when it arrived. What you propose to do is no way objectionable to me, provided my anonymity is fully guaranteed (nor should it be apparent that the dreamer is a physicist). I am very pleased that my dreams may be serve some scientific purpose and am curious as to what you will have to say. I wonder whether I shall always be in agreement with your interpretations?*

When I began working with Frau Rosenbaum I was 32 years old; to be more precise: I was born in Vienna on 25.IV.1900, and the work with Frau Rosenbaum began in February 1932.

I should like to take this opportunity to come back to something that I hinted at in my last letter. It is the use of physical analogies to denote psy-

*"Traumsymbole des Individuationsprozesses," in *Eranos Jahrbuch* 1935, 1936, pp. 13-133; revised, title change, tr., "Individual Dream Symbolism in Relation to Alchemy," CW 12 (2d edn.), pars. 44-331.

chic facts in my dreams. I came across it in a concretist, roundabout sort of way. Initially in the dreams, a Physics Congress had been convened and, depending on the situation, certain definite colleagues had been invited to participate. At first I tried to connect the analysis of the dreams to my personal relationships with these colleagues, but the outcome was absolute nonsense. Then I suddenly realized that they were always analogies to those subjects that these colleagues had focused on in their work, and that their personalities as such were completely irrelevant. It ended up with the attempt to draw up a table (or lexicon) for the translation of the (symbolically interpreted) physical expressions into their psychological language. As the facts are objective ones, I shall be so bold as to enclose a brief sample and ask you to let me know what you think when you have time and what your response is. I do not actually have the accurate translation in every instance, and sometimes there seems to be more to the analogy than I can conceptually formulate.

I quite like it here. The above address is valid until the end of April.

With my best wishes,

Yours sincerely,

W. PAULI

* Missing.

[Enclosure to the letter of 2 October 1935]

"Physical" symbolism.

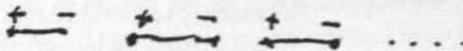
Psychological interpretation.

1.) Mapping

Note. The mapping always appears through a polar field of force, conveyed in such a way that the people mapped are related to each other.

A special case of this is

2.) Small dipoles arranged in parallel fashion (as found physically in a magnetic solid body.)



3.) The *suspension of the mapping* comes about in this case when a dipole starts to rotate as a result of its inherent heat.

In another image, the same thing is represented by the separation of isotopes. (By isotopes one means chemical elements that occupy the same place in

1.) "Participation mystique"

2.) Many people with an unconscious sense of identity, as in the case of a hypnotic experiment.

3.) Suspension of the participation mystique by means of individual differentiation.

the periodic table and that can be separated only by means of extremely difficult methods.)

4.) A similar symbolic image is the splitting of spectral lines in a magnetic field

Without field	
With field	

Groups of corresponding lines, so-called doublets, triplets, or multiplets, also frequently appear as an image.

5.) Radioactive nucleus

6.) Resonances

Every engineer knows what the catastrophic effects can be of the coincidence of 2 vibration frequencies. But what the simple worker does not usually know is that one can escape the resonance by raising the rate of revolution.

4.) Process of differentiation

But what does the polar field mean in psychological terms? It must be essential as the cause of the differentiation. All I know is that the same polarity is also represented by dominoes, playing cards, or other games (in two or in fours!)—The polar field must express a sort of dynamic regularity of the collective unconscious.

5.) "Self"

It is clear that "nucleus" means the same as the individual center. But what does "radioactivity" mean in psychological terms? On the one hand it seems to indicate a gradual transformation of the center, and on the other hand an effect radiating outwards (rays!).

6.) Archetypes

= falling into the archetype by identification.

I could go into these examples in greater depth, but initially I would just like to have your general impressions.

14J

Dear Professor,

[Küsnacht] 14 October 1935.
[Typewritten carbon copy]

Please accept my grateful thanks for your friendly cooperation.^a As I have already stated, you can rest assured that your anonymity will be guaranteed in every respect. I have selected only the dreams that contain symbols of the "Self," and these I have largely condensed. The interpretation is not of a personal nature and refers solely to the configuration of ideas, to which, moreover, I have given historical parallels. Thus, there is hardly likely to be anything in my essay with which you might disagree, for the historical paral-

lels are simply facts, which can only be disputed insofar as it would be possible to challenge the historical authenticity of the evidence. The personal associations of the dream are much closer to the dreamer than the purely abstract associations of ideas. I shall take the liberty of sending you a copy, and I think you will find that wherever possible I have omitted any personal references.

In your case, the idea of the polar-force image is probably connected with your earliest dreams of the pole of Heaven. The pole is the center of a rotating system, which actually represents the mandala. The basic primeval idea behind this seems to be that people are classified in this field of force. The "pole" is also represented, as seems to be the case with you, as an emanating nucleus. I have just discovered such a medieval representation in London. The nucleus is often depicted as a lapis, as a mediator, as a *vinculum* and *ligamentum elementarum*, the connection of the elements. The idea seems to be linked to the medieval concept of the microcosm and macrocosm, according to which all men are contained in the macrocosm, with every individual representing the whole as a microcosm.

The dipoles probably indicate first and foremost the complementary relationship in a self-regulating system. Thus in psychological terms: conscious = unconscious, projected: man and woman, which, next to the family, represent the simplest case of participation. The rotation of one pole is indisputably the beginning of individuation, hence the numerous rotation symbols in your dreams (historically designated as *circulatio spirituum*, and in Chinese as the circulation of light). It is probably basically a spiral rotation with a perpetual movement toward the nucleus. The representation by isotopes and spectral lines is along the same lines. They are fixed units or fixed groupings of units symbolizing the individual case (= individual + related individual or series of individuals).

Generally speaking, the unconscious is thought of as psychic matter in an individual. However, the self-representation drawn up by the unconscious of its central structure does not accord with this view, for everything points to the fact that the central structure of the collective unconscious cannot be fixed locally but is an ubiquitous existence identical to itself; it must not be seen in spatial terms and consequently, when projected onto space, is to be found everywhere in that space. I even have the feeling that this peculiarity applies to time as well as space. The representation of the collective unconscious usually consists of the so-called quaternium—which is the medieval term—meaning the fourfold emanation or radiation that has been designated by a medieval philosopher as the exterior of the nucleus. A biological analogy would be the functional structure of a termite colony, possessing only unconscious performing organs, whereas the center, to which all the functions of the parts are related, is invisible and not empirically demonstrable.

The radioactive nucleus is an excellent symbol for the source of energy of the collective unconscious, the ultimate external stratum of which appears as individual consciousness. As a symbol, it indicates that consciousness does not grow out of any activity that is inherent to it; rather, it is constantly being produced by an energy that comes from the depths of the unconscious and has thus been depicted in the form of rays since time immemorial. The center is thus represented by the Greek Gnostics as *Spinther* (the spark) or as *Phos archetypon* (the archetypal light).

Alongside this representation of the psychic structure, there is another one, actually the reverse; namely, the soul as a shell enveloping the spherically shaped cosmos, in the innermost part of which lies the earth as the heaviest and most dead part. In this case, the rays are directed onto the earth from outside through the medium of the stars. So one could speak here in terms of an introverted and an extraverted attitude. However, I believe that they are essentially one and the same thing, in that these opposites only come into being through the projection onto space of what is in itself a nonspatial (i.e., transcendental) existence. In my essay, I have actually attempted to show these things to a certain extent but have deliberately refrained from going into the parallels with physics, since, for obvious reasons, I did not wish to draw attention to this particular aspect. The center, or the nucleus, has always been for me a symbol of the totality of the psychic, as the conscious plus the unconscious, the center of which does not coincide with the ego as the center of consciousness, and consequently has always been perceived as being external. That is also why it was always projected onto the conception of the Deity, the One, the Monad, and so on.

I hope you are enjoying America. With best wishes, I remain,

Yours sincerely, [C. G. JUNG]

² Pauli's material appeared in the published version of Jung's lecture, "Traumsymbole des Individuationsprozesses" [Dream Symbols of the Individuation Process] and in *Psychology and Alchemy*, CW 12 pars. 44–331.

15J

Dear Professor,

[Küsnacht] 14 February 1936
[Typewritten carbon copy]

By the same post I am sending you an offprint of my essay on the dream motif, which I have already mentioned in our correspondence. You will see that the dreamer has remained anonymous, and there is nothing at all in the dreams related that could prove embarrassing, even without the anonymity.

I hope you are well and that you are enjoying your stay in America. With best wishes,

Yours sincerely, [C. G. JUNG]

16 P

[Princeton] 28-II-36

Dear Professor Jung,

[Handwritten]

I recently received your letter and most interesting essay. I am pleased that you have been able to make so much use of my material. I couldn't help smiling a little when you praised it so much, thinking to myself that it was the first time I had ever heard you address me in such a way.

I was personally amazed to learn how many parallels to the later development are already to be found in these early dreams. And yet I read it as if it were a report from far-off days. By way of my contribution to the parallels mentioned, I would like to mention just one point where I had the feeling that your dream interpretation was not entirely accurate. (As you can see, I still won't be "fobbed off" with just anything.) I am referring to the interpretation of the *seven* and the *ace of clubs* in lines 13 and 16. These two dreams have both a retrospective and a futural meaning. In my seventh year, my sister was born.³ *So the 7 is an indication of the birth of the anima.* (This appeared again in later dreams.) I can also offer further evidence of the connection for me between the anima and number 7. In a much later dream, the card with the 7 of diamonds came up, and it looked like this:

×		×
×	×	×
×		×

And then the "wise man" in the dream explained to me that this also meant M and referred to Mother and Mary. And he said that the step from the personified Mary to the 7 of diamonds went much further than Catholicism (which fits in beautifully with your interpretation of "expelling" as excommunication). N.B. The diamond card is also a reference to the color of the sun.

As for the ace of clubs, I am sure you are correct in relating it to the shape of the cross, but for me there does not seem to be such a direct connection to the Christian concept of God as there is for you. In my view, this ace of clubs, which comes before the seven, is thus the "*Origin of the birth of the anima*," an indication of a Keplerian archetype of *power*, which appears

much later as "Diocletian," "Danton," or "the duke who chases the maid". (By the way: this interpretation also fits in with the retrospective meaning of the dream—and with the dark color of the club.)

What also struck me was Dream II, with the croquet ball that smashes the mirror into pieces. The mirror is, I feel, not just the intellect but consciousness in general. The croquet ball reminds me of the wasp flying by, and the smashing of the mirror makes me think of the wasp's sting (the wasp's *venom* is always meant as inflationary, causing blindness).

One could say a lot about the cosmic aspect of the "Self" and the space-time problem that is bound up with it, but I don't want this letter to get too long. Instead, I am going to write out a dream that I had immediately after reading your essay, so that you can see how my unconscious reacted to it (see enclosure).^b It is also connected with the problems mentioned in my last dream. Thank you also for your last letter (of 14-X-35).^c I would like to hear sometime what you think about the collection of dreams (in the material I sent to you earlier), in which the dark anima asserts with a certain persistence that there is a "magical" connection between sexuality and eroticism on the one hand, and political or historical events on the other. This is the aspect of the anima frequently represented in dreams as "Chinese." I believe that there is also a connection with the workings of the Self that appears in the enclosed dream and which is represented as "diffraction of the molecular rays in the polar field" (see my last letter).

I do hope that my questions won't put you to too much trouble. Actually, I have spent very little time recently on dreams and the unconscious, and only rarely do I write my dreams down. I am generally in good health, and things seem to be fairly stable in that respect. Breaking away from you and from analysis made things rather difficult for me for a while, but that seems to be all over now.

Once again, many thanks for your essay and the trouble you have taken. With best wishes,

Yours sincerely, W. PAULI

^a Hertha Ashton-Pauli was an actress and writer, best known for her book *Der Riss der Zeit geht durch mein Herz*. She was born in Vienna in 1909 and died in New York in 1973.

^b Missing.

^c Letter 14.

17J

Dear Professor,

[Küsnacht] 19 May 1936
[Typewritten carbon copy]

My most heartfelt thanks for kindly sending me your interesting work, which I was privileged to hear as a lecture.^a With best wishes,

Yours sincerely, [C. G. JUNG]

^a This lecture, "Raum, Zeit und Kausalität in der Modernen Physik," was delivered before the Zürich Philosophical Society, November 1934, and published in *Scientia* tr., "Space, Time, and Causality in Modern Physics," in Pauli, *Writings on Physics and Philosophy*, pp. 95-106.

18P

Dear Professor,

Zürich 7, 16-VI-36
[Handwritten]

I am taking the liberty of sending you further material—the observations of the previous year—in the hope that it will be of interest to you and with the request that you add it to my dossier. Since March of this year, there has been a further development in the dreams which, among other things, are connected with the link between Eros and political events—a link that is extremely surprising and unexpected for me. But all this is still too new for me to be able to present it to you in condensed form.

I hope you received my letter from Princeton, in which I thanked you very much for your essay. In that letter I also pointed out that the symbol discussed in this essay—the ace of clubs—suggests an archetype, which in later dreams appears personified as "Diocletian," "Danton" or as the "duke" and a sort of "wish for power." I have since given much thought as to how that is consistent with the crosslike shape of the ace of clubs and have come to accept the idea that the ace of clubs is *like a shadow cast by the Christian cross*—in other words would symbolise the *dark side of Christianity*. Do you regard such an interpretation as possible and are there historical parallels?

In the hope that I have not taken up too much of your time, I send you my best greetings and thank you once again for the essay you sent.

Yours sincerely, W. PAULI

19J

[Küsnacht] 6 March 1937
[Typewritten carbon copy]

Dear Professor,

Your letter gave me much pleasure, and I thank you most sincerely for your willingness to make more of your dream material available to me. As you know, I have always taken a lively interest in your unconscious processes, and I really would be most grateful if you at least continued to send me those dreams that are of a significant nature—you are fully aware of what I mean by that. Most dreams, as you rightly say, are insignificant; that is, when the external situation changes, they soon lose their value, which only lasts for a certain period of time. Such dreams fade away quickly if they are not written down, and this is no great loss. The significant dreams, on the other hand, and especially yours, are of great value when it comes to scientific research into motifs.

I have not been able to spend any time on your dreams recently, as I had to "excavate" the ancient and medieval lines that have led to our dream psychology. But sooner or later I shall tackle these dreams and extend the examination to the additional dreams, and not just the 400 dreams that have come in so far.

With best wishes,

Yours sincerely, [C. G. JUNG]

20P

Zürich 7. 3. v. 1937
[Handwritten]

Dear Professor Jung,

I refer to your kind letter in March of this year and so am sending you further dream material, to which I have added a short chronological table. There is also a drawing that goes with the material, which I shall send to you in the next few days.

All the dreams are from the year 1936, but the accompanying notes were written only recently (April 1937). These notes are in no way meant to preclude a psychological interpretation by the expert; their sole aim is to establish the context, especially the link with the earlier material. Any detailed scientific interpretation would certainly have to make comparisons with other material (possibly with historical material), which is quite beyond my competence and my abilities.

I leave it entirely up to you as to whether you wish to make further use of the material, and remain, with best wishes,

Yours sincerely, W. PAULI

21J

[Küsnacht] 4 May 1937.

Dear Professor,

[Typewritten carbon copy]

My sincere thanks for kindly sending me your dream material. You must allow me some time before I am in a position to study it in depth.

With best wishes,

Yours sincerely, [C. G. JUNG]

22P

Zürich 7, 24 v. 37

Dear Professor Jung,

[Handwritten]

I would just like to say a brief word of thanks for sending me your treatise on alchemy.³ It was bound to be of great interest to me, both as a scientist and also in the light of my personal dream experiences. These have shown me that even the most modern physics also lends itself to the symbolic representation of psychic processes, even down to the last detail. Of course, nothing is further from the thoughts of modern man than the idea of penetrating the secrets of matter in this way, for he would actually rather use these symbols to penetrate the secrets of the soul, since it seems to him that, relatively speaking, less research has been done on the soul, and it is less familiar than matter.

But perhaps there is a lesson to be learned from alchemy's mistake of attributing to the lapis the ability to help in the manufacture of genuine gold. For it seems to me important for us, too, not to attach any particular expectations of external, material success to the formation of the central symbol. This appears to be very closely connected with the "epilogue" of your treatise, where you touch on the questions of imputing psychic contents to the ego and the risk of the inflation of consciousness. Maybe the alchemists' idea that they could really make gold by using the lapis can be seen as an expression of such an inflation of consciousness. By way of contrast, if the expectations of external, material success are given up—expectations that are initially connected with the appearance of the central symbol—then other fantasies emerge in the course of time, and they are concerned with the death of the individual and the meaning of death. And it might possibly be that the rejuvenation of Faust, which only came about in a postmortem state, would be right, *sub specie aeternitatis*, for the individuated individual, if not for the history of civilization in general; this would be the case insofar as the death of the individual is *always*, in a certain sense, a historically conditioned necessity, for this individual is also

constantly subjected to such psychic influences, which in his lifetime could not be fully assimilated into consciousness. If the reverse were the case, there would be something incomplete about the individual life.

As far as individually mentioned symbols in your treatise are concerned, what particularly struck me, in addition to the Christ-lapis parallel, is the evaluation of the Sacrifice of the Mass by the alchemists. The former is quite analogous to my experience that the central symbol can be represented both as an acting person and an abstract one (as a "radioactive nucleus"). As for the transformation and communion symbols, they are also very familiar to me as representing certain stages in the spiritual transformation in the individuation process.

I look forward with great interest to your further investigations into this process and am somewhat hopeful that they also might lead to the discovery of dynamic laws about the chronological sequence of the various phases.

Once again, my thanks and best wishes,

Yours sincerely, W. PAULI

* Jung, "Die Erlösungsvorstellungen in der Alchemie" tr., "The Idea of Redemption in Alchemy," in *Integration of the Personality*, pp. 205-80; rev. and exp. in *Psychologie und Alchemie*, pp. 317-631; further rev. in 2d edn. of *Psychologie und Alchemie*; with new title CW 12, pars. 332-554.

23 P

Dear Mr. Jung,

Zürich 7, 15-X-38
[Handwritten]

In summer I came across your book *Psychology and Religion*,^a and I saw that you have attached a certain importance to some of my early dreams, especially the vision with the "World clock." This now prompts me to tell you about a dream I had at the beginning of this year which, both in structure and content, is closely related to the dreams discussed in the book, especially the world-clock vision. In my defense for bothering you with it, I would also point out that the dream recorded in detail on the enclosed sheet,^b after my notes, is one of the relatively few dreams that I regard as significant and effective.

As an obedient student of yours, I must first say something about the conscious attitude when the dream occurred. I was once at a meeting where someone was talking about the oracle of the *I Ching*.^c It struck me that the one consulting the oracle has to "draw" *three times*, whereas the result of the draw depends on the divisibility of a quantity by *four*. This reminded

me vividly of the "world-clock vision," in which the motif of the permeation of the 3 and the 4 was the main source of the feeling of harmony. The dream occurred about 2 weeks later, when the matter was no longer consciously preoccupying me, and it brought the subject to a sort of provisional conclusion.

As to the dream contents, I don't want to get bogged down in too much sweeping speculation but would just like to make a few general observations. After a careful and critical appraisal of many experiences and arguments, I have come to accept the existence of deeper spiritual layers that cannot be adequately defined by the conventional concept of time. The logical consequence of this is that the death of the single individual in these layers does not have its usual meaning, for they always go beyond personal life. In the absence of appropriate terms of reference, these spiritual spheres are represented by *symbols*; in my case, they are particularly often represented by wave or oscillation symbols (which still remains to be explained). The relationship to these images is strongly affective and connected with a feeling that could be described as a mixture of fear and awe. (You will perhaps say that the curves are an *imago dei*.)

In the dream described here, an attempt is first made to relate the two lowest of the 3 layers to a four-part object (clock), but this does not work. This is why, in contrast to the earlier world-clock vision, the sense of harmony is missing.

The cry of the ecstatic "voice" at the end of the dream is perhaps a way of showing the puzzling "rhythms" from a new side, and they seem to be regulating that process which is here called "paying." One is inclined to connect the "certain life" with the first (quickest) rhythm and the (temporally) indefinite life with the other two rhythms.

I would be interested to hear what you make of this dream, for I attach a great deal of importance to all these problems.

Thanking you in advance for your trouble, I send my best wishes,

Yours sincerely, W. PAULI

^a Jung, *Psychology and Religion*; tr. as *Psychologie und Religion*; CW 11, pars. 1-168. [Apparently, Jung used a series of Pauli's dreams as the subject matter for his interpretation in *Psychology and Religion*. The dreams to this point are found in CW 11, pars. 40 (Catholic Church dream), 58 (House of the Gathering dream), 111 (world-clock vision), each followed by Jung's commentary on their psychological significance, the latter of which he perceives to be the psychological equivalent of a religious conversion (par 110). Pauli is not alarmed by anonymous use of his material, nor does he argue with the interpretation. Jung also uses this "world-clock vision" as an illustration with an extensive commentary in CW 12, pars. 307-22.]

^b See Appendix 1.

^c Cf Wilhelm, *I Ging, das Buch der Wandlungen*; tr., *I Ching, The Book of Changes*.

24J

[Missing]

25 P

[Zollikon-Zürich] 30 Oct. 1938

Dear Mr. Jung,

[Handwritten]

Many thanks for your letter.^a The comment it contains on the dream is a confirmation of my own attitude to these problems, which basically tallies with your interpretation. I shall try to allow the “anima” to have a greater say on the concept of time.

The first attempt of the “anima” to express *her* concept of time is to be seen in the fact that she produces these odd oscillation symbols. The light and dark stripes must also probably be seen as falling into the same category of periodic symbols, as must the pendulum and the “little man” from the earlier material. Perhaps you can substantiate them with some sort of historical material; but in the alchemical literature quoted in your essays I have not been able to find such material. As you can see, I would like to “saddle” you with this problem as well.

As regards your request to be kept more or less up-to-date about my dreams, I’ll come back to that later at some point. I have a basically coherent series of dreams from the first half of 1937, which seems to have the character of initiation rites. But it is always a good thing to allow some time to elapse before I work through the material, for I am then better able to distinguish between what is important and what is not. I may take the liberty of sending you further material next spring.

Of the alchemical literature, it was especially the 17th century that aroused a certain interest, particularly Fludd, because of the symbols he employs. By the way, do you know Meyrink’s novel *Der Engel vom westlichen Fenster*,^b which deals with the alchemy of this period (17th century)? (I simply mention it because you made a point of quoting Meyrink in your 1935 essay [“Traumsymbole des Individuationsprozesses,” in *Eranos Jahrbuch* 1935]).

Many thanks for your essay on the “Zosimos visions.”^c With kind regards,

Yours sincerely, W. PAULI.

^a Missing.

^b Gustav Meyrink (1868–1932), *Der Engel vom westlichen Fenster*. [In the Eranos lecture, Jung was referring to Meyrink’s *Der Golem* in dreams nos. 1 and 18, pp. 20, 39; rev. CW 12, 2d edn., pars. 53, 103.]

^c Jung, “Einige Bemerkungen zu den Visionen des Zosimos” [Some Observations on the Visions of Zosimos]; tr., rev., exp., CW 13, pars. 85–144.

26J

[Küsnacht] 3 November 1938.
[Typewritten carbon copy]

Dear Professor,

As regards the "little man," we have evidence of that as far back as the earliest alchemical literature, particularly with Zosimos, where the *anthroparia* are to be found. In connection with "pendulum," one automatically thinks of medieval timepieces, where segments of time were represented by little men. The personification of time can be found on a large scale in the identity of Christ with the church year, or in the identification of Christ with the serpent of the zodiac.² Moreover, you will find many representations of the planet or metal gods as little men, or children, in picture material, e.g.:

1. Symbolical Scrowle of Sir George Ripley. Ms. British Museum, Additional 10302.
2. Berthelot: *Alchemistes Grecs*. Pat. 1. I., p. 23.
3. Daniel Stolz v. Stolzenberg: *Viridarium Chymicum*, 1624. Fig. 50.
4. Lacinius: *Pretiosa Margarita*, 1546. (in *Colloquium nuncupatorium*.)
5. Museum Herm. 1678. *Liber Alze*. p. 326. ("Quatuor corpora mas et masculus nominantur.")

With regard to the symbolism of periodicity in alchemy, nothing springs to mind at the moment, apart from the frequent reference to the importance of figures, weight, proportion, and duration of time. The only regularity in the alchemical process that I know is the one going back to Greek times with its division into four, corresponding to the four elements. (*Quatuor operationes, quatuor gradus caloris*.)

I certainly know Meyrink's novel. The John Dee [1527-1608] he deals with is a terrible speculator. I have read a treatise by him on the *Monas Hieroglyphica* that is simply unbearable. Incidentally, there is an English biography of him: Charlotte Fell-Smith, *John Dee*.

With kind regards,

Yours sincerely, [C. G. JUNG]

² See Jung, *Wandlungen und Symbole der Libido* [Transformation and Symbols of Libido], 2d edn., 1925, p. 99; tr., rev., exp. *Symbols of Transformation*, CW 5, pars. 160-63.

27 P

Dear Mr. Jung,

Zürich 7, 8-XI-38
[Handwritten, postcard]

Many thanks for your letter of the 3rd inst. Your bibliographical data are very valuable. I have now recalled a picture from the Middle Ages in which the 12 Apostles represented the 12 months.

For the time being I won't bother you any further and will give more thought to the whole problem. I may come back to it once again at some point.

Once again, many thanks and kind regards,

Yours sincerely, W. PAULI

28 P

Dear Mr. Jung,

Zürich 7, 11-I-39
[Handwritten]

In the meantime I have thought more about the problems that were broached in your letters of Oct. and Nov. 1938,* and I would like to take the liberty of raising once again the question of the *periodic* symbols, one of which occurred in the dream of 23-I-1938^a and which you were kind enough to comment on in your letter. I think I can take the matter a little farther by referring back to an even earlier dream, which is to be found in the material I sent to you on an earlier occasion. Specifically, it is the dream of 13-III-1936. This dream affords a certain insight into how a periodic symbol actually comes about, for in it a dark man appears (associated by me with the "shadow" archetype), who is cutting pieces out of a zone of light at regular intervals. Although the two dreams refer to external situations that are very different and thus probably have different meanings, it seems to me nevertheless very instructive to compare the two symbols (see the drawing at that point). In the 1938 dream, the "oscillation" was horizontal, whereas it is vertical in the 1939 one (but I also know rare cases where it is slanting). My own idea about this (arrived at purely intuitively) is that these symbols have a connection with the *attitude to death*, in that *one* oscillation signifies one human life, but one which is to be interpreted only as part of a larger whole. For this whole, the usual concept of time applies, except that here there comes into play what you in your letter called the "time concept of the anima." Whether this idea is definitive or not, this periodic symbolism expresses for me a crucial life problem.

* The letter of October is apparently number 24, missing.

Despite your statement to the contrary in your letter of 3.XI.38, I suspect that this symbolism *can* be historically supported by documentary evidence after all, possibly by the mystery cults of late antiquity. Should anything else occur to you on the basis of the earlier dream, I would be grateful if you would let me know.

I am also taking the liberty of sending you the promised work on the dream series from the first half of 1937, to complete your collection. I recall that I became tired in the spring of 1937 and did not pursue the matter further. But these problems crop up repeatedly with me from time to time, in one form or another.

With my best wishes for the New Year, Yours sincerely, W. PAULI

* See Appendix 1.

29 P

Dear Dr. Jung,

[Zürich] 28/IV [1934]*

[Handwritten]

Now that the holidays are over, I should like to ask you whether we may resume our Monday meetings in May; the first Monday in May is the 7th; could you receive me at 12 o'clock on that day? Unfortunately I find myself having to count on the offer you kindly made with regard to the financial side, and I am most grateful to you for this.

It was with great interest that I read your essay on "Seele und Tod" [Soul and Death] in the April edition of the *Europ. Revue*,^a especially your remarks on "Telepathy" and the "non-spatial, non-temporal form of being of the psyche," where you even specifically mention my special subject—Theoretical Physics. It is something that is very important to me, on the one hand, and yet is still largely unclear. Of course, it all depends on what position one adopts in the relationships of the hypothetical, nonspatial, nontemporal form of being of the psyche to observable occurrences. (For *apart from* these relationships, one can, from the scientific point of view, adopt any arbitrary approach to the nonspatial, nontemporal form of being of the psyche.) The general approach of the modern physicist to life phenomena is always the following: It is certainly impossible, through any observation of living beings, to ascertain any direct contradiction to the laws of physics as we know them. However, in the experiments with living beings—be they of a biological or a psychological nature—the condition of keeping them alive or of

* See note at Letter 5.

preventing them from destroying themselves by scientific experimentation in a way that would annihilate the phenomenon would render impossible the testing of the laws of physics in the narrow sense of the term, particularly with those manifestations that are characteristic of living beings (e.g., adaptation, propagation, heredity), so much so that there is no room left for any new type of law of nature with life phenomena.

Of course, these remarks are intended as a general framework. As far as the "parapsychological" phenomena in particular are concerned, I certainly do not know of any factual material (and even if I did, God knows whether I would believe any of it). But in my dreaming and waking fantasies, those abstract figures are appearing in ever greater numbers; you know them already (circles or stylized "little men" like hieroglyphics or acoustic rhythms, or alternating light and dark stripes), and it will become a matter of life and death for me to understand more about the objective (communicable) meaning of these symbols than I do at the moment. I have certain grounds for assuming that only then will it be possible for me to "subjugate" my anima complex (transform it into a "function" in your psychology). And my phobia about wasps is also very much connected with that. In the meantime, my relationship to those creatures, which are of such exaggerated importance to me, has changed insofar as the object of the fear is starting to become separated from the wasps (or partially at least). I recognized that behind it lurked the fear of a sort of ecstatic state in which the contents of the unconscious (autonomous part systems) might burst forth, contents which, because of their strangeness, would not be capable of being assimilated by the conscious and might thus have a shattering effect on it. On the other hand, if an assimilation of the contents did come about, as a result of the conscious gradually becoming accustomed to such experiences as those that are concealed behind the word "parapsychology" and symbols like the ones mentioned, then the danger would be averted (and ecstatic outbursts would hardly be likely to occur).

I would very like to discuss this and related series of fantasies with you in person.

Incidentally, you were perfectly correct when you predicted that for me marriage would constellate the "dark side of the collective" and corresponding "représentations collectives."*

With best wishes,

Yours sincerely, W. PAULI

* "Seele und Tod"; tr., "The Soul and Death," CW 8, pars. 796-815.

* See Letter 7, note a.

30 P

Dear Dr. Jung,

[Zürich] 24. v [1934]
[Handwritten]

I have just received your letter, and it would be very convenient for me to meet you on Monday at the earlier time of 11 o'clock.*

May I take this opportunity of adding a few remarks? In the meantime, I have to a very large extent become clear about the danger specific to my life, which had been projected onto the wasps. The alternating light and dark stripes must be diametrically opposed psychic attitudes, or dispositions to forms of behavior. Moreover, they are very closely related to ethics, religion, and relationships toward other people, as well as to sensual feelings, eroticism, and sexuality. The specific threat to my life has been the fact that in the second half of life I swing *from one extreme to the other* (enantiodynamia). In the first half of my life I was a cold and cynical devil to other people and a fanatical atheist and intellectual "enlightener." The opposite to that was, on the one hand, a tendency toward being a criminal, a thug (which could have degenerated into me becoming a murderer), and, on the other hand, becoming detached from the world—a totally unintellectual hermit with outbursts of ecstasy and visions.

So the purpose of my neurosis was to keep me from this danger of changing abruptly into the opposite. In marriage there can only be the balance of the happy medium, the Tao. My wife has a similar problem of opposites, but the reverse of mine. Up to now, all that she has lived out externally has been social relationships and human kindness, and she makes unrealistic ethical demands, such as Everybody should be good. Consequently, as I have been able to observe by looking closely, the demand of the evil side for recognition has accumulated in her unconscious, and her animus has an extremely robust, nay even violent character. And that is why she fell in love with my shadow side, because it secretly made a deep impression on her. But in my view this creates the prerequisites for balance in marriage.

But there is more to it than that: This abrupt swing into the opposite is a danger not just for me but for our whole civilization. This is what the dream with the 3 giant horses is saying; in this moment everything can turn into primitive barbarianism, unless Tao and individuation step in. This is why my personal problem is also a collective one, and, conversely, the danger that I personally was faced with was greatly heightened by a disposition that was forced upon me by the collective unconscious.

* See Letter 6, note a.

I spent Whitsuntide in Melchtal and I visited the Bruder Klaus chapel at great length,^a studying the pictures hanging there, which represent his visions. I was thoroughly fascinated by them and felt a strong and immediate rapport with them. His life was really turned upside down when he left his family and went into the wilderness. And he had that peculiar vision of the Trinity, which gave him such a terrible fright. As far as I know, no attempt has yet been made to explain this fright. I believe that it must have been a similar fright, albeit much greater and stronger, to the one I had in the dream with the 3 giant horses. Now Bruder Klaus knew nothing about individuation or any alternative to Christianity. He must have had a vision of something like the end of the world. And the relationship to the Trinity is perfectly understandable to me, for I once had a dream in which the Trinity turned into the 3 rhythms (the "world clock"). And the interplay of the latter is said to involve danger at a certain point in time.

Do you find this point of view outlandish? Perhaps it is. But we must not lose sight of the fact that these are objective, psychic facts, which all come from the same collective unconscious.

So I am really looking forward to seeing you again next Monday at 11 o'clock, and remain, with best wishes,

Yours sincerely, W. PAULI

^a Cf. Jung, "Bruder Klaus" CW II, pars. 474–87. [Bruder Klaus, or Nikolaus von Flüe (1417–1487), popular Swiss saint, canonized by Pius XII in 1947 and declared patron saint of Switzerland.]

31 P

Zollikon-Zürich, 3. vi. 1940, [actually the Physics Institute of the ETH, Zürich, Gloriastrasse 35, owing to possible departure.]

Dear Professor Jung,

[Handwritten]

Owing to circumstances beyond my control, I am sending you the enclosed dream material from the years 1937–1939, so that it does not get lost. In the middle of May I suddenly and quite out of the blue received an invitation to be a guest professor at Princeton, where I have already been once before. I may be leaving this week; it all depends which of the two will win the race: the passport and visa bureaucracy or the war looming up in the Mediterranean.

I mention this here in order to justify the fact that I am sending you the material without any additional remarks, which I would have liked to have worked out beforehand. With the concept of time (cf. in particular the dream from 12-III-1939), I have since made some progress by studying the

writings of Wilhelm,^a especially his commentary to the *I Ching* (comments on "Kreislauf des Geschehens" pp. 155ff in *Der Mensch und das Sein*; p. 176f on transmigration of souls/reincarnation). And I have also read the part in the text of the *goldenen Blüte*^b pp. 142-43 of the 1st edn. [Baynes translation, 1931, p. 55] about the possibility of multiplication in a moment when the pairs of opposites counterbalance each other (relationship of the "tree series" to my periodic dream symbols). The motif of the projection of various periodic processes onto each other, as a sort of associative connection, seems to play an important role here, especially as, psychologically speaking, the concept of time is based on memory, powers of recall, and association. This projection of cycles onto each other was later actually represented by me in dreams by abstract, mathematical symbols. I believe I agree with you totally when you say that a "metaphysical" assumption of reincarnation is not necessary.

In the meantime, now that I have worked through the 1934 material once again, another aspect of the rhythms has become clear to me, especially the "great vision" with the world clock published by you in your 1935 lectures. This link has already been hinted at with the word "pulse" and concerns the relationship of the rhythm to the heartbeat and to *circulation*. Unfortunately, I no longer have time to compile the relevant material, but I do feel that this relationship is a crucial one. The dreams seem to express the idea that an archetypal image of the *four-beat* stands for a permanent, automatic, steady rhythm, with self-regulation as the aim of both a physical-biological process as well as a purely psychic one (cf. here the "Eternal City"), and that this image of the objective psyche also causes, as it were, the circulation of the blood. (The four chambers of the heart seem to have a link with the quaternity of the mandala.) With me, this then gave rise to the question of whether, in the comparative anatomy of the animal order or in the embryonic development of lower animals with single blood vessels up to the actual formation of the heart, there do not emerge parallels to the individuation process (with its formation in the "middle"). I have often talked about this with Dr. C. A. Meier,^c and he has informed me of an interesting vision from his material that seems to be related to this question. But this whole problem is far beyond my personal competence as well as my education and training.

^a Richard Wilhelm, see Letter 23, note c, for details on the *I Ching*. Wilhelm commented further on the *I Ching* in a chapter from a collection of his essays, *Der Mensch und das Sein*, where the pages cited can be found.

^b *Das Geheimnis der goldenen Blüte, Eine chinesisches Lebensbuch* [tr., *The Secret of the Golden Flower*]; Jung's commentary, rev. and exp., CW 13, pars. 1-84.

^c Cf Meier, "Persönlichkeit," pp. 181-83; tr., "Personality," in *The Psychology of C. G. Jung*, pp. 123-25.

Do you perhaps still have a copy of the German edition of *Psychology and Religion* for me? (I never got a copy of the English edition.)

With my best wishes to you in this difficult time,

Yours sincerely, W. PAULI

32 P

[Zollikon-Zürich] 25 October 1946
[Handwritten]

Dream:

Through the post I receive a casket. Inside it is apparatus for the experimental investigation of cosmic rays. Next to it is a tall, blond man. He seems to be somewhat younger than me (maybe between 30 and 40). He says: "You must force the water up higher than the houses in the city so that the city dwellers will believe you." Then behind the apparatus in the little box I notice a bunch of keys, 8 in all, arranged in a circle with the key-bits hanging down.

Comment: The water and the city are allusions to earlier dreams. In these dreams there was a dark, male figure playing a role who appeared as a "Persian" who had not been accepted as a student at the Institute of Technology (contrast to the prevailing scientific collective opinion). "The Blond" and "The Persian" may be dual aspects of one and the same figure (they never appear together). The figure has an extremely "psychopompos" character and has a similar function to Mercury with the alchemists. He is not the same as the "wise old man" (also familiar from dreams), although the main difference is that of age.

It was only in June of the following year that I dreamed that the water had drained off.

[Zollikon-Zürich] 28 October 1946
[Handwritten]

Dream:

The "Blond" is standing next to me. In an ancient book I am reading about the Inquisition trials against the disciples of the teachings of Copernicus (Galileo, Giordano Bruno) as well as about Kepler's image of the Trinity.

Then the Blond says: "*The men whose wives have objectified rotation are being tried.*" These words upset me greatly: The Blond disappears, and to my consternation the book also becomes a dream image: I find myself in a courtroom with the other accused men. I want to send my wife a message,

and I write a note: "Come at once, I am on trial." It is getting dark, and for a long time I cannot find anyone to give the note to. But finally a *Negro* comes along and says in a friendly way that he will deliver the note to my wife.

Soon after the *Negro* has left with the note, my wife turns up in fact and says to me: "You forgot to say good night to me." Now it starts to get lighter, and the situation is as it was at the beginning (except that my wife is now present, too): The "Blond" is standing next to me once more, and I am reading the ancient book again. Then the Blond says to me sadly (apparently referring to the book): "The judges do not know what rotation or revolution is, and that is why they cannot understand the men." With the insistent voice of a teacher, he goes on to say: "But you know what rotation is!" "Of course" is my immediate reply, "The circulation of the blood and the circulation of light—all that is part of the basic rudiments." (This seemed to be a reference to psychology, but the word is never mentioned.) Whereupon the Blond says: "Now you understand the men whose wives have objectified their rotation for them." Then I kiss my wife and say to her: "Good night! It is terrible what these poor people who have been charged are going through!" I grow very sad and start crying. But the Blond says with a smile: "Now you've got the first key in your hand."

At this point I woke up and was quite shaken. The dream was an experience of a *numinous* character and has deeply influenced my conscious attitude. As a result, I went back to my work on Kepler. At that time, apparently (17th cent.), a projection of the mandala and rotation symbolism had occurred externally. The "accusation" relates to the resistance of collective opinion (see above, comment to the previous dream). From the higher point of view of acquiring consciousness, the accusation relates to the fact that the men did not know where their wives (=anima) were, nor what *their* role was in the process of perception.

As you know, I then came across the work of that remarkable fellow R. Fludd,^a whose anima did not objectify rotation for him, since this was able to find its expression in the Rosicrucian mysteries. This is where the *infans solaris* is born, in the middle sphere, accompanied by the *proportio sesquitertia* of world time. Kepler's other proportions could not possibly be of any interest to Fludd, since his anima did not respond to the archetype that modern natural science had produced. But Fludd knew where the anima was with Kepler and the other scientists: It had moved from the material into the perceiving subject, which aroused deep distrust in Fludd since it was then—outside the Rosicrucian mysteries—removed from control through consciousness.

It appears that Fludd's voice, which was ignored at the time, is imbued with new meaning, since for the moderns the objectifying of space had only limited validity. *The neutral language of the "Blond"* in the dream (he did

not employ such terms as “physical” or “psychic” but just talks of people who “know what rotation is” and those who do not know) seems to be reanimating that intermediary layer where the *infans solaris* used to be. The modern unconscious speaks here of a “radioactive nucleus.”

* Robert Fludd (*de fluctibus*) (1574–1637), Rosicrucian Paracelsianer, alchemist, M.D., Christ Church, Oxford, practiced as a doctor in London. On his controversy with Kepler, see Pauli, “Theorien bei Kepler”; tr., Pauli, “Kepler”; same tr. also in Pauli, *Writings on Physics and Philosophy*, pp. 219–79.

33 P

Zollikon-Zürich, 23 December 1947

Dear Professor Jung,^a

[Handwritten]

In reply to your letter of 9 Dec., I should once again like to confirm in writing that I truly welcome your wish to found an institute with the objective of cultivating and promoting the field of research that you have inaugurated; and I give my consent to my name being on the list of sponsors.

The way your research and alchemy coincide is to me serious evidence that what is developing is indicative of a close fusion of psychology with the scientific experience of the processes in the material physical world. It is probably a long journey, one we are only just setting out on, and it will especially entail, as a modifying factor, constant criticism of the space-time-concept.

Space and time were virtually turned by Newton into God's right hand^b (oddly enough, the position made vacant when he expelled the Son of God from there), and it needed an extraordinary mental effort to bring time and space back down from these Olympian heights. Going hand in hand with this, apparently, is the criticism of the basic idea of classical natural science, according to which it describes objective facts to such an extent that there is absolutely no link between them and the researcher (objectifiability of the phenomena independently of the way in which they are observed). Modern microphysics turns the observer once again into a little lord of creation in his microcosm, with the ability (at least partially) of freedom of choice and fundamentally uncontrollable effects on that which is observed. But if these phenomena are dependent on how (with what experimental system) they are observed, then is it not possible that there are *also* phenomena (extra corpus) that depend on *who* observes them (i.e., on the nature of the psyche of the observer)? And if natural science, in pursuit of the ideal of determinism since Newton, has finally arrived at the stage of the fundamental “perhaps” of the statistical character of natural laws (what enantiodromial), then should there not be enough room for all those oddities that ultimately

rob the distinction between "physics" and "psyche" of all its meaning (as with the distinction between "physics" and "chemistry")?

I hope that the continuation of the research you have inaugurated in this field will bring solutions to these problems, and thus I also hope for closer contact between this field of research and the natural sciences than has hitherto been the case.

It was a great pleasure to talk to you again, especially as at the moment my attention is focused strongly on the influence of the archetypal concepts (or, as you once said, the "instinct of imagination") on scientific definitions. For me, the best way to make something clear to myself has always been to announce a lecture or a speech on the subject in question; and with this in mind, I hope that one or two lectures on Kepler (as an example) in the Psychological Club will get me off to a good start.^c

I shall look further into the sources you were kind enough to give me. I hope that I can bring alive for the public the collision between the magic-alechemistic and the (new in the 17th century) scientific way of thinking (a collision that I believe recurs on a higher level in the unconscious of modern man).

Once again, many thanks and kind regards.

Yours sincerely, W. PAULI

^a Cf. the two letters in Appendix 9.

^b Cf. Markus Fierz, "Über den Ursprung und die Bedeutung der Lehre Isaac Newtons vom absoluten Raum" [On the Origin and Significance of the Teachings of Isaac Newton about Absolute Space].

^c Club 48, Lecture, see Appendix 6.

34 P

Zollikon-Zürich, 16 June 1948

Dear Professor Jung,

[Handwritten]

When that amusing "Pauli effect" of the overturned vase occurred, on the occasion of the founding of the Jung Institute,^a I had the immediate and vivid impression that I should "pour out water inside" ("*innen Wasser ausgiessen*")—to use the symbolic language that I have acquired from you). Then when the connection between psychology and physics took up a relatively large part of your talk, it became even more clear to me what I was to do. The outcome of all this is the enclosed essay.^b It is not intended for publication or for a lecture, especially as for me it is just the *beginning* of an examination of these problems; it could, however, serve as a basis for further discussion. (I would be very happy if it would be possible for you to spend a quiet evening in the second half of July discussing these problems

with Dr. C. A. Meier and myself.)¹ But perhaps you prefer to communicate by letter.

If the same set of problems is looked at from such different angles as those of psychology and physics, there are bound to be differences of opinion over certain details. The main one for me still remains that I relate the fact of the representation of psychic circumstances to characteristics of the material, which was first proved by you in the case of alchemy. Furthermore, I attempt to show that in this it is very easy for the unconscious to replace the alchemistic oven with a modern spectrograph.² This should come as less of a surprise to the psychologist than to the physicist: Whereas the latter soon jumps to the false conclusion that such symbolism is now invalid as a consequence of the strides made in our knowledge of matter, the former knows only too well how little the structure and tendency of the unconscious have been affected by the technological progress of the past 300 years.

Hoping to see you again at the Psychological Club on Saturday, I send my best wishes and remain,

Yours sincerely, W. PAULI

^a On 28 February and 6 March, Pauli gave two lectures to the Zürich Psychological Club based on "Theorien bei Kepler." See this speech in Appendix 6, as recorded on pp. 37–43 of the club's annual report. For Jung's "Address on the Occasion of the Founding of the C. G. Jung Institute of Zürich," 24 April 1948, see CW 18, pars. 1129–41.

^b See Appendix 3.

35 P

Zollikon-Zürich, 7 Nov. 1948

Dear Professor Jung,

[Handwritten]

Our talk yesterday on the "synchronicity"^a of dreams and external circumstances (Do you also use this term "synchronous" when there is a gap of 2–3 months between dream and external event?) was of great help to me, and I should like to thank you once again.

As you told me you were very preoccupied at the moment with the rotation symbolism of mandalas, I am taking the liberty of sending you the exact text of one of my dreams—one that occurred about 2 years ago—in which rotation, and hence the concept of space, was the central feature. It may be useful to you in dealing with these questions that are on your mind at the moment. Of course, it is about the relativity of the concept of space in relation to the psyche, and if the problem were not important here and now, this dream would not have had such an overwhelming effect on me at the

¹ Dr. Meier was kind enough to explain to me more fully the psychology of the doubling of contents.

² This oven is also familiar to me from my own dreams.

time. The Kepler lecture, the idea of the neutral language, and the further pursuit of the archetypal background of physical terms were all triggered off in me at the time. The objectivity of the archetypal background makes it seem very likely to me that the problem of the mandalas, which you mentioned briefly yesterday, and the one that is behind this dream will be one and the same.^b As to the phenomenon described by you as synchronistic, I am for the time being using a sort of symbolic aid or working hypothesis which—as the simplest elementary case of the Riemann surface—looks as follows: This is supposed to represent the cross-section of two leaves (to be thought of as continuing perpendicular to the plane surface)



that are generally separated but that connect at the central point marked out (penetrating each other—mathematicians are very generous in this respect). The number of leaves is arbitrary, two simply being the easiest number. The essential thing is *by circling round the central point* (perpendicular to the plane surface) *one gets from the lower leaf to the upper one (and vice versa)*.

The “radioactive nucleus” is a symbolic cause, determined by the unconscious, of the “synchronistically” connected phenomena, one of which, for example, (lower leaf) consists in the fact that I have a certain dream, the other (upper leaf) in the fact that Mr. or Mrs. X falls ill or dies. The activity that comes from the central point in the intermediate stratum deals initially with the distinction between “physis” and “psyche” and represents an order that operates outside space and partly outside time as well.

But the presence of this activity—described as “radioactivity” by the neutral language that springs up spontaneously from my unconscious—is essentially linked to the condition that archetypal contents (from a deeper, completely timeless stratum) draw near to the conscious (doubling phenomenon), so that the problem of their integration into the conscious has become an immediate one. Is it not a fact that when one looks more closely at the drawing, the mandala circle is split into two leaves lying on top of each other, which, in accordance with a set pattern, overlap in the center (Self)?

With many thanks,

Yours sincerely, W. PAULI

^a This is the first use of the term “synchronicity” in the correspondence. See Jung’s following letter. It should be noted that the “Pauli effect,” in which most physicists and Pauli himself believed, was a synchronistic phenomenon in the Jungian sense. Cf. Markus Fierz, “Naturerklärung und Psyche, ein Kommentar zu dem Buch von C.G.J. und W. P.”

^b See Appendix 3.

36J

Dear Mr. Pauli,

[Küsnacht] 22 June 1949
[Typewritten carbon copy]

Quite a while ago, you encouraged me to write down my thoughts on synchronicity. I have finally managed to get around to it and more or less collect my thoughts on the subject.^a I would be most grateful if you would be kind enough to cast a critical eye over it, covered as it is with question marks. Nowadays, physicists are the only people who are paying serious attention to such ideas. If you prefer to discuss it in person, maybe we could meet in the first week in July, when I shall already be in Bollingen. I am more relaxed there, and we shall have more time to ourselves. I would, however, appreciate it if you could briefly let me know beforehand what your general impression is.

I hope I am not encroaching too much on your valuable time. Your opinion in this matter is so important to me that I have cast aside any misgivings I might have in that respect.

Thanking you in advance,

Yours sincerely,

[C. G. JUNG]

^a Ms version of Jung, "Synchronizität," later published together with Pauli, "Thorein bei Kepler"; rev. tr., "Synchronicity"; slightly rev. in CW 8, pars. 816-968.

37P

Dear Professor Jung,

Zollikon-Zürich, 28 June 1949
[Handwritten]

Many thanks for your interesting manuscript and your friendly letter. I should first of all like to point out that the Rhine series of experiments* seem to me to be a totally different type of phenomenon from the other phenomena listed by you as "synchronistic." For with the former I cannot see any archetypal basis (or am I wrong there?). This for me, however, is crucial to an understanding of the phenomena in question, as is your earlier observation (*Eranos Jahrbuch 1947* [1946])[†] that their appearance is complementary to the archetypal contents becoming conscious. I regret very much that this aspect is not mentioned at all in your latest work. Perhaps you could make further additions here, for it would make it all easier to understand. In this way, the appearance of the synchronistic phenomenon actu-

* J. B. Rhine (1895-1980), "An Introduction to the Work of Extra-Sensory Perception"; *Extra-Sensory Perception; New Frontiers of the Mind*; with J. G. Pratt, C. E. Stuart, B. M. Smith, and J. A. Greenwood, *Extra-Sensory Perception after Sixty Years*.

[†] Jung, "Der Geist der Psychologie," pp. 385-490; tr. rev. CW 8, pars. 343-442.

ally seems to be connected to a definite state of consciousness (this term is deliberately rather vague).

Your proposed statistical experiment on the horoscopes of married and single people should be carried out on a broader scale and under very strict conditions. Whatever the outcome (I do not discount a negative one), it will add further to our knowledge.³ Speaking for myself, I can relate much better to those situations where an external event coincides with a dream than to what emerges from a series of statistics. Whereas I have some personal experience of the former, my intuition lets me down when it comes to the latter. I have now given much thought to your report about the coinciding of the scarab in the dream with the real insect and have attempted to feel myself into the situation. I shall return to this below, where it is more relevant.

At this point I shall deal with the epistemological aspect of the problem so as to be able to come back to the questions broached at the end of your letter about the relationship between psychology and physics. This gives me an opportunity to extend last year's essay on "background physics" by discussing the symbol "radioactivity," which at the time was no more than a key word. This is also the best answer I can give to your question at the moment.

The idea of *meaningful coincidence*—i.e., simultaneous events not causally connected—was expressed very clearly by Schopenhauer [1788–1860] in his essay, "[Transzendente Spekulation] über die anscheinende Absichtlichkeit im Schicksale des Einzelnen [On the Apparent Design in the Fate of the Individual]." There he postulates an "*ultimate union of necessity and chance*," which appears to us as a "force," "which links together all things, even those that are causally unconnected, and does it in such a way that they come together just at the right moment." He compares causal chains with the meridians, simultaneousness with parallel circles—corresponding exactly to your "equivalent cross-connections." He sees, "albeit imperfectly from a distance," the *compatibility* of the opposition "between the apparent chance element in all occurrences in the life of the individual and their moral necessity in the shaping of that life in accordance with a transcendental practicality for the individual—or, in popular language, between the course of nature and providence."⁴

Perhaps some reference in your work to this essay of Schopenhauer's would be a good idea, all the more so as he, too, was influenced by the ideas of Eastern Asia that you quote so frequently. Although Sch.'s essay is

³ The first three of these quotations appear in *Arthur Schopenhauer Sämtliche Werke*, ed. Wolfgang von Löhneysen, Stuttgart, 1960–1965, vol. 4, pp. 243–72, on pp. 255–5 and 271; "equivalent cross connections" (*sinngemäßae Querverbindungen*) and "albeit imperfectly from a distance" (*wenn auch nur unvollkommen aus der Ferne*) were not found in the cited article.

probably known to only a relatively small number of physicists, it is always pleasing in a fundamental issue to be able to make connections with what is already in existence.

This essay of Schopenhauer's had a lasting and fascinating effect on me and seemed to be pointing the way to a new trend in natural sciences. But whereas Sch. wanted at all costs to cling to rigid determinism along the lines of the classical physics of his day, we have now acknowledged that in the nuclear world, physical events cannot be followed in causal chains through time and space. Thus, the readiness to adopt the idea on which your work is based, that of the "meaning as an ordering factor," is probably considerably greater among physicists than it was in Schopenhauer's day.

Accordingly, I myself have no serious misgivings about such an idea. It does seem to me, however, that in your interpretation the term "acausal" needs to be made more precise, and the special use of the concept of time needs further elaboration. For the physicist, the words "causal" and "causality" have a much less specific meaning than the word "determinism." And what is more, the word "acausal" means different things to different writers. According to your interpretation of the "synchronistic" phenomenon (I refer particularly to pp. 20 and 21 of your essay),* it occurs through *duplication or multiplication of an abstract ordering factor*, the external manifestation of which is in fact doubled or multiple. In *this* sense, the ordering factor could also be described as the *cause* of the synchronistic phenomenon. This cause, however, could not be conceived of in time and space. Conversely, if only objects in time and space can be described as causal, then synchronistic phenomena do in fact appear to be "acausal." Just as in microphysics, the characteristic feature of the situation is the impossibility of simultaneously applying the principle of causality and the classification of the phenomena in time and space.

What is much more difficult for me than the question of the definition of "acausal" is the entrance of the concept of time into the word "synchronistic." Initially it refers expressly to phenomena that are supposed to be *simultaneous* in definitions in the usual physical sense. Later, however (top of p. 21),[†] you try to include phenomena such as predicting the future, which do not occur at the same time. The word "synchron" thus seems to me somewhat illogical, unless you wish to relate it to a *chronos* that is essentially different from normal time. This seems to me to be a difficulty that is not just one of formal logic but also a factual one. For it is by no means easy to see why events that "express the presence of one and the same image or

* The MSS for Jung's evolving "Synchronicity" essay are at the Historisches Sammlungen, ETH Library, Zürich, file HS 1055:867, 1 and 2. As changes occurred as a result of Jung's discussions with Pauli, one can compare points of discussion in the letters with the published version of 1952, tr. 1955. For the point discussed on pp. 20-21, cf. CW 8, par. 965.

† Cf. CW 8, par. 855.

meaning" have to be *simultaneous*: The term *time* presents me with greater difficulties than the term *meaning*.

So *what is the connection, then, between meaning and time?* By way of experiment, I shall construe your interpretation as follows: First of all, events related in meaning can be perceived much *more easily* when they are simultaneous. But second, simultaneity is also the characteristic that determines the unity of the conscious contents. So inasmuch as "synchronistic" events form what you have termed a "psychoid" initial stage of consciousness, it is understandable if (not always, but in many cases) they also share this standard characteristic of simultaneity. This also suggests that the meaning-connection, as primary agent, produces time as the secondary one. (I hope that these vague formulations will become clearer in the course of our conversations.) What seems satisfactory to me is that the ordering factor, "consisting of meaning," which contains time (the *chronos*) as a special case, as the masculine principle, stands in contrast to the feminine-indestructible one (causality in the narrowest sense, energy, collective psyche), as also seems to be the case in microphysics.

I now come to your questions concerning the possibility of linking together some of the physical facts mentioned by you with the synchronicity hypothesis. The question is a very difficult one, as it seems to be connected with some of my personal experiences in "background physics," which mainly manifest themselves in dreams. The energy quantum and the half-life radium decay seem to me much better suited to illustrate these connections than the two other phenomena quoted by you, since they have an elemental and fundamental character. Perhaps we can discuss this energy quantum again when we meet; at this point I would like to pick up on the physical phenomenon of radioactivity.

To make my views and my attitude to this question clearer, permit me to conduct a fictive thought experiment with you. Please imagine that on the evening after the incident with the scarab that you have described, a stranger visits you and says something on the lines of: "Congratulations, doctor, on having finally succeeded in producing a *radioactive substance*. It will be most beneficial to the health of your patient." Your assertion that there are no radioactive substances in your house and that the atmosphere is also free of radioactivity falls on deaf ears. In fact, the stranger proceeds to explain in detail the half-life of the substance and the residual activity.

I have been playing this type of game for about 15 years now; it is played according to strictly defined rules and is so methodical that it cannot simply be dismissed as madness. My initial attempts to throw the stranger out were soon abandoned, for although he is friendly by nature, the visitor can soon turn very unpleasant. Judging from your question about radioactivity, I

automatically assume that you are conspiring with the stranger and even expect you to agree with this conclusion.

As to what the stranger means, I can only deduce this indirectly from his reactions to my intellectual hypotheses; I am never completely sure about them. Nor did he come to me on such easily perceived occasions as those I have created for my thought experiment with his remarks on radioactivity. And before I could get down to finding out anything about "radioactivity" as he understood it, I had to have a rationally acceptable idea about who the stranger was.

The hypotheses that at the moment I just use for myself are the following:

1. "The stranger" is the archetypal background constellated by the system of scientific concepts of our time.
2. The expressions that emerge spontaneously from this background, such as "a radioactive substance has been produced" or "there is radioactivity," can be translated into the language of reason as follows: "a state of consciousness has been produced, or is simply present, which is accompanied by the multiple manifestation of the ordering factor in meaningfully related (usually simultaneous) events."

The language of the background is in the first instance a *language of parables*. It seems to demand that reason, by dint of dedicated work, should translate it into a *neutral language* that adequately fulfills its requirements with regard to the distinction between "physical" and "psychic." This neutral language does not yet exist, but one can attempt to make progress in the direction of its construction by means of careful analysis of analogies, such as the differences in what is indicated by the same words in the parable language.

With regard to the example in question—that of "radioactivity"—what strikes me first from the psychological angle is that a far-reaching parallel exists with what the alchemists referred to as the "production of the red tincture." Experience has shown me that what you call a "*conjunction process*" is generally conducive to the appearance of the "synchronistic" phenomenon (referred to as "radioactivity" by the "stranger"). And it is more likely to make its appearance *when the pairs of opposites keep in balance as much as possible*. In the *I Ching* this moment is depicted by the sign "Chen" (shock, thunder) [Wilhelm Baynes, hexagram 51]. In the case of your scarab, I am fairly sure that it was one of those moments, since you say that it was preceded by a long, drawn-out course of treatment. From all the material you have at your disposal, it must be easy to establish the conjunction process and its situation when the synchronistic event occurred. In this respect, I would be very interested to know in which month of the year it happened. The equinoctial days are particularly suitable. I would be prepared to bet 4:1 that it was in September or March and perhaps 2:1 that it was in the second

half of the month. (Perhaps those who believe in horoscopes will hit on the idea of setting up horoscopes for the moment when such events occur. For according to your report, a spiritual birth has taken place, and there can be no essential difference between that and a physical birth.)

I regard it as evidence of progress in our knowledge when, in this connection, the alchemistic concept of the "red tincture" is replaced by the "radioactive substance." Between the phenomena compared there are the following illuminating analogies:

1. Just as in physics, a radioactive substance (through "active precipitation" from developing gaslike substances) radioactively "contaminates" a whole laboratory, so the synchronistic phenomenon seems to have the tendency to *spread* into the consciousness of several people.

2. The physical phenomenon of radioactivity consists in the transition of the atomic nucleus of the active substance from an unstable early state to its stable final state (in one or several steps), in the course of which the radioactivity finally stops. Similarly, the synchronistic phenomenon, on an archetypal foundation, accompanies the transition from an unstable state of consciousness into a new stable position, in balance with the unconscious, a position in which the synchronistic borderline phenomenon has vanished again.

3. Once again, the difficult thing here for me is the time concept. In physical terms, it is known that the actual *amount* of a radioactive substance (which can be measured by weighing it) can be used as a clock, or rather its logarithm can: In a definite time interval (selected as sufficiently small), it is always the same fraction of the existing atoms that disintegrates, and two time intervals can conversely be defined as the same when the same fraction of the initially existing atoms disintegrate in them. But this is where the statistical character of the laws of nature comes into play: There are always irregular fluctuations about this *average* result, and they are only relatively small when the selection of the existing active atoms is sufficiently large; the radioactive clock is a typical *collective phenomenon*. A quantity of radioactive substance consisting of just a few atoms (let's say 10) cannot be used as a clock. The moments in time when the *individual* atoms disintegrate are in no way determined by *the laws of nature*, and in the modern view *they actually do not exist independently of their being observed* in appropriate experiments. The observation (in this case: the energy level) of the individual atom *releases it from the situation- (i.e., meaning-) connection with the other atoms* and links it instead (in meaning) with the observer and *his* time.

This leads to the following analogy with the synchronistic phenomenon on an archetypal basis: The case where it has not been determined whether the *individual* atom of a radioactive clock is in the initial or final stage of radioactive decay corresponds to the connection of the individual with the collective unconscious through an archetypal content *of which he is*

unconscious. The ascertaining of the state of consciousness of the individual, which emerges from this collective unconscious and which causes the synchronistic phenomenon to vanish, corresponds to the determination of the energy level of the *individual* atom by means of a special experiment.

This is as far as I have got. I very much look forward to talking over these questions with you, as well as other examples, and not just radioactivity.

I have spoken to C. A. Meier, and we have agreed that Thursday, 14 July, would be a good day for us both to visit you in Bollingen. He will be in touch with you to see whether this day is convenient for you.^b Please excuse my lack of brevity. With best wishes,

Yours sincerely, W. PAULI

^a Cf. tr., Jung, "The Interpretation of Nature and the Psyche," 10, p. 81, and pp. 93-94; CW 8, par. 901, n. 10, Appendix to chap. 2, and pp. 483-84.

^b The meeting took place.

38 P

Zollikon-Zürich, 4 June 1950

[Handwritten]

Dear Professor Jung,

Further to our talk yesterday, I am sending you the texts of two dreams that occurred last year after I had read your manuscript on the phenomenon of synchronicity. These dreams are still on my mind in connection with my attitude to these phenomena. I should like to add some comments to all the dreams (which for you will be part of the "material").

1) The time concept, which is the topic of the first dream, is not that of physics but that of the "dark anima." It is an intuitive assessment of the characteristic features of an external situation, although it can also be linked up with the seasons. What the position of the hand on a clock is to the physicist, the "situation of the pairs of opposites" is to this intuitive concept of time, namely, which are conscious and which are unconscious. For example, when I wrote to you at the time of the dream that the scarab incident you described had probably taken place in March or September, it was—in the language of the dream—"the dark maiden who had made a short journey so as to define the time." This time concept can be applied to external situations as well as to dream situations.

2) Applied to the first part of the second dream (before the "stranger" appears) it would mean, "It is summer." The absence of the dark maiden in this dream (she appeared in later dreams) or—which is the same thing—the fact that there are only three children here and not four means that there is

a preponderance of light on the feminine (i.e., feeling-intuitive) side. The light-feminine is the erotic-spiritual and often appears as the preliminary stage of the formation of a concept, whereas the dark-feminine usually tends toward the realization of a situation in the material physical world (in external nature). The absence of the latter is a certain lack of symmetry in the initial situation of the second dream. Summer may well be a pleasant time, but it is one-sided and incomplete. Incidentally, there were other dreams with four children in the autumn of 1948.

3) Apparently this must be directly connected with the conflict—seemingly unsolvable on a rational basis—between my conscious attitude and the unconscious one (the anima) toward the assessment of the two boys. Unfortunately, I do not know what the two boys are. In judging the younger boy, however, I have been struck by my consciously dismissive attitude toward horoscopes and astrology, but this fragment of the dream probably has a more general meaning than that.

4) The situation that arises now apparently “constellates” the archetype that is very familiar to me and appears as “the stranger.” His character is very much that of the so-called “psychopompos” and always dominates the whole situation, including the “anima.” He used to have two types of appearance, a light one and a dark one (the latter occasionally as a “Persian” in the dream). But in 1948 a further transformation took place with him, which brought the two poles of the pair-opposites closer together, so that he then appeared as a blond, but in a dark robe, or vice versa, yet clearly one and the same man. (Incidentally, he is *not an old* man, nor does he have white hair, but is rather younger.) From your essay “Der Geist Mercurius [The Spirit Mercurius]”^a I learned a lot that helped me to understand this figure, since he plays a role similar to that of Mercury with the alchemists. In my dream language, he would be identified with the “radioactive nucleus.”

5) In the second dream recorded here, he makes important statements about the book which the light maiden is holding (he also says that *he* gave her the book).

With regard to this book, when I woke up I thought of the Wilhelm translation of the *I Ching*. (The gothic lettering indicates Germany, where the book was published.) I often turn to it when interpreting dream situations. For me, “normal” mathematics means algebra and especially differential and integral calculus; this of course does not exist in the *I Ching*. However, elementary arithmetic often crops up there (e.g., divisibility by 4), and the 64 signs also excited Leibniz’s mathematical imagination.* Bearing this

* Gottfried Wilhelm von Leibnitz (1646–1716), in a series of letters (1697–1701) exchanged with the Jesuit Father Bouvet, discusses the mathematical features of the *I Ching*. See Leibniz, *Zwei Briefe über das binäre Zahlssystem und die chinesische Philosophie*; also, Hellmuth Wilhelm, “Leibniz and the I-Ching.”

in mind, one can actually describe the *I Ching* as a "popular mathematics book."* The "stranger" also has the tendency—apart from the way he relates to physical terms—to represent the contemporary sphere of application of mathematics as inadequate. He makes no distinction whatsoever between "physical" and "psychic," and he also applies mathematics to what we call "the hermetic world of the psyche." The objection that this is qualitative and not quantitative is not necessarily valid, for on the one hand many aspects of mathematics (such as topology) are also qualitative and not quantitative, and on the other hand whole figures are also a crucial factor in the psyche. What is interesting is that generally "the stranger" does *not* use terms that are taken directly from your field of analytical psychology. Here he usually substitutes physical terms, which he then uses unconventionally in an extended sense.

In the dream here, he now implies that the small fair maiden should be able to do mathematics as well as I can, and he makes it a sort of long-term task that she should learn it. By way of contrast, he represents the "popular mathematics book" as being of a provisional nature.

So much for the material. I believe it would be a major step forward in my attitude to the phenomenon of synchronicity if I could arrive at a correct interpretation of the two boys in the dream (and the conflict concerning the younger of the two). It seems fairly obvious that the children—there are supposed to be four actually, and sometimes there were—should be linked with your function schema. But I do not wish to get caught up in speculations that have no real foundation.

In Princeton, I unexpectedly had the opportunity to discuss the synchronicity phenomenon on several occasions. In doing so, I preferred to use the term "meaning-correspondence" rather than "synchronicity," so as to place more emphasis on meaning rather than on simultaneity and to link up with the old "correspondentia." Moreover, I made a point of stressing the difference between the *spontaneous* appearance of the phenomenon (as in your scarab report) and the *induced* phenomenon (by means of a preliminary treatment or a rite), as is the case with mantic practices (*I Ching* or *ars geomantica*). I wonder whether the two boys have anything to do with this distinction?

I am eagerly looking forward to your talk on 24 June, and I hope that it will lead to an instructive discussion (e.g., on the concept of "natural laws" in physics and the term "archetype" in psychology).

In the meantime, I send my best wishes,

Yours ever gratefully, W. PAULI

* Jung, "Der Geist Mercurius"; tr., rev., exp. "The Spirit Mercurius," in CW 13, pars. 239-303.

* The *I Ching* is composed of sixty-four hexagrams; hence the above reference to "divisibility by 4."

39J

[Küsnacht] 20 June 1950

Dear Mr Pauli,

[Handwritten]

Unfortunately, my lecture on synchronicity has once again had to be postponed.^a I am feeling better now, and I have had time to think about your dreams. Here are some of my thoughts:

Dream 1. Aeroplane = intuition. Strangers: not yet assimilated thoughts. Can one say that you had conscious difficulties with the time concept with regard to the possibility of its relativity in cases of synchronicity? The anima has to "make a short journey," i.e., *change her place* to achieve definite time. So she probably has no definite time, meaning that she lives in the unconscious. She has to transplant herself into consciousness in order to be able to define time.

Dream 2.

mother			
older boy	— —	younger boy	= wholeness, but predominantly
	daughter		= feminine (maternal)

Older boy probably = ego; younger boy = shadow. Consciousness would be too masculine-boyish, i.e., too positivistically adjusted. This is why it is compensated by *maternal* wholeness. The positivistic attitude of natural science does not produce any holistic concept of nature since the experiment is always just a reply of nature extorted by a definite question. This gives rise to an image of nature that is too influenced or prejudiced by intellect. This prevents the appearance of any possible holistic governing of nature. So the so-called mantic random methods do not stipulate any conditions for capturing synchronicity—that is, meaningful coincidence.

The shadow is underestimated by the conscious and overestimated by the unconscious. The "stranger" wishes to induce the anima—that is the feminine sensitive and vulnerable side of the personality—to study mathematics, and specifically "archetypal" mathematics, where the whole numbers are still (qualitative) *archetypes of order*. For it is with their help that the synchronicity phenomenon can be captured (mantic methods!) and a more unified world picture produced.

	space	
causality	— —	correspondentia
	time	

With best wishes,

Yours sincerely, C.G.J.

^a Jung's lecture "On Synchronicity" was given in the Psychological Club in Zürich in two parts, 20 January and 3 February 1951.

40 P

Zollikon-Zürich, 23 June 1950
[Handwritten]

Dear Professor Jung,

I would like to thank you most heartily for your letter. What I found particularly interesting was your interpretation regarding the two boys in the dream, with the older one as the “ego” and the younger one as the “shadow.” I accept that as totally plausible, but it is perhaps difficult to prove such an assumption beyond any doubt. The motif of two (youngish) men, of whom only one speaks to me, is a familiar one; it has occurred repeatedly in earlier dreams.

As to my conscious difficulties with the time concept, they related to the question of to what extent and how accurately a time coincidence is actually necessary for there to be a “meaningful coincidence.” Is it not so that the “anima” has “knowledge” of meaningful wholenesses precisely because she lives outside physical time (i.e., in the unconscious)? I have always been fascinated by the paradox that on the one hand the anima as the inferior function is most “contaminated” with the unconscious, and on the other hand, as a result of her closeness to the archetypes, seems to have superior knowledge.

I am in no doubt that the aim of the “stranger” is to convey a holistic concept of nature (not expressed in the conventional scientific point of view). It is true that I regard the interpretation of modern physics in the narrowest sense as correct within the confines of its field of application but as basically *incomplete*. My resistance to the archetype and its tendencies is correspondingly weakening. Last autumn I had a dream in which “he” brings me a thick manuscript; I have not yet read it, for it first had to be seen by strangers in the background. In my experience, the best thing to do in such cases is simply to wait and see. At any rate, there is no shortage of “not yet assimilated thoughts” with me.

Best wishes for your recovery. I am still looking forward to your lecture on synchronicity.

Yours ever gratefully, W. PAULI

41 J

Küsnacht-Zürich, 26 June 1950
[Handwritten]

Dear Professor,

I have just discovered that a letter to you that I dictated on 2 March was never sent. In it, I thanked you for the trouble you have taken and the precise evidence of the purely random nature of the astrological figures. It

had already struck me as suspicious that with larger figures there is a gradual approximation to a mean value. I am sorry that because of this oversight on the part of my secretary you were not informed of my gratitude for your valuable assistance.

I have had other matters to deal with in the meantime and was also ill for a while.

[C. G. JUNG]

42 P

To Emma Jung

[Zollikon-Zürich] [11] Oct. 1950

Dear Frau Professor,

[Typewritten carbon copy]

In my work on Kepler,^a I once again came across the archetype of the lower chthonic Trinity (cf. the downward-reflected triangle with Fludd, which I projected at the time), which is familiar to me from old and recent dreams (in the form of the playing card the ace of clubs and in the form of three simple planks). Ever since then, it has always aroused great interest whenever it crops up anywhere.

This summer I read the French reprint of the *Romans de la Table Ronde*,¹ which Mr. Fierz showed me in Paris last spring. My attention was immediately captured by the three wooden spindles (*trois fuseaux de bois*) that appear in Merlin's story (l.c. p. 65). This story (pp. 56-78) is an interesting myth in itself. The spindles, one of which is white, one red, and one green, are found on a mysterious revolving island. The section on this island begins with the four elements, like so many alchemical treatises. The spindles are then taken back to a tree that stems from a branch that Eve was allowed to take to Earth from the Tree of Paradise. This earthly double of the Tree of Paradise was first white, then red, then green. According to the myth, Solomon's wife had the spindles made from it and added them to David's sword. The sword and the spindles travel for centuries by boat until they are finally found on this island.

To support the argument that the spindles are the archetype of the chthonic Trinity—which in this way, albeit in a special form, would be brought into relation with the Grail story—the following points can be put forward: The number 3 in the book quoted is often directly associated with the Trinity (see, e.g., p. 78), and the ship bearing the spindles and the sword is later (p. 364) claimed to be the Church. The spindles have a chthonic

¹ Ed. Jacques Boulanger, Paris, 1941.

origin (tree) and (as Mr. Fierz emphasized) are specifically feminine tools. So they relate to the boat as the Trinity does to the Church.

What is new to me, however, is that this archetype is not represented here by three ordinary planks but by 3 spindles. Spindles are not complete without spinners, but in the myth they are absent. These absent spinners can probably be identified with the Fates (in the lexicon the Fates are mentioned under the word "*fuseaux*"). One has the feeling that in the myth these spinners have become the victims of a sort of Christian "censorship"; when I say "censorship" I do not necessarily mean some external authority but a tendency on the part of the original narrator of the Grail story to suppress any heathen motif as not assimilable. (Yet with Diana they have not gone very far in other places.) This fits in with the fact that in the later story the spindles have no plausible purpose. All it says is that Galahad sleeps with the 3 spindles in his bed before he sees the secret of the Grail and dies (see p. 379f.). But Mr. Fierz pointed out to me that the revolving island also appears in Plato, at the end of "the State," where the 3 Fates sit round the "spindle of necessity." Through this (albeit unstated) connection with the Fates, the fateful aspect of the archetype is emphasized.

As you have worked on the Grail legend in depth, whereas I have only read this *one* book, I should like to ask you whether and how the three spindles appear in other versions of the Grail legend. I would of course be most interested to hear whether my attempt to interpret the spindles as the archetype of the "lower Three" strikes you as plausible and supported by the material.

Thanking you in advance and with best wishes to Prof. Jung,

Yours sincerely, [W. PAULI]

* Published in 1952; see bibliography for details.

43J

Dear Mr. Pauli,

[Küsnacht] 8 November 1950

[Typewritten carbon copy]

I am taking the liberty of sending you the enclosed work on synchronicity. I hope that it is more or less finished now. I am grateful that you wish to read it through with a critical eye and would welcome any comments.

With best wishes,

Yours sincerely, [C. G. JUNG]

44 P

To Frau Professor Emma Jung

[Zollikon-Zürich] 16 November 1950

Dear Frau Professor Jung,

[Typewritten carbon copy]

I have studied both of your works on the Grail legend* and am now in a position to reply to your very instructive letter. I should like to stress straightaway that I not only totally agree with your own interpretations of the Grail legend but that I am happy to see the general nature of a certain group of my dreams and, to a certain extent, even my fascination with the Grail legend as a confirmation of your views. The following points are of crucial importance to me: the connection between the Grail and the quaternity (Part I conclusion,¹ and Part II, p. 51f.,¹ although the solution in Wolfram's version emerges as the more psychological one, whereas in the French versions the story ends tragically with the disappearance of the Grail; the reflection motif Christ-Judas or the seat of Christ—*siège périlleux*, representing the contrast between the upper and lower region;¹ the interpretation of the Grail legend as an expression of the reception of Christianity (assimilation processes) by the unconscious. It can certainly be said that in this process the archetypes of the lower region (also the "lower Trinity") are the ones that met with a good response initially, but later there was an attempt to eliminate this "lower" aspect by means of allegories along the lines of traditional Christianity. I paid special attention to the fair-dark form of Merlin. You yourself point out his "dual layer"—namely, "half Christian-human," "half devilish-pagan" (II, p. 76 [1960 edn., pp. 365–66/tr., pp. 355–56])—and you go on to emphasize his need for redemption (II, p. 95 [1960

* Emma Jung (1882–1955) is said by M.-L. von Franz, in her foreword to Emma Jung, *Die Graalslegende in psychologischer Sicht*, 1960 (tr., *The Grail Legend*), to have studied the Grail legend for thirty years, in hopes of some day publishing her material. However, at the time of this letter, Pauli had read only two items by her on the subject, to which he is responding here. The first was the four lectures of *Die Graalssage*; tr., *The Grail Legend*. And second, *Die Graals-sage, II, Le Roman de l'Estoire dou Graal von Robert de Boron*, 1944. Unfortunately, the revisions and expansions of the Grail material by von Franz make it virtually impossible to locate all of the exact 1944 text in the 1960 book, and in some instances only fragments remain. Basically, the first part of the early Emma Jung material is found in chapters 1–15, and the second part in chapters 16–24, although the chapters are not numbered in the 1960 edition. The 1960 edition is cited by page number and its parallel in the English translation by Andrea Dykes.

¹ Lecture 4, p. 25; Welsh trans., p. 129; 1960 edn., p. 306; tr., p. 299.

² 1960 edn., p. 350; tr., p. 39.

³ The interpretation of the story of the life of Perceval as the road to individuation (part II, p. 84 [1960 edn., pp. 393, 403/tr., pp. 383, 392])—i.e., also as an attempt to tread a road to the quaternity.

edn., p. 404/tr., p. 392]). It was also most useful to me to hear of *Geoffroy's* alternative depiction of Merlin as more of a natural creature.

In connection with this general interpretation of yours of the Grail legend, I would like to come back to the special question of the 3 spindles and matters directly connected with them. You were kind enough to deal with this question in your letter, and we pursued the subject in our last brief conversation. I think we are in full agreement that the "*fuseaux*" do not necessarily have anything to do with spinning (and hence with the Fates), but that as *prima materia* processed by humans, and thanks to their connection with the feminine (Solomon's wife), they do belong to the lower region. I now feel I must tell you about the earlier dream of mine, the one that actually led me to write to you about the 3 spindles (see enclosed sheet).² In this dream, there are 3 pieces of wood with an apparently archetypal significance, and when I read about the 3 spindles in Boulanger this summer, I immediately felt myself transported back into the mood of the dream. The river in the dream evidently corresponds to the mother's lap, and in this an archetype has for me acquired what is so far a definitive form, namely, the fair-dark "dual-layered" one. Incidentally, it has already appeared previously with wood, and on one occasion it brought me a circular piece of wood. It is always the wood that has been treated by human beings that has a "magic" effect in my dreams, in contrast to the *natural state* of the *prima materia*. This, together with the other dream experience described below, makes it seem likely that this is not just an external analogy between my dreams and the Grail myth but is a *more far-reaching identification of the relation of the archetype to consciousness*, despite all the differences due to any problems arising from the time factor. Just as a dream can be interpreted by being compared to a myth, a myth can equally well be understood by resorting to dreams. The direction one chooses seems to depend on whichever of the two happens to be more familiar at the time.

It is with all this in mind that I should now like to attempt to describe to you the figure of the "stranger" (who in the dream under discussion emerged from the river but had already been there in another form); I shall do so as if he were a character from a story, although I shall be bringing in material not just from recent dreams but from dreams going back to 1946. It is evidently the archetype of the "mana personality" or the "magician" (the only reason I do not call him the "wise old man" is that my figure is not old but is actually younger than myself). Everything that Prof. Jung says about the "spirit Mercurius" fits him perfectly. While reading your work, however, I saw that there is also an important analogy between this figure and *Merlin* (especially in Robert de Boron's version). My dream figure is also "dual-layered"; on the one hand, he is a spiritual-light figure with superior knowledge, and on the other hand, he is a chthonic natural spirit. But his knowledge repeatedly takes him back to nature, and his chthonic origins are

also the source of his knowledge, so that ultimately both aspects turn out to be facets of the same "personality." He is the one who prepares the way for the quaternity, which is always pursuing him. His actions are always effective, his words definitive, albeit often incomprehensible. Women and children follow him happily, and he frequently tries to instruct them. In fact, he regards everyone around him (especially me) as completely ignorant and uneducated compared with himself. He does not reject the ancient writings on magic but simply regards them as a popular preliminary stage for people with no education (e.g., myself).² But now comes the really odd bit, namely, the analogy to the "Antichrist": He is not an Antichrist, but in a certain sense an "Antiscientist," "science" here meaning especially the scientific approach, particularly as it is taught in universities today. This he sees as a sort of *Zwinguri*,^b as the place and symbol of his oppression, which (in my dreams) he occasionally sets fire to. If he feels he is being disregarded, he does everything in his power to draw attention to himself, for example by means of synchronistic phenomena (which he calls "radioactivity") or through moods of depression or incomprehensible affects. Your observation (II, p. 86) "that . . . the factor which brings on sickness or has any other unfavorable effect occurs when contents that are ready for consciousness are not taken over" literally hits the nail on the head.* The "stranger's" attitude toward science is very similar to that of Ahasuerus toward Christianity: This "stranger" is something that did not accept the scientific world picture about 300 years ago and is now running around autonomously in the collective unconscious like a loose cannon; in doing so, it is becoming more and more loaded with "mana" (especially when "up above," my branch of science, physics, has got somewhat bogged down). The same thing can be said in a different way: When rational methods in science reach a dead end, a new lease of life is given to those contents that were pushed out of time consciousness in the 17th century and sank into the unconscious. With the passage of time, they take possession of the ever-present original of the "mana personality" there, and this "mana personality" is ultimately so powerfully enveloped by these contents that its physiognomy is determined by that loose fragment that was rejected by the conscious back in the 17th century. And yet, when all comes to all, the relationship of the "stranger" to science is not a destructive one, which is also true of Merlin's relationship to Christianity: He happily uses the terminology of modern science (radioactivity, spin) and mathematics (prime numbers) but does so in an unconventional manner. Inasmuch as he ultimately wishes to be understood but has yet to find his place in our contemporary culture, he is, like Merlin, in need of redemption. It seems to me that for him the "bonfire"^c of liberation

² Cf. your comments on magic and mystic attitude, II, p. 25 [1960 edn., p. 230/tr., p. 223].

* This quote does not appear in the subsequent versions of Emma Jung's work.

will only burn in a form of culture that will be effectively expressed by the quaternity. As far as I can see, it has not yet been determined in detail just when and how this will come about. But it is probably such expectations that will for us replace that of the "Third Kingdom" by *Gioacchino da Fiore* [Joachim of Floris] (II, p. 41 [1960 edn., pp. 325-26/ tr., pp. 317-18]).

I hope that these remarks will have made clear the conformity of the situation of the archetypes to consciousness in the Grail legend, on the one hand, and in my dreams, on the other; if this is the case, my next "adventure" with your letter will not be quite so unexpected.

I was at once both fascinated and excited by the description in your letter of the arrangement of the "*fuseaux*"³ quoted from the texts. There was an affective relationship and an emotional situation. I began to consider the fact that it was really odd that the "spindles" were not rotating, even if they had nothing to do with spinning. The whole thing struck me as a mechanism to prevent the spindles from rotating; the rotation was reserved much more for the island than for the original form of the *prima materia*, which had emerged from the four elements and had remained untouched by human beings. I discussed your letter—and this question in particular—with C. A. Meier, and he hit on the idea of looking up the role played by spindles in folklore. What he found out was that sometimes a harmful "magic" influence is attributed to the rotating of the spindles, which is why it was forbidden on certain occasions (for example, when bringing in the harvest). For me, this gave rise to the association "Rotating spindles—magic or sympathetic effect." A couple of nights later, I had the dream that you will find on the enclosed sheet;⁴ in it, surprisingly, the arrangement of the "*fuseaux*" described on your letter is transformed into a pair of scales. The meaning of the dream certainly has a lot to do with the problems discussed by Prof. Jung in his latest treatise on synchronicity. However, I would like to emphasize once again that it is impossible for the dream to have been *influenced* by Prof. Jung's new writings, which I have only just received. The dream occurred quite a while *earlier* and is thus to be interpreted as a consequence of reading your letter.

Let me make it quite clear that I am not sending you the dreams because I expect you to interpret them. Actually, I am quite skeptical about "interpretations" of dreams of this nature. What has worked best for me has been on the one hand "shedding as broad a light" as possible onto the context, and reflecting on the general problems to be found in this context, and on the other hand observing the dreams over periods of several years. This brings about a certain familiarity with the "point of view" of the uncon-

³ "One of them was attached to the front side of the bed, so that it stood upright, the second was attached in the same way to the back side of the bed, the third one lay crosswise over the whole width of the bed and was screwed or mortised to the other two."

scious and at the same time a long-lasting and gradual shifting of the point of view of the conscious. But I actually wanted to inform you about the real reasons for my interest in the Grail legend, as well as the response you have triggered. (I leave it to you to decide whether or not you wish to show Prof. Jung these two dreams.)

Once again, many thanks for your fine work (which I should like to hold on to for a while). Best wishes to you and to Prof. Jung (to whom I shall write as soon as I have studied his latest work on synchronicity).

Yours, [W. PAULI]

^a Missing. [Herbert van Erkelens—in his research for *Wolfgang Paulis Alchemistische Queste*, published a condensed version as “Wolfgang Pauli and the Chinese Anima-Figure”—has located this dream at the Wissenschaftshistorische Sammlungen, ETH-Bibliothek, Aniela Jaffé archive, file 1090:71.]

^b A Habsburg fortress in Silenen built to assert domination over the people of Uri.

^c Signal fire upon the liberation of the original cantons (Uri, Schwyz, and Unterwalden) on 1 August 1291.

^d Missing. [Van Erkelens has also located this dream. See above, note a, file 1090:73.]

45 P

[Zollikon-Zürich] 24 November 1950

[Typewritten carbon copy
with handwritten additions]

Dear Professor Jung,

It was with great interest that I read the latest version of your work on “synchronicity.” We had basically agreed in the past on the possibility and usefulness and also, in view of the Rhine experiments, on the necessity of a further principle of interpretation of nature other than the causal principle. After the turn taken in your Ch. II, “The Astrological Argument,” it seems that our points of view have come one step closer.

1. In several discussions last autumn and winter (which also gave me the opportunity to observe a great interest in your concept of synchronicity in places where I would not have expected it), I repeatedly expressed my hope that such a turn would come about. For example, I said to M. Fierz and C. A. Meier at the time, “It is really paradoxical that physicists are now obliged to tell psychologists that they must not eliminate the unconscious in their statistical investigations!” And now the unconscious has returned in the form of the “lively interest of the test persons or the psychic state of the astrologer”;¹ here your statement about “the pernicious influence of the statistical method on the determination of synchronicity in terms of figures”

¹ See pp. 33 to 35 [in this typescript] of your work, which for me were conclusive.

(p. 35)* seems to be the most important result of all your statistical investigations. This "pernicious influence" consists in the elimination of the actual influence of the psychic state of the participants by means of the statistical formation of mean values, in that these values are measured without this psychic state being taken into consideration. It actually seems to me a general and essential attribute of synchronistic phenomena, one that I would even like to incorporate into the definition of the term "synchronicity"; in other words, whenever an application of statistical methods, without consideration of the psychic state of the people involved in the experiment, does *not* show such a "pernicious influence," then there is something very different from synchronicity going on.² I shall come back to this aspect later in connection with the discontinuities in microphysics.

The result you give of your investigation, according to which the continually renewed interest of your test persons is decisive, even makes astrology seem a *secondary* factor in this result and sets up favorable results for traditional astrology, in analogy to the "hits" in the Rhine experiment.

(Just a quick question here: In the Rhine experiment, would it be possible to imagine test persons who produce a "negative" effect—i.e., who always come up with *fewer* hits than statistics would lead one to expect? In your statistical experiment on the comparison between the horoscopes of married and single people, are there also test persons who, for example, find the sun-moon conjunctions predominantly with single people instead of married ones, precisely because their psychic state indicates a particular resistance to astrology? When I say "predominantly," I mean more frequently than the chance statistics would lead one to expect? I am reasonably certain that the astrological case and Rhine's ESP experiment will also behave analogously in this respect; but it might also be that the bringing in of the archetypes in both cases hinders the possibility of "negative" test persons.)^a I have not examined the statistics in Tables I to V in detail, as this would take a lot of time and trouble, and anyway, unless I am mistaken, this whole material has been checked by Mr. M. Fierz, who has more experience in such matters. (Should I be wrong in assuming this, then I would strongly recommend you to call on him again. His present address, probably until about the end of April 1951, is: The Institute for Advanced Study, Princeton, N.J.)^b At any rate, your result corresponds perfectly to my expectations. A

* Cf. CW 8, par. 884.

² Although you are only speculating on the possibility when you hint at an interpretation of the relationship between body and soul as a synchronicity link (p. 52, note 1, and p. 57), it is for this reason that I have misgivings about it. Such an interpretation would, incidentally, be basically identical with the old "two-clock theory" of GEULINCX. But I fully agree with you that the "psychophysical parallelism" is "completely impenetrable." [Cf. CW 8, par. 938, n. 70. Arnold Geulincx (1625-1699) was a Flemish philosopher. See *ibid.*, par. 937, n. 57]

positive result, independent of the state of the astrologers, would contradict the well-known causality of the processes involved. In truth, nature is so fashioned that—analogue to Bohr's "Complementarity" in physics—any contradiction between causality and synchronicity can never be ascertained.

2. This now leads me to the question, the discussion of which forms the main part of this letter, How do the facts that make up modern quantum physics relate to those other phenomena explained by you with the aid of the new principle of synchronicity? First of all, what is certain is that both types of phenomenon go beyond the framework of "classical" determinism. But this in itself does not answer the question, which is touched on in several places in Ch. I and IV of your work. Naturally, this question is of particular interest to me as a physicist; I have been discussing it and thinking about it at great length for a year.

What appears to me of fundamental importance is the requirement made of a law of nature in any experimental science—namely, that in principle at least it should relate to reproducible processes (also indicated by you on p. 2).^{*} In nuclear physics, it has turned out that the statistical character of these laws of nature is the price that has to be paid for fulfilling this requirement of reproducibility. Now in physics, the essential aspect of uniqueness (for which there has never been a place in the physical laws of nature) has manifested itself in an unexpected place. This place is the observation itself, which is unique (or is an act of creation, if you will) because it is impossible to eliminate the influence of the observer by means of determinable corrections. The type of statistical law that thus comes into being (one that is not reproducible by statements on individual cases), which acts as a mediator between the discontinuum of individual cases and the continuum that can only be realized (approximately) in a large-scale statistical framework, may be described as "statistical correspondence."³ (The law of half-life periods in radioactive decay is a special case of this kind.) At least the *statistical* regularities of the natural laws of microphysics are *reproducible* (independent of the psychic state of the observer), a case in point being the above-mentioned half-life periods. There also seems to me here (cf. in this respect the criterion formulated above on the "pernicious influence" of statistical methods on synchronicity) such a fundamental difference between the acausal physical phenomena (such as radioactivity or any other discontinuity that comes under the "correspondence" of physics) and the "synchronistic" phenomena in the narrowest sense of the term (such as ESP

* Cf. CW 8, par. 821.

³ I am very pleased to see you quote my comment on Bohr's use of the term "correspondence." (On p. 8 [74] of my publication in *Experientia* 1950, I have made an additional note.)

Rather than on p. 42a, your note here might be better placed on p. 61, where there is a reference to the physical discontinuities.

experiments of mantic methods) that I would like to propose that they be construed as *phenomena or effects on different levels*.⁴ On these different levels, there is a difference similar to that between a unique pair and a continuing series (although in the latter at least the statistical characteristics are reproducible). Although in the second case, too, it is something that cannot be covered by the old deterministic form of natural law, I nevertheless, as a physicist, have the impression that the "statistical correspondence" of quantum physics, seen from the point of view of synchronicity, is a very *weak* generalization of the old causality. This also manifests itself in the fact that although microphysics allows for an acausal form of observation, it actually has no use for the concept of "meaning."⁵ So I have grave misgivings about placing physical discontinuities and synchronicity on the same level, which is what you do on p. 58.* If you do not share my misgivings, I shall be most interested to hear what your arguments are.

To emphasize the difference between the case of microphysics and any cases involving the psyche, I proposed a quaternary schema in an unpublished essay on "background physics" written in 1948. In the schema, the different pairs of opposites are intended to correspond to these two cases. The pair of opposites for physics is:

Indestructible energy and momentum
|
definite spatial-temporal process

and for psychology:

Timeless collective unconscious ——— Self-awareness, time.

Of course, I cannot claim that the whole quaternary that I proposed at that time is a genuinely suitable expression for "synchronicity." But a further characteristic of this schema, which seems important to me, is that space and time are *not* placed opposite each other, which a modern physicist would find particularly unacceptable.

I admit that this placing of three-dimensional space opposite one-dimensional time seems more natural in the physics of Newton (which can be said to have begun with Kepler) than in modern relativity and quantum physics, and I am also aware that time and space are psychologically different in that the existence of a memory (recollection) distinguishes the past from the

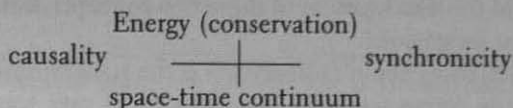
⁴ This does not exclude the possibility of comparisons being made between the two. Affects on different levels also have their similarities as well as their differences.

⁵ I do, however, feel that although it cannot be proved, it can be argued that acausality in microphysics is a sort of "preliminary stage" for your concept of "synchronicity." The term "state" or "physical situation" in quantum physics would then be a preliminary stage for your more general term "meaningful connection."

* Cf. CW 8, par. 966.

future, for which there is no analogy in space. Yet the positioning of space and time opposite each other in your schema on p. 59 does not really seem acceptable to me.* For a start, they do not form a true pair of opposites (since space and time can easily be applied simultaneously to the phenomena), and second the reasons you yourself give on p. 17a for the basic identity of space and time are very sound ones.⁶

That is why I would now like to make the following *compromise proposal* for a quaternary schema as a basis for discussion; it avoids the opposing of time and place and perhaps combines the advantages of your schema and the one I drew up in 1948.



On p. 61, where you talk about the "triadic world picture,"[†] perhaps one could replace "by means of space, time, and causality" (8th line from the bottom) by "and the notion of causality." That would also fit in better with the term "three-principles doctrine," since *continuity* (*natura non facit saltus*) can certainly be viewed as a characteristic *principle* for the (classical) scientific age.

3. When you use physical terms in order to explain psychological terms or findings, I often have the impression that with you they are dreamlike images of the imagination;⁷ this impression is usually accompanied by the feeling that the sentences you write here stop at the very point where they should begin. For example, on p. 9 it says: "The physical analogy for this" (for a coincidence in time) "is radioactivity or the electro-magnetic field." And on p. 10 it says of the archetypes that: "They represent a field of force that can be compared with radioactivity." Such sentences cannot be understood by any physicist, since *he would never compare a field of force* (neither electromagnetic nor any other) *with radioactivity*.[‡]

The concept of the physical field of force is based originally on the illustrative idea of a state of tension of the "ether" penetrating space. This state was used as the medium of "ponderomotoric" effects between bodies (e.g., electrical and magnetic ones). Field theory has made itself independent (since Faraday) in that a real existence was attributed to the state of tension

* Cf. CW 8, par. 961.

⁶ It says there: "Space and time are basically one and the same thing, which is why one speaks of 'time spaces' and Philo Judaeus says: *tempus est spatium motus*." [Cf. CW 8, par. 855.]

[†] Cf. CW 8, par. 952/CW 8, par. 962.

⁷ The justification for such an assumption is based on the fact that I can often recognize motifs from my own dreams in your images.

[‡] See Letters 45, sect. 3, and 46, Ad 3, where the issue is further alluded to. In CW 8, pars. 959, 963, radioactivity is mentioned, but not in association with any electromagnetic field.

even when it is not made visible with specimen bodies. Later, the concrete-mechanistic image of the state of tension and the medium of ether was abandoned in favor of the abstract view that the relevant physical state is described in mathematical terms simply by appropriate continuous functions of the space and time coordinates, dispensing with descriptive images. It was then the task of "field physics" to establish the laws that fulfill these functions, together with the specifications as to how these said functions, with the aid of test bodies, can—in theory at least—be measured. (I myself have a few ideas about the analogies of this physical field theory with the psychological notion of the unconscious and about the parallels in the temporal course of the development of these two concepts, but I do not want to prejudice your judgment.)

The essential thing about radioactivity is the transmutation of a chemical element that is connected with the emission of rays transporting energy (possibly of different sorts). These rays are "active," i.e., they produce chemical and physical action when they encounter matter.

Such analogies as

or	{ Synchronistic coincidence of archetypes		or	{ Field of force Radioactivity
----	--	--	----	-----------------------------------

can be of great interest, but only on condition that the *tertium comparationis* is given (and possibly what the differences are). My personal wish is not that you delete the sentences mentioned but rather that you extend and elucidate them.

4. As you yourself say, your work stands and falls with the Rhine experiments. I, too, am of the view that the empirical results of these experiments are very well founded.⁸ Given the importance of the ESP experiments for your synchronicity principle, I would appreciate it if you would make a point of explaining how, in your view, the so-called PK ("Psychokinesis") experiments that you mentioned on p. 8 are to be interpreted.* Does the person expressing the wish concerning the results of the dicing have a prefigured image of the way the dice will go? You mention in this connection a psychic "relativity of mass," but you do not go on to say what you mean by this nor how such an assumption can explain the PK experiments. Here, too, I sus-

⁸ I was recently sent a paper by R. A. McConnell ["ESP—Fact or Fancy?"], in *The Scientific Monthly* 69 (August 1949), pp. 121–25. The author has repeated, confirmed, and developed the Rhine experiments in the Dept. of Physics (I) of the University of Pittsburgh. This work also made a very favorable impression on me.

* Cf. GW/CW 8, pars. 837–40.

pect that these are "dreamlike images of the imagination" of yours, and once again I would welcome further clarification.

There are other interesting details in your work that I would like to give more thought to (e.g., the connection between mantic methods and the psychology of the number concept), but at the moment I have nothing new to report.

It's about time I brought this long letter to a close. I am hopeful that the questions that are still open and any differences still remaining in our points of view will be cleared up, given the basic agreement pointed out at the beginning of this letter.

With best wishes,

Yours sincerely, [W. PAULI]

^a There is now a whole collection of writings on the subject of "psi-missing."

^b Available in the American edition (see Letter 37, note a). [See also Jung's letters to Fierz in CW 18, pars. 1193f.]

^c Pauli, "Die philosophische Bedeutung der Idee der Komplementarität" tr., "The Philosophical Significance of the Idea of Complementarity," in Pauli, *Writings on Physics and Philosophy*, pp. 35-42.

^d See Appendix 3.

46J

Bollingen, 30 Nov. 1950

[Typewritten carbon copy
with corrections made by hand]

Dear Professor,

Many thanks for your kind letter and for the time and trouble you have taken with my manuscript. Your opinions are very important to me, not just in the material itself but also in the light of our different points of view.

Re 1. In reply to your question about any possible "negative" synchronistic effect, I can state that RHINE gives a series of examples in which the initially positive number of hits is strikingly reversed. I can well imagine that similar things happen in astrological-experiment setups. But given the complexity of the situation, they are much more difficult to ascertain, for I am the test person whose interest would need to turn into resistance. For this purpose, I would need to collect and work on a few hundred horoscopes—i.e., until I was absolutely fed up with the whole thing. Only then could one expect negative results.

Re 2. What you so fittingly describe as "statistical correspondence" characterizes radioactivity, for example, but not, as you correctly say, synchronicity; in the former case, the regularity of the half-life period can be ascertained only when there is a large number of individual cases, whereas in the latter the synchronistic effect is there only with a small number and

disappears when there is a larger number. There is in fact no connection between the phenomenon of the half-life period and synchronicity. If I do bring the two together, then it is on the basis of another analogy, which seems to me crucial: Synchronicity could be understood as an *ordering system* by means of which "similar" things coincide, without there being any apparent "cause." I now wonder whether it is not so that every state of being that has no conceivable cause (and thus no potentially ascertainable one) falls into the category of synchronicity. In other words, I see no reason why synchronicity should always just be a coincidence of two psychic states or a psychic state and a nonpsychic event. There may also possibly be coincidences of this kind between nonpsychic events. One such case might be the phenomenon of the half-life period. For the connection of psychic states to each other or to nonpsychic events, I use the term "meaning" as a psychically appropriate paraphrasing of the term "similarity." In the coincidences of nonpsychic events, one would naturally use the latter term. (A quick question: could a possible factor here be the odd result in Rhine's dice experiment,* which showed that with a small number of dice the results are bad, whereas with a larger number [20-40] they are positive? A purely synchronistic effect would be just as conceivable with a small number of dice as with a larger one. But doesn't the positive result with a larger number indicate an additional synchronistic factor between the dice themselves? Might there not be a similar harmony with a large number of radium atoms that would not be there with a smaller number?)

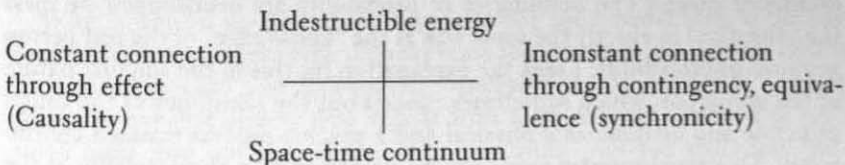
Insofar as for me synchronicity represents first and foremost a simple state of being, I am inclined to subsume any instance of causally nonconceivable states of being into the category of synchronicity. The psychic and half-psychic cases of synchronicity would be the one subcategory, the nonpsychic ones the other. Insofar as physical discontinuities prove to be causally no further irreducible, they represent a "so-ness" ["So-sein"] or a unique ordering factor or a "creative act," just as well as any case of synchronicity. I fully agree with you that these "effects" are on various levels, and conceptual distinctions should be made between them. I just wanted to outline the general picture of synchronicity.

As for the world-picture quaternio, our differences of opinion seem to stem from the different nature of our approaches (which I referred to at the beginning). The "dreamlike nature" of my physical concepts is based essentially on the fact that they are purely illustrative, whereas in your case they have an abstract-mathematical character. Modern physics, having advanced into another world beyond conceivability, cannot dispense with the concept of a space-time continuum. Insofar as psychology penetrates into the unconscious, it probably has no alternative but to acknowledge the "indistinct-

* J. B. Rhine, *The Reach of the Mind*, pp. 75ff.

ness" or the impossibility of distinguishing between time and space, as well as their psychic relativity. The world of classical physics has not ceased to exist, and by the same token, the world of consciousness has not lost its validity against the unconscious. Spatial and temporal definitions of measurement are different, even though they can both be applied to phenomena. Meter and liter are, and will continue to be, incommensurable terms, and no schoolboy would ever say that a lesson lasts for 10 km. And so space and time are also visual notions that are eternally separate and antithetical in a visual image of the world in spite of its background identity.¹ Equally, causality is a credible hypothesis because it can be constantly verified. Nevertheless, the world abounds in "coincidences," but this proves that it would virtually take laboratories to demonstrate effectively the necessary connection between cause and effect. "Causality" is a psychologem (and originally a magic *virtus*) that formulates the connection between events and illustrates them as cause and effect. Another (incommensurable) approach that does the same thing in a different way is synchronicity. Both are identical in the higher sense of the term "connection" or "attachment." But on an empirical and practical level (i.e., in the real world), they are incommensurable and antithetical, like space and time.

Your compromise proposal is most welcome, for it makes the bold attempt to transcend descriptivism and to extend the concrete world-picture by the one beneath the surface; in other words, it is not just on the surface like my schema. Your proposal really set my mind working, and I regard it as perfectly suitable for a more complete world-picture. You have replaced the space-time connection by energy conservation and space-time continuum, and I would now like to propose that instead of "causality" we have "(relatively) constant connection through effect," and instead of synchronicity we have (relatively) constant connection through contingency, equivalence, or "meaning"—i.e., the following quaternio:



Whereas my original schema seems to formulate the world of consciousness quite adequately, this second one satisfies the requirements of modern physics on the one hand and those of the psychology of the unconscious on the other hand. The *mundus archetypus* of the latter is characterized

¹ Psychological criteria have to be brought in here when we are dealing with illustrative terms and not abstract ones. Despite what they have in common, space and time are opposites here in that space is static and 3-dimensional, and time is fluid and 1-dimensional.

essentially through the *contingence* of the archetypes, which causes their indistinctness and also their inability to be localized. (The archetypes are always “breaking barriers,” meaning that they disturb the sphere of influence of a definite causal agent by—thanks to the autonomy of their (noncausal) connections—assigning contingent factors to a specific causal process.)

Re 3. I shall probably have to delete the sentence on p. 9 (and p. 10)* on radioactivity and field, because I cannot explain it properly. I would really need to have a good knowledge of physics, which is unfortunately not the case. I can only suggest that although ray energy and field voltage seem to be incommensurable in physical terms, they have, in psychological terms, an equivalence to the “breaking of barriers” by means of contingence with the archetypes, or they form their physical equivalence. Perhaps I don’t know enough about psychology either to be able to develop these ideas further.

Re 4. The psychic “relativity of mass” is actually a logical outcome of the psychic relativity of time and space, insofar as mass cannot be defined without a concept of space and, when it is moved, not without a concept of time. If these two concepts are elastic, then mass is undefinable—that is, psychically relative; one could just as well say that mass behaves arbitrarily—that it is contingent with the psychic state. Nothing is known about any prefigured notions on the part of the test person. My experience has shown that there aren’t any. If there were, they would only disturb the experiment in my view.

The concept of the relativity of mass does not actually explain anything, and neither does the relativity of time and space. It is simply a formulation.

There is no way of seeing how the term “relativity of mass” can be explained *more precisely*. Within the randomness of the throwing of the dice, a “psychic” orderedness comes into being. Is this modification based on whether the dice are heavier or lighter, or whether their speed is accelerated or slowed down? The boundaries of probability are overstepped by mass (i.e., the dice) in exactly the same way as the “knowledge” of the test person acquires improbability. I seek the explanation for this in the singular nature of the archetype, which sometimes cancels out the constancy of the causal principle and assimilates a physical and a psychic process through contingence. This synchronistic event can be described as a characteristic of the psyche or mass. In the former case, the psyche would cast a spell on mass, and in the latter mass would bewitch the psyche. It is thus more probable that both have the same characteristic, that both are basically contingent and, heedless of their own causal definitions, actually overlap. A further possibility is that neither mass nor the psyche possesses such a characteristic but that a third factor is present to which it must be attributed, a factor that

* See Letter 45, sect. 3, n. 13.

can be observed in the sphere of the psyche and can be observed from there—namely, the (*psychoïd*) archetype which, thanks to its habitual indistinctness and “transgressivity,” assimilates into each other two incommensurable causal processes (in a so-called numinous moment), creates a joint field of tension (?), or makes them both “radioactive”(?).

I hope I have managed to make myself clear.

Once again, many thanks for your stimulating criticism.

Yours sincerely, CGJ

P.S. Could I ask you to please lend me the work by R. A. McConnell?*

47 P

Zollikon-Zürich, 12 December 1950

[Typewritten carbon copy

with handwritten corrections]

Dear Professor Jung,

I was very pleased to receive your long letter, not just because it made a lot of things clear but also because it provided me with more food for thought.

Re 2. In my last letter, I suggested that synchronicity should be defined in a narrower sense so as to comprise effects that only appear when there is a small number of individual cases but disappear when there is a larger number; you, however, have now done the opposite by means of a definition of synchronicity which, in a broader sense, comprises every acausal and—I should like to add—holistic system. You do this so that the nonpsychic among these systems—namely, the compiled facts of “statistical correspondence” in quantum physics—also come under the same general category.

What has so far prevented me from adopting the broader term is the fear that with the more generally defined term too much might get lost that is specific to psychic and half-psychic synchronicity. In quantum physics, there are not just effects that appear with large numbers instead of with small ones, and not only is the term “meaning” not the right one here (which you have written about at great length) but also the concept of the (psychic or psychoïd) archetype cannot be used so lightly in the acausalities of microphysics. So if one wishes to use the more extensive definition of synchronicity, then one must deal with the question of which is the more general case that includes as a special case that of the archetype as ordering factor. In quantum physics, the observer makes a conscious choice (which always implies a sacrifice) between mutually exclusive experimental setups.

* See Letter 45, note 8.

Nature replies to this man-made setup in such a way that the result in the individual case cannot be predicted and cannot be influenced by the observer; but when this type of experiment is conducted on several occasions, there is a reproducible static regularity, which is in itself a holistic orderedness of nature. The experimental setup forms a whole that cannot be divided up into parts without fundamentally changing and affecting the results, so that in nuclear physics the definition of the term "phenomenon" must also include the particulars of the whole experimental setup in which it occurs.¹ Thus, the more general question seems to me the one about the different types of holistic, acausal forms of orderedness in nature and the conditions surrounding their occurrence. This can either be spontaneous or "induced"—i.e., the result of an experiment devised and conducted by human beings. The latter is also what happens with mantic methods, but the result of the experiment cannot be predicted here (e.g., the throwing of a coin when consulting the oracle); it is just assumed that there is a "connection through equivalence" (meaning) between the result of the physical process and the psychic state of the person conducting the experiment. In cases of nonpsychic acausality, on the other hand, the statistical result as such is reproducible, which is why one can speak here of a "law of probability" instead of an "ordering factor" (archetype). Just as the mantic methods point to the archetypal element in the concept of number, the archetypal element in quantum physics is to be found in the (mathematical) concept of probability—i.e., in the actual correspondence between the expected result, worked out with the aid of this concept, and the empirically measured frequencies. In connection with this, it should be noted that the specialized field "Fundamentals of Mathematics" is in a state of great confusion at the moment as a result of a large-scale undertaking to deal with these questions, an endeavor that failed because it was one-sided and divorced from nature. In this field of research into the fundamentals of mathematics, the "basis of mathematical probability calculus" marks a particular low point. After reading an article on this subject in a journal, I was dismayed at the differences of opinion, and later I heard that, whenever possible, experts avoid discussing this subject on the grounds that they know they will not be able to agree! A psychological approach would be both appropriate and very useful here.

It seems to me absolutely essential that when you talk about physical discontinuities in chap. IV, you should indicate clearly the distinctions of terminology between the nonpsychic acausal ordering systems on the one hand and the half-psychic and psychic synchronicities on the other. In your letter, you actually promised that you would do this.

¹ Bohr also applies the term "individuality" to the acausal individual case, deliberately suggesting the etymological connection between this word and "indivisibility."

Bearing this in mind, I have once again carefully weighed up the pros and cons of the narrower and broader definitions of "synchronicity." Pure logic gives us a free hand to choose either definition. In such a case, the deciding factor is intuition, pointing the way to the future as it does, but this is psychology and the branch of psychology that I am particularly interested in—namely, the scientific formation of concepts. With me, the intuitive function has such a strong tendency toward the apprehension of holistic structures that despite all arguments to the contrary, I find myself leaning toward your broader definition: Given the impossibility of a direct application of the term "archetype" in microphysics, I am more inclined to believe that the present term "archetype" is inadequate rather than that your broader definition is in itself inappropriate. For since your essay in the *Eranos Jahrbuch* for 1946 [see Letter 37, n. 1], it seems to me that the term "archetype" is going through a phase of great change at the moment, and my intuition leads me to suspect that more changes are in the offing. What is of consequence here is that several other important concepts can be applied in both psychology and physics without that having been specifically so intended: similarity, acausality, ordering, correspondence, pairs of opposites, and wholeness.

If the decision is now made to adopt the broader interpretation of the counterprinciple to causality, then I have no doubt that your new formula of the "world picture quaternio" (p. 4 of your letter [46, par. 5]), which corresponds to my earlier wishes anyway, is exactly the proper expression. If you extended chap. IV along these lines, it would be very different and in some respects more than simply a "résumé"; it would be a glimpse into the future of natural philosophy.

Re 3. I was a little surprised at the note of resignation in your letter in the way you commented on your sentences referring to radioactivity and field, for there seems to be no objective reason for such resignation. But in my explanation of my own point of view, I myself must also become psychological, otherwise I shall fail to deal with all the essentials; I am happy to swap roles and expose myself to the full brunt of your criticism.

As regards the "dreamlikeness" of your physical concepts, or your ideas in general, it seems to me that they are only accurate to a certain degree, when you say in your letter that they are based on the absence of abstract-mathematical character and on their "concreteness." I know a lot of people (such as chemists and radiologists) who approach physics from the experimental angle, and they all assure me that they have to imagine the physical conceptions "graphically," since the mathematical-formula apparatus is not accessible to them. With none of them would I speak of the "dreamlikeness" of their concepts but would rather call their images "concretist." The "graphicness" of your physical concepts is much more along the lines of an

introverted view, which, as part of the picture, involves psychic "background" processes in the subject, which are to be found alongside the conscious use of physical concepts. It is this, in my opinion, that defines the dreamlike nature of your concepts, which brings out analogies and ignores differences. These "background" processes are not usually perceived, but I believe that they are always present in the unconscious. I myself know them very well from "physical" dreams, and that is why I feel that your physical concepts are not only interesting but also accessible to meaningful and rational interpretation if they are simply treated as dream symbols. This is where I want to bring in my idea of a neutral language (which you were kind enough to quote), this language being interpretable both psychologically and physically, so as thus to obtain the "psychological correspondence" of the physical concepts.

In the case of field and radioactivity, which (as I remarked in my last letter) are not compared with each other by physicists in general, you seem to have particular problems, owing to the fact that a difference in the physical concepts stands in contrast to a similarity in their psychological correspondence. But I believe this problem is not a serious one and is based on the fact that a crucial element is missing in your statements in the letter on the subject of the psychological correspondence to radioactivity. In actual fact, the psychological correspondences to field and radioactivity also seem to differ from each other.

Expressed in the neutral language, what the two have in common is the idea of a conveyance of connections between spatial (and maybe temporal), distantly visible manifestations by means of an invisible reality. Here both visible and invisible are to be understood in the sense of everyday life. Both electromagnetic fields and the rays emitted by radioactive substances are invisible; it is only their mechanical or chemical effects on material bodies that are visible. In finding the psychological interpretation of the neutrally formulated idea, one must take into account the fact that illustrative concepts are always based on causal interpretation, even when acausal connections are meant. Invisible reality can thus be the collective unconscious, visible manifestations can also be conscious concepts (they are "visible" to the subject conceiving), and the causal connection "conveyed" can be a synchronistic one.

As we now move on to the concept of radioactivity, we are struck forcibly by the process of chemical transmutation of the radioactive nucleus as the feature that distinguishes radioactivity from the (static) field theory. The nucleus is the center of the atom; the radioactive rays generally produce new radioactive centers where they encounter matter. So let us test the following expression for "radioactivity" in the neutral language: A process of transmutation of an active center, ultimately leading to a stable state, is accompanied by self-duplicating ("multiplying") and expanding phenom-

ena, associated with further transmutations that are brought about through an invisible reality.

And now one does not have to look far for the psychological interpretation of this neutral expression. The "active nucleus," familiar to me as a dream symbol, has a close relationship to the lapis of the alchemists, and thus in your terminology is a symbol of the "Self."² The transformation process as a psychic process is still the same today as that represented in the alchemical opus and consists of the transition of the "Self" into a more conscious state. This process (at certain stages at least) is accompanied by the "multiplicatio"—i.e., by the multiple outward manifestation of an archetype (this being the "invisible reality"), which again is the same as the "breaking of barriers through contingency" or "transgressivity" of the archetype that you talk about in your letter.

The transformation process is the missing item in your letter when you talk of the psychological correspondence to radioactivity. The psychic process is the same as with the alchemists, but in the physical process of radioactivity not only has the transmutation of the chemical element become reality, but acausality has now appeared on the scene in our conscious scientific ideas. This symbolism, in contrast to that of the alchemists, seems to be more differentiated and more highly developed. Whether or not you delete or elucidate the sentences on pages 9 and 10 of your work is a purely technical question; an explanation might become too long-winded.*

Re 4. What you say about the "relativity of mass" and the PK experiments still seems to me very obscure, but perhaps that is all we can say about it at the moment, given the current level of our knowledge. With the prefigured image of the test person, I actually did not mean a conscious conception but an unconscious prefigured image, operating from the unconscious. As to your "quick" question about the positive result of the Rhine experiments when large numbers of dice are involved, I cannot come up with an answer.

I am very happy about this correspondence, for I now have the feeling that there is a real exchange of views on both sides about all these borderline problems.

Enclosed please find McConnell's work. Please let me know when you need your manuscript back.

With kind regards,

Yours sincerely, W. P.

² For my own purposes, I do not use the term "self" at all but rather "active nucleus." It will come as no surprise to you that as a physicist I am closer to the alchemists than to the Sanskrit philologists.

* See Letters 45, sect. 3, n. 46, Ad. 3.

48 J

Dear Professor,

[Küsnacht] 18 December 1950
[Typewritten carbon copy]

Unfortunately I am not yet ready with the formulation of my answer to your kind letter. I think it would help me if I could talk the whole thing over with you.

Would it be possible for you to come to Küsnacht next Saturday (23.XII) at 6 P.M.? I would be pleased if you could stay on for dinner afterward.

I am most grateful for your detailed letter. It is most pleasing to me that our points of view are becoming closer.

With best wishes,

Yours sincerely, [C. G. JUNG]

49 J

Dear Professor,

At present in Bollingen, 13 January 1951
[Typewritten carbon copy
with handwritten additions]

I am particularly indebted to you for having given me new heart. When I enter the sphere of physical or mathematical thinking *sensu strictiori*, I lose all understanding of what the term synchronicity means; I feel as though I am groping my way through dense fog. This feeling is obviously due to the fact that I do not understand the mathematical or physical implications of the word, which you certainly do. I could imagine that, for similar reasons, the psychological aspect seems unclear to you.

As regards the narrower and broader meaning of the term synchronicity, which you have explained so clearly, it seems to me as if Σ (abbreviation of synchronicity) in the narrower sense is characterized not just by the aspect of the archetypal situation but also by acausality. The archetype certainly characterizes the psychic and half-psychic Σ cases, but I wonder whether the "anomaly" of the so-called causal law—namely, acausality—is not a more general characteristic and "superordinated" condition than the archetypal basis that can be traced in psychic and half-psychic Σ cases. The latter can only be ascertained as present through introspection but remains hidden to the outsider as long as I do not inform him of my observation. If I keep my observations to myself, the former can only ascertain an acausal "so-ness" ["So-sein"], especially in those cases where the archetypal *tertium comparationis* is not obvious (as in the case of the scarab, for example). Like the time when I was working on the psychology of "Das Wandlungssymbol in der Messe [Transformation Symbol in the Mass],"* approaching it from the

* *Eranos Jahrbuch 1940-1941*, pp. 67-155; rev. and exp. in CW 11, pars. 296-448.

angle of alchemy, it happened that a serpent tried to swallow a fish that was too large for it and consequently choked. Fish is the other eucharistic food, and in this case it is seized not by a person but by the chthonic spirit, the mercurial serpent. (Fish = Christ. Serpent = Christ and the feminine darkness principle.) At the time, I was the observer on the outside who could only see the coincidence but not the common archetypal basis; i.e., I did not understand how the serpent corresponded to the Mass. But I did feel very strongly that the case was one of meaningful coincidence—i.e., not just an irrelevant “so-ness” situation. In this case, the only distinguishing feature is the presence of acausality, and in such situations and similar ones it is precisely this that has given me the idea that acausality is the more general definition, whereas the archetype is a characteristic that can be perceived occasionally where, almost by chance, an insight is possible. Now if there are “nontransparent” cases of synchronicity even in the psychic sphere, then they are even likelier in the half-psychic or physical sphere. In other words, what should emerge is that the general case is the acausal “so-ness” one, whereas Σ is the *causa particularis* of a transparent “so-ness” situation.

But I can turn the argument around and say: Introspection teaches me that the archetype is characteristic of Σ ; i.e., Σ is that special case of acausality in which the archetype can be perceived as the (transcendental) basis. This perception is possible because the acausal case occurs (by chance) in the psychic sphere, where something can be perceived from inside through introspection; in the half-psychic, this is less possible and not at all in the physical one. With the merely psychoid (transcendental) nature of the archetype, its purely physical occurrence is by no means precluded. It can thus be both the basis of the purely psychic and half-psychic synchronicity as well as physical acausality in general. The old precept of the *creatio continua* and the correspondencia was applied to nature as a whole and not just the psyche.

I fully agree with you that the synchronicity of the psychic sphere must be conceptually separated from the discontinuities of microphysics. But this leaves open the question of whether one should subsume the facts of psychic Σ —i.e., the archetypal characteristic—to a general causality or subsume the latter to the universal validity of the archetype. In the latter case, this would give rise to a Platonic world-picture with a *mundus archetypus* as its model: In the former, the Σ would appear with its archetypal characteristic as a psychic “anomaly” of general causality, just as acausality would need to be its physical anomaly.

Your idea that the probability concept in mathematics corresponds to the archetype was most illuminating. In fact, the archetype represents nothing else but the probability of psychic events. To a certain extent, it is the symbolically anticipated result of a psychic statistic. This can probably be best

seen in the tendency of the archetype to keep producing and confirming itself (cf. the reinstatement of a Goddess in Christian Olympus!).

I am, of course, very pleased that you have indicated your inclination to consider seriously the extension of the Σ theory. Under these circumstances, you are fully justified in demanding a new interpretation of the term archetype. It seems to me that the way to achieve this is via the analogy archetype-probability. In physical terms, probability corresponds to the so-called law of nature; psychically, it corresponds to the archetype. Law and archetype are both modi and abstract ideal cases that occur only in modified form in empirical reality. My definition of the archetype as "pattern of behavior" accords with this interpretation. But whereas in the sciences the law appears exclusively as abstraction derived from experience, in psychology we encounter an a priori existing image, already complete as far as can be judged; this image occurs spontaneously, in dreams, for example, and possesses an autonomous numinosity, as if Someone had stated in advance with great authority: "What is coming now is of great significance." This strikes me as being in sharp contrast to the a posteriori character of the law of nature. If that were not so, one would have to assume that the image—for example, of radioactivity—had always been present and that the real discovery of radioactivity (in this case) would simply be this particular image becoming conscious. The way you deal with the image of the lapis raises the question for me of whether ultimately the symbols accompanying the lapis, such as the *multiplicatio*, do not indicate a transcendental basis common to both the physical and the psychic. So although everything seems to indicate that radioactivity and its laws are something perceived a posteriori, it is nevertheless fundamentally impossible to prove that the law of nature is actually based on something *toto coelo* different from what we in psychology call archetype. For in the end the law of nature, irrespective of its obviously empirical derivation, is always a psychic form as well, and *nolens volens* also has its origins in psychic premises. Under these conditions, the analogy between the archetype and the constellation effects it radiates on the one hand, and the way the active nucleus affects its surroundings on the other, mean rather more than a simple metaphor, and the psychic transformation process would be, as you point out, the actual correspondence to radioactivity.

I shall now set about extending my manuscript along the lines of what we have agreed on and hope that I succeed in expressing myself clearly.

I shall close by once again expressing my thanks for the friendly and helpful interest you have shown,

With best wishes,

Yours sincerely, C.G.J.

50 P

Zollikon-Zürich, 2. II. 1951

Dear Professor Jung,

[Handwritten]

Many thanks for sending me the edited version of your manuscript. I paid particular attention to the new version of chap. IV and found that it reflects faithfully the state of affairs with the problems at the moment and, from the standpoint of modern physics, is now unassailable.

I was a little taken aback by the relatively large amount of space devoted to your discussion with A. Speiser.^a Unlike your own ideas, those of Speiser are, I must confess, often difficult to understand. Some of them also seem out-of-date; in particular, remarks such as the "initial state, which is not determined by the law alone" and then "is carried through time completely according to the law" represent the point of view of classical physics and not modern nuclear physics. In the latter, every observation is basically an intervention that interrupts the causal connection. And furthermore, is it not a regression into extreme "Nominalism" (in the sense of the medieval polemic between "Nominalism" and "Realism") to dismiss any concept as "Nothing"?

But this, of course, is just a small detail in your new chapter, which, I would like to say, once again meets with my wholehearted approval.

I look forward to your lecture on Saturday and remain until then with best wishes,

Yours sincerely, W. PAULI

^a Andreas Speiser (1885-1970), like Pauli, a very versatile scholar. Mathematician (group theory) who was also interested in the arts (music) and philosophy (Plato, Plotinus). First a professor of mathematics in Strasbourg, then in Zürich (1917-1944), and afterward in Basel.

51

A. Jaffé to Pauli

[Küsnacht] 14 March 1951

My dear Professor,

[Typewritten carbon copy]

Many thanks for returning the synchronicity paper. Prof. Jung has not worked on it recently but is planning to go back to it. As far as I know, however, this has nothing to do with physics.

I should have returned the enclosure (with letter) a while ago, along with

Prof. Jung's thanks. Please excuse the delay. I am always behind schedule at the moment.

With best greetings and wishes for a Happy Easter,

Yours sincerely, A. J.

52J

Dear Mr. Pauli,

[Küsnacht] 27 March 1951

[Typewritten carbon copy]

Excuse me for bothering you with this letter. I am in somewhat of a dilemma as Prof. Gonseth has inquired whether I would not like to take part in the "Gesprächen von Zürich" (the International Forum Zürich). Basically he seems to want to list my name. I am totally unqualified to take part in such philosophical conversations and would prefer to say no. However, I have no wish to seem unfriendly toward Prof. Gonseth and so am taking the liberty of asking you for advice, seeing that you yourself will also be there.

I would appreciate some brief information and good advice.

With best wishes,

Yours sincerely, [C. G. JUNG]

53P

Dear Professor Jung,

Zürich, 17. IV. 1951

[Handwritten]

Unfortunately your letter of 27 March has been lying around for a while, because I was on holiday in southern Italy and Sicily for about three weeks.¹ I telephoned Prof. Gonseth^b today, and he said he would be very pleased if

^a Marie-Jeanne Schmid, then secretary to Jung (later Frau M.-J. Boller-Schmid), d. 1984.

^b Ferdinand Gonseth (1890–1975), mathematician, 1929–1960 professor of higher mathematics at the ETH, also professor of the philosophy of sciences from 1947 on. As Pauli and he were both at the ETH, they met frequently and had discussions or phoned each other, so there was no correspondence. Gonseth was the founder of the journal *Dialectica*, in which Pauli had articles published. There is still today an F. Gonseth Association in Biel.

¹ There was a further complication ("Pauli effect"?) with the fate of this letter in that the envelopes of a letter from you to Mr. Quispel and the other letter to me got mixed up. So first of all your letter to me went off to Holland, and second it will have taken Mr. Quispel quite a while to get his letter, since I could forward it only on my return yesterday. Please pass on my best wishes to Fr. Schmid.^a

you would take part in the *patronage* of the "International Forum Zürich." There are no obligations involved, and you are certainly not expected to take part in the philosophical conversations. This solution would fit in with the wishes of both yourself and Prof. Gonsseth.

I hope to complete the Kepler paper in the next few days.

With best wishes,

Yours sincerely, W. PAULI

54 P

To A. Jaffé

[Zürich] 3. XII. 1951

Dear Mrs. Jaffé,

[Typewritten carbon copy]

Many thanks for sending me the Hoyle book review; I have quickly read it through and find that it gives a good picture of Hoyle and his book.* I know Hoyle quite well and attended his lecture in Zürich. His mixture of fantasy and science I find in poor taste (I regard it as feminine—i.e., more precisely, I see Hoyle as a feeling type). His "Background Matter" and his continuous creation of matter out of nothing strike me as sheer nonsense. I see no reason to doubt the conservation of physical energy. It is clear to me that this type of cosmogony is *not physics but a projection of the unconscious*. Which takes me once again to the subject of my old essay on "background physics."[†]

Partly in connection with this, I should like to mention that recently I have thought more about "Symbols of the Nucleus" (according to C. G. Jung, symbols of the "Self" or "*imagines Dei*," and have had another look at A. Huxley's *Perennial Philosophy*. It seems to me to have the same shortcomings as *Theologia Deutsch* (much admired by Huxley, actually), which I have recently read: I do not see why the "ground" made the "fall in time" known as creation and how it can have the need to be perceived by human consciousness. In other words, Huxley's premises are too straight-Buddhist-Platonic for me and disregard Cusa's[‡] *coincidentia oppositorum* and even the paradox of complementary pairs of opposites.

So far I know of only two religious philosophy systems that are logically free of contradiction: One of them is the static-taoistic one (Lao-tse), the other an evolutionary one, based essentially on an assumed reaction of human (or even prehuman) consciousness to the "nucleus" (you may say, to

* Fred Hoyle (b. 1915); the book is probably *The Nature of the Universe*, 1950.

† See Appendixes 2 and 3.

‡ Nikolaus Cusanus (1401-1464).

the "God-image").¹ In the latter case, I like to imagine it thus: That in this masculine-feminine symbol (cf. the essays by A. Jaffé)* it is precisely the feminine part (matter, energy—see my essays on background physics) that captures the timeless-unchangeable in the "Chronos," whereas the masculine part possibly captures the changeable.

Now I should like to ask you something about this last aspect: Do you think that this is objectively correct, or do you look on such an idea more as characteristic of a masculine thinking type and his particular psychology?

As ever, W. PAULI

55 P

Zollikon, 27 February 1952

[Typewritten carbon copy
with handwritten additions]

Dear Professor Jung,

It has been a long time since I spoke to you at any length, and in the meantime all sorts of material has accumulated that I would like to tell you about and make available to you. Now that classes are over for the semester, I can set about putting this long-cherished plan into action. I'm talking about the different considerations and amplifications that your book *Aion*² has triggered. Apart from astrology, where our views certainly differ, there is still much that has caught my interest—namely, the subject dealt with in chap. V,^b and also that of chap. XIII and XIV.^c It may be of interest to you to see the problems dealt with there from a different angle than the conventional one.

As you well know, when it comes to religion and philosophy, my background is Lao-tse and Schopenhauer (although I could expand the time-conditioned determinism of the latter with the idea of the complementary pairs of opposites and the acausal factor). Given this background, your analytical psychology and, I believe, your personal mental attitude in general has always seemed readily accessible to me, but I must confess that specifically Christian religiousness—especially its concept of God—has always left me emotionally and intellectually out on a limb. (I have *no emotional resistance* to the idea of an unpredictable tyrant such as Jahweh, but the

¹ I regard as possible but not as proven the assumption of such an evolution of the "God-image." In Buddhism, the "will to live" is considered an "error." But it is difficult for me to imagine that life is only at all possible as the result of a mistake.

* It is not clear which essays by Mrs. Jaffé Pauli is talking about. In Letter 58, n. 11, he refers to a book by Jung that includes an essay by Jaffé that he read: *Gestaltungen des Unbewussten, Mit einem Beitrag von Aniela Jaffé*, 1950. Mrs. Jaffé's contribution was entitled, "Bilder und Symbole aus E.T.A. Hoffmanns Märchen 'Der Goldne Topf.'"

excessive arbitrariness in the cosmos implied in this idea strikes me as an untenable anthropomorphism from the point of view of natural philosophy.) In the Lao-tse world-picture, the problem of evil does not exist, as can be seen particularly in *Taoteking* no. 5 (“Nicht Liebe nach Menschenart hat die Natur. . . [Wilhelm’s translation: “Nature’s love is not like human love. . .”). But Lao-tse’s whole concept is better suited to the intuitive world-picture of the Chinese, whereas Western science and its perceptions are alien to it. This does not mean that I would go so far as to claim that Lao-tse’s point of view, however satisfying it seems to me, is the last word on these matters as far as the Western world is concerned. On the other hand, Schopenhauer’s philosophy—also because it mediates between the West and East Asia—enables me to have much easier access to your book *Aion*. For I was always of the opinion that it was precisely the *privatio boni* that was the bone of contention that led Schopenhauer to reject “the *θεός*,” as he called it.¹ Thus Schopenhauer rejects “your *θεός*” because the evil would inevitably rebound on him. It was precisely this point that made Schopenhauer emotionally appealing to me.

From a critical point of view, I should like to say myself that *what is being rejected here is only the idea of a humanlike consciousness in God*. I actually tend to identify Schopenhauer’s so-called will (the way he uses this word has not gained currency at all) with the *θεός ἀνεκνόητος* of the Gnostics, which is mentioned on pp. 278–82 of *Aion* [CW 9ii, pars. 299–304]. Such an “unknowing God” remains innocent and cannot be held morally responsible; emotionally and intellectually the difficulty no longer arises of reconciling him with the existence of sin and evil.

I can happily agree with your view that the emotional and intellectual discussion of the “problem of evil” has once again become an urgent necessity for modern man. This is particularly true for a physicist now that the

¹ Cf. a) *Die Welt als Wille und Vorstellung* [The World as Will and Representation], vol. 2, chap. 50, Epiphilosophy. Sch. is here criticizing Scotus Eriugena in particular as a strong representative of the *privatio boni*: “Scotus Eriugena declares quite consistently, in the spirit of Pantheism, that every phenomenon is a theophany: but then this term must also be applied to dreadful and hideous phenomena: fine theophanies!” And he goes on to say about pantheism in general “that their *θεός*? manifests himself *animi causa*, in order to display his glory and majesty, or even to let himself be admired. Apart from the vanity here attributed to him, they are thus put into the position of having to sophisticate away the colossal evils in the world: but the world remains in glaring and terrible contradiction with that fancied eminence.”

b) *Parerga*, vol. 1. *Fragmente zur Geschichte der Philosophie* [Fragments on the History of Philosophy], ¶ 9 Scotus Eriugena: “God is said to have made all things, everything and in all things everything; that is sure: —consequently evil and wickedness, too.” This logical consequence has to be eradicated, and Eriugena finds himself compelled to indulge in pathetic hairsplitting. There should be no evil and wickedness, should in fact be nothing. Not even the Devil! The “pathetic hairsplitting” is nothing more than the doctrine of the *privatio boni* explained in chap. V of your book, which Eriugena has taken over from the non-Christian Neoplatonists (via Proclus and Dionysius Areopagita).

possibility of using the results of physics for the purposes of mass destruction is just around the corner. Even when there is no *direct* involvement in such a use of physics, it is possible that unless this discussion takes place, it can lead to a certain stagnation in physics (because in the unconscious the libido will flow away and hence also the interest in physics in the narrower sense of the term).^d Given the central role played by the doctrine of *privatio boni* here (I believe that a lot of people today—like you or me—will tend to reject it), I have investigated the historical origins of this tenet.

My work on Kepler had also led me to look more closely at Neoplatonism (since Kepler was strongly influenced by Proclus, Fludd, and Iamblichus—although as an alchemist he followed Aristotle much more than Plato or the Neoplatonists). And I saw not only how Scotus Eriugena (who I felt to be a very weak sort of Christian) was a prominent promulgator of the *privatio boni* but also that Plotinus (whom I read in translation last summer) supported it as a basically full-fledged doctrine. At the same time, he gives the impression that there is powerful opposition to this tenet on the part of the Gnostics.² I was also struck by the fact that according to Plotinus, matter (*ύλη*) is supposed to be a pure *privatio* and “absolutely evil” to boot; furthermore, evil, evidently as understood by Parmenides, is depicted as “non-being.” Recently I met Prof. Howald^f at a social gathering and asked him about Neoplatonism; he kindly pointed out that Dr. H. R. Schwyzer^g had just written a lengthy paper on Plotinus.³ This led to an exchange of letters^h between Dr. Schwyzer and myself, as a result of which I was able to substantially increase my knowledge of the story of the *privatio boni*: Whereas Plato never uses the word *ύλη* nor the word *στέρησις*,ⁱ Aristotle⁴ polemicizes (together with Parmenides and his school) against the equating of *ύλη* with *στέρησις*. So even in those days there must have been people of note who supported the idea that the *ύλη no quale* was simply a *στέρησις* of the “Ideas.” (Actually one can, if one chooses, interpret Plato in this way,* but that seems to me to be doing Plato a grave injustice.) In this equation of *ύλη* with *στέρησις* I am inclined to see the *older model of natural philosophy* (which for me as a physicist is interesting in itself), which was the basis for the later *privatio boni*. Later the *ύλη* was designated *τὸ κακόν* by the Neo-

² All scholars seem to agree that these are heathen and not Christian Gnostics. Later, some time in autumn, I was pleased to note that in his book *Gnosis als Weltreligion* [Gnosis as World Religion], G. Quispel^e makes a point of mentioning the *privatio boni* in Plotinus (see p. [?] above).

³ Real-Encyclopaedie d. klassischen Altertumswissenschaft (Pauly-Wissowa, etc. Article *Plotinus*, vol. 21, col. 471–592, published 1951, as well as Supplement vol. 15, col. 310–28 (1978).

⁴ See his “Physics” A 9, p. 192a—Although with Aristotle the *ύλη* is second-rank compared with form (masculine), it is not just a *privatio*. With him, matter longs for form just as the feminine longs for the masculine.

* [In Plato, visible bodies are a mixture of “hyle” and “Ideas.” Hyle is *υποδοχή* (receptacle), *χωρα* (space for ideas) *τιθήνη* (nurse).—C. A. Meier]

pythagoreans.⁵ It seems—in accordance with the idea of your book *Aion*—that at the time all pairs of opposites were related to the one pair of opposites that was growing in importance—namely, “good-evil.” Parallel to this is the identification of the “One” with the “Good,” which actually begins back with the early commentators on Plato. This is what I regard as the model for the theological formula that you mentioned, *deus = summum bonum*.⁶ With Plotinus this has all been elaborated into a doctrine,⁷ enhanced by the distinction between the *νοῦς* and the *έν*. (This last distinction gives rise to the Plotinistic “Trinity” τὸ έν, νοῦς, ψυχή, whose members are arranged in hierarchical order, unlike in the Christian Trinity, where they are of equal importance.)

Whereas everyone agrees that Plotinus, who never mentions Christians, never knew the Bible and was not influenced by Christians, there is, conversely, clear evidence of the influence of Plotinus on Christian theology, especially on Augustine (and also on Basilius, whom you quote). One has the impression that the intellectual formulas of Neoplatonism fell into the laps of the early Christian theologians like ripe fruit. All they had to do was a little editing in order to harmonize them with the Bible and their conception of God.

At this point I should like to raise for discussion the question of what this whole development in ancient philosophy since Parmenides means *psychologically*, and your views on the subject would be of great interest to me. I myself have the impression that especially the story of the Plato commentaries actually corresponds to the dissociation of an *early uniform archetype into a light one* (Neoplatonists) *and a dark one* (Gnostics).⁸ This division is probably the same as that which appears later as “Christ” and “Antichrist.” I also suspect that the “being” and “nonbeing” things with Parmenides correspond psychologically to the “should be being” (desired) and “should not be being” (undesired) ones. Parmenides was the reaction to Heraclitus. For the latter, there is only the “process of becoming,” represented as a permanent living *fire*; the pairs of opposites are treated symmetrically and God is a *coincidentia oppositorum* (as later in Christian form with Nicholas of Cusa). With Parmenides, there is no becoming (there can be no thinking

⁵ This comes about at the latest with *Moderatos* (1st century A.D.), whose teachings are reported by the Aristotle commentator Simplicius. (*Commentary on Aristot. Physik*, A 7 p. 230f.)

⁶ The corresponding formula in Plotinus is (II 9, lines 5–6) *δταν λέγωμεν τὸ έν, και δταν λέγωμεν τὰγαθόν, την αὐτην δεῖ νομί ζειν την φύσιν και μίαν λέγειν*.¹

⁷ See especially I 8 (*πόθεν τὰ κακά*). (Evil is “Nonbeing,” “formless,” a “shadow” of being, a “lack”; but it is of extrahuman origin. Matter is “evil in that it has no qualities,” even “absolute evil.” As *privatio*, it cannot be apprehended by thinking. See also II 9 (“against the Gnostics”).

⁸ The evil world soul in Plato’s *Laws* 896e reoccurs with the Gnostics. With the Neoplatonists it has disappeared, as has the passage *ὑπεναντίον γάρ τι τῷ ἀγαθῷ ἀεὶ εἶναι ἀνάγκη* in the *Theaetetus* 176 a.¹

about "nonbeing" nor hence about "becoming," since it is devoid of characteristics), the pairs of opposites are treated unsymmetrically (slanted) in favor of the "being," which is presented as a *stationary sphere*. Psychologically speaking, this is the yearning for peace and quiet (lack of conflict) as against the dispute (war) of "Heraclitus," who could "never step twice into the same river." The ensuing extremely strong devaluation of matter is for me a sort of rationalized withdrawal from the world. It strikes me as psychologically significant that it was precisely "those who denied the notion of becoming" who, with their static "ideal world," gradually came to interpret matter, and then evil, as simply a "lack."

I can well understand that on a feeling level these philosophical ideas can be intensified into a form of "provocation," and on a thinking level into a logical contradiction if they are connected with the Biblical idea of a "Creator God" who is also supposed to be "almighty," "only good," and "omniscient" in the bargain.⁹ As you can see, your chap. V has taken me quite a way back to antiquity (and to the classical philologists). After this excursion into history, let us now return to the point where I ascertained that Schopenhauer's "will" and the "unknowing God" of the Gnostics were the same. Is it possible for this "agnosis" of God, which allows this God to retain his innocence, to be of help to modern man philosophically and on a feeling level?¹⁰ This is a crucial and difficult question on which I cannot take any

⁹In this respect, Plato was in a much better position since his demiurge, as a master craftsman, must, as well as he can, build the world with the material given to him. Thus in Plato, nobody is responsible for any discrepancies between ideas and the *χώρα*, "material" space.

Plotinus, on the other hand, has to "sophisticate away the colossal evils of the world," since his *τὸ εἶναι ἀγαθόν* has all the characteristics of a creator God (according to V I, it not only is the origin of things but has also created them. The spiritual situation with him is, however, made somewhat unclear when in other passages he develops a so-called negative theology about the "One," according to which nothing positive can be said about the One and it is in fact *ὑπεράγαθον* (VI 9). This different approach of Plotinus is very reminiscent of Meister Eckhart. (I have Protestant Christian friends who also happily adopt the view of "negative theology" and are willing to dismiss as "actually meaningless" the attributes of God listed above. According to this point of view, God would not be attainable on an ethical basis.* But the Neoplatonist "negative theology" of the One (and also the analogous "negative theology" of the Christian God) gives rise to another difficulty that is hard to understand: Why did the One (or God) not remain alone and still need the theophanies (let alone people). (This difficulty arises from the Neoplatonist requirement of an exact, unchanging God, or "One.")

* Personally I get on best with this sect of the Protestants. They would fully agree with you in your polemic against the formula *deus = summum bonum*, and would say: "Good is an abstract concept in ethics, and 'God is God.' There is no direct connection between the two. Granted, 80% of all priests still say that God is attainable on an ethical basis, but that of course is not the case."

I think that the thing with this minority, psychologically speaking, is that for them the *God-Man relationship has itself become a privatio*. What they and I have in common is the feeling that there is a vacuum in the modern age that seeks to be filled.

¹⁰ At this point I should like to say that concerning the concept of consciousness in general

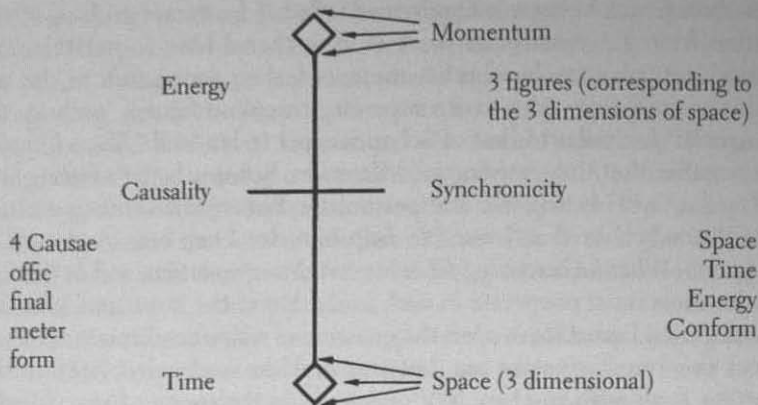
direct stance, not being a metaphysician. But if I attempt to look at the question from a *psychological* point of view, then I have to put the *other question* instead; namely, whether my own feeling connection to the unconscious (and especially to its superior masculine figures, such as the "stranger")¹¹ is similar to that of Schopenhauer to his "will." Then I immediately realize that there are crucial differences. Schopenhauer's feeling attitude to the "will" is negative and pessimistic. But my own feeling attitude to the "stranger" is that I want to *help* him, for I see him as *in need of redemption*. What he is striving for is his own *transformation*, and in this ego consciousness must cooperate in such a way that at the same time it broadens and grows. I must leave open the question of what the ultimate aims and laws of this transformation are, but this problem is closely related to the questions dealt with in chap. XIV of *Aion*.¹² In the spring of 1951, I had a dream in which the word "*automorphism*" cropped up (it is a word taken from mathematics). It is the word for the ascribing to others one's own characteristics, an isomorphism of an algebraic system with itself, in other words, for a process in which the inner symmetry, the wealth of associations (relations) of a system reveals itself. In abstract algebra there is also "the automorphism-producing elements" (which I cannot specify here), and in the analogy they probably correspond to the "archetypes" as ordering factors, as you yourself defined and interpreted them in 1946. My interpretation of the dream at the time (it was a proper examination, with the "stranger" as examiner, in which the word "automorphism" had the effect of a "mantra") was that a *generic term* was being sought that was to cover both your concept of the archetypes as well as the physical laws of nature.

This is why I read with great interest your formula on p. 370 of *Aion* [CW gii, par. 410] when the book came out. For a mathematician, it would be an obvious thing to do to apply the term "*automorphism*" to the relationship of the small square to the large one. What also occurred to me was that the quaternio on p. 99 of your article on synchronicity^m [CW 8, par. 961] (on which we had agreed) can also be written thus:

I prefer to restrict it to ego consciousness to avoid using such paradoxical terminology as "*consciousness in the unconscious*." What is characteristic of ego consciousness is differentiation, what is characteristic of the unconscious is the actual distinctiveness (e.g., of the 4 functions or the pairs of opposites). There may be intermediary stages, such as the difference between "light" and "dark" in the unconscious. Your expression "*multiple consciousness*" (1946) ["Der Geist der Psychologie," chap. 6; tr., "On the Nature of the Psyche," CW 8, pars. 388-96] for the luminosities seems to be open to misinterpretation if what is meant thereby is a "consciousness" outside ego consciousness.

¹¹ Being "light and dark," this figure has a connection to the Merlin of the Grail legend (which I wrote about at length to Frau Prof. Emma Jung on 16. XI. 1950 [Letter 44]) and also to the Mercurius of alchemy.

¹² In the course of the transformation, the figure of the unconscious often undergoes a duplication or even multiplication.



3-dimensional space belongs to one-dimensional time and correspondingly the (also indestructible) momentum (3 components corresponding to the 3 space dimensions) belongs to the (one-component) energy. The small squares then correspond to the four-dimensionality of the space-time continuum and the 4 figures for energy and momentum.

Thus it seems to me that in the generic term “automorphism” is where the possibility lies for further progress, especially as it belongs to a neutral language (in relation to Physis and psyche) and as it also indicates a complementarity of oneness and plurality (or singularity and generality), cf. *Aion*, p. 99 [CW 9ii, pars. 115–16].

Now insofar as these images of the “Self” (or the Son of God) are subject to laws or destiny or the necessity (*ἀνάγκη*) of those transformations, they appear as in need of redemption, and there arises a psychological (also feeling-toned) connection between them and man (or his consciousness of self).¹³ We do not know whether these transformations all return to their original form or whether they represent an evolution¹⁴ toward unknown objectives. (You hinted at the latter in connection with your formula on p. 370 [CW 9ii, par. 410] by mentioning a “higher level,” which is attained by the process of transformation or integration.)

I would enjoy talking to you about what this actually means in terms of everyday living with regard to the attitude toward ethical or moral problems.

The conclusion to this letter leads me back to the excursion into history. It was those who denied the process of becoming (the “static ones”) who came up with the idea of the “*privatio*.” Thus it comes as no surprise to me

¹³ The fact that this is missing in Schopenhauer is almost certainly very closely connected with his lack of a feeling relationship with women. I always had the impression that his poodle exteriorized his anima and in fact read later that he called one of his poodles “Atma” (world soul).

¹⁴ Any evolutionist idea is diametrically opposed to Lao-tse.

that those modern thinkers who—like yourself—are now once again pleading the case for a symmetrical treatment of the pairs of opposites are also closer to the concept of becoming¹⁵ (the stationary sphere of Parmenides). It is the *fire of Heraclitus*, now appearing to you once again “on a higher level” as the “Dynamics of the Self.”

By way of apology for this lengthy letter, all I can say is that it has taken me about a year to now be able to write it. I remain with best wishes,

Yours sincerely, W. PAULI

^a Jung, *Aion, Untersuchungen zur Symbolgeschichte*, 1951; with changes in subtitle, CW 9ii, “Researches into the Phenomenology of the Self.”

^b “Christ, a Symbol of the Self”; CW 9ii, pars. 68–126.

^c “Gnostic Symbols of the Self,” *GW/CW* 9ii, pars. 287–346. And “The Structure and Dynamics of the Self,” *GW/CW* 9ii, pars. 347–421.

^d It should be recalled here that in the course of his stay at Princeton during the war, Pauli absolutely refused to take part in the Manhattan Project for reasons of conscience.

^e Gilles Quispel, b. 1916, professor for the history of the ancient Church, Utrecht.

^f Ernst Howald (1887–1967), Prof. for Classical Philology at the University of Zürich, also the Rector.

^g H. R. Schwyzer (b. 1905), Zürich. Greek scholar, scholar of Plotinus. His complete edition of the works of Plotinus, *Opera Plotini*, is authoritative: see also his article “Plotinus,” in Pauly-Wissowa, *Real-Encyclopaedie d. klassischen Altertumswissenschaft*, now available separately as *Plotinus*.

^h See Appendix 3.

ⁱ In the philosophical sense.

^j Whenever we say the “One” and the “Good,” they are to be understood as one and the same entity (Harder, vol. 3).^k

^k *Plotins Schriften* [The Writings of Plotinus], trans. Richard Harder.

^l But the sentence comes from *Plotinus* 1, 8, 6, 16–17 (H. R. Schwyzer).

^m Jung, “Synchronizität”; tr., Jung, “Synchronicity.” I should like to point out neither Pauli nor Jung needed much persuading to have their works published jointly.

56 P

Zollikon, 17. V. 1952

[Handwritten]

Dear Professor Jung,

I should like to thank you once again for the pleasant evening I spent with you. I shall give a lot of thought to many of the things you said, so that I can digest them properly. What made the deepest impression upon me was the central role played in your thinking by the concept of “incarnation” as a scientific working hypothesis. This concept is of particular interest to me, first of all because it is interdenominational (“Avatara” in India) and also because it expresses a psycho-physical unity. More and more I see the

¹⁵ In China, Chuang-tzu is very much on the side of “becoming.”

psycho-physical problem as the key to the overall spiritual situation of our age, and the gradual discovery of a new ("neutral") psycho-physical standard language, whose function is symbolically to describe an invisible, potential form of reality that is only indirectly inferable through its effects, also seems to me an indispensable prerequisite for the emergence of the new *ἑρπός γαμός* predicted by you.

I have also clearly seen how you have linked the concept of incarnation with ethics, which, moreover, just like Schopenhauer (in his work on the basis of morality), you have based on the identification of the Self with one's fellow men on deeper psychic levels ("what one does to others, one also does to oneself" etc.). Is it possible to define your point of view as *incarnatio continua*?

There are two essentially different opinions with respect to psychic evolution (as distinct from the biological one): that of recurrence, as is the case in India, for example [the periodically recurring 4 aeons (Yugas)], but also with Heraclitus, according to whom the world is continually resurrected from "fire" and then swallowed up by it again. The other view is the Christian-western one, with the one and only genesis of the world, which ends in a permanent state of rest. At the moment I see no possibility of objectively deciding between the two.

I actually also mentioned the fire of Heraclitus in my last letter because in those days, in the ancient world, it combined the physical and the psychic by being both a physical energy symbol and a psychic libido symbol (according to Heraclitus, fire was supposed to be "endowed with reason"). The problem of psycho-physical unity now seems to be returning "on a higher plane."

I shall be making further inquiries about "flying saucers." In June I have to attend a physicists' congress in Copenhagen and will discuss the matter with people from America. There are two contradictory opinions on the subject; according to one of them, which still finds support among experimental physicists in particular, it is a hallucination (like the "sea serpent" and similar "sea monsters"); according to the other, more common in military circles, the phenomenon is a real one, and they have been invented by Americans for military purposes and are either special planes or balloons (hence "sacks").

As I was walking up the hill from Zollikon station after leaving your house, I did not actually see any "flying saucers," but I *did* see a particularly beautiful large *meteor*. It was moving relatively slowly (this can usually be explained by factors of perspective) from east to west and finally exploded, producing an impressively fine firework display. I took it as a spiritual

"omen" that our general attitude toward the spiritual problems of our age is in the sense of *καιρός*, in other words is more a "meaningful" one.

Once again many thanks,

Yours sincerely, W. PAULI

57J

Küsnacht-Zch. 20. v. 52

[Typewritten carbon copy
with handwritten additions]

Dear Mr. Pauli,

I read your kind letter with great interest. I chose the expression *incarnatio* more or less at random, albeit obviously under the influence of religious symbolism. As *incarnatio continua*, it is synonymous with *creatio continua* and actually means the materialization of a potentially available reality, an actualization of the *mundus potentialis* of the first day of creation, or the *Unus Mundus*, in which there are as yet no distinctions or differences. (This is a piece of alchemical philosophy.) A similar idea is to be found in Ch'uang-tze.

In actual fact, I do not see any real possibility of deciding on the question of whether the "rotation"—i.e., the course of events—runs cyclically in itself or spirally. All we have is the experience in the psychic sphere that the initial stage is unconscious, the final stage conscious. In the field of biology we have the fact that alongside the further continuation of lower organisms, highly complex living creatures also came into being, as did, ultimately, the unique fact of reflected consciousness (i.e., "I know that I am conscious"). These facts suggest at least the possibility of an "*analogia entis*," i.e., the fact that these partial aspects of being probably correspond to a general characteristic of the state of being.

To me, the psychological problem really seems to lie at the very heart of modern-day living. Unless we tackle this stumbling block, it will not be possible to give any uniform description or interpretation of nature.

As regards "flying saucers," I had hitherto been of the opinion that it was a "mass hallucination" (whatever that may be). But now it seems that the problem is being taken seriously by the relevant military authorities in America—hence my curiosity.

The meteor was good, and was indeed a *καιρός*: ἐν τῷ καιρῷ πάρεστι πάντα. (All good things lie in the *καιρός*).

With best greetings and many thanks for your ever wonderfully stimulating conversation.

Yours sincerely, [C. G. JUNG]

[Zürich] 27 February 1953
 [Typewritten carbon copy]

Motto: "To be," or "not to be," this is the question

Dear Professor Jung,

A year has elapsed since I last wrote to you, and now I feel the time is right to carry out what has long been my intention; namely, to write to you again. The topic I have chosen this time could be called: *Reflections of an Unbeliever on Psychology, Religion, and your Answer to Job*.^a I do not doubt that you have received very many letters about your book *Antwort auf Hiob* [*Answer to Job*] (especially from theologians who, consciously or unconsciously, are beset with grave doubts and for whom your psychology will surely be welcomed as a means of helping them to deal with these doubts). Nevertheless, despite the wealth of your experience, this letter will probably strike you as rather unusual. My topic will deal with neither the complete historical development of the Judeo-Christian God-image nor all too general ideological questions. Instead, I should like to single out in particular the last four chapters of your book, where the problem of the anima and hence—by definition—the opposition Catholicism-Protestantism and the individuation process play a crucial role in your religious-psychological reflections. For in this way there is a connection between this chapter of your new book and your earlier book, *Psychologie und Religion*,^b which I have deliberately alluded to in the heading above. It goes without saying that if I react at all to such a personal book, it can only be in this personal way. Hence it is impossible for this letter to remain on a purely scientific level, and in order to enable the emotional side and the unconscious to have their say, too, I shall make use of dreams. In doing so, I have selected some that are very typical in that their motifs recur—with variations—at intervals extending over many years.

Even if my reaction and my point of view regarding these problems is a personal one, it is nevertheless clear to me that we are all—as children of the 20th century—affected unconsciously by the same archetypal occurrences, however different our conscious attitudes toward them may be; this is true of the psychologist who, at the end of a book and in the eventide of a long working life, sees a new *hieros gamos* approaching, the physicist who has to compensate for the one-sidedness that ensued after the pioneering scientific achievements of the 17th century, and the pope, who, by way of sanctioning an ancient popular belief, declares a new dogma. Thus I write and report the following in the hope that in spite of any differences in the nuances of our opinions, there is still a sufficiently broad basis of

understanding between us in these problems, which are as thorny as they are crucial.

I.

To read your book *Antwort auf Hiob* [*Answer to Job*], I had chosen the period of the equinox last autumn—after overcoming certain reservations, by the way. On the evening of 19 September I had read the first 12 chapters (up to and including the Apocalypse). My attitude was not at all critical; on the contrary, the effect that these chapters had on me, with their touches of sarcasm, was as if I had enjoyed some light reading, and I was in a cheerful, albeit somewhat superficial mood. However, in the night immediately after reading your book I had the following dream:

“At first I am riding in a train with Mr. Bohr. Then I get out and find myself in a stretch of countryside dotted with little villages. Now I start looking for a station so that I can ride off to the left. I soon find it. The new train comes from the right and seems to be a small local train. As I get in, I immediately see “the dark girl” in the compartment, *surrounded by strangers*. I ask where we are, and the people say, “The next station is Esslingen, and we are nearly there.” I wake up *very annoyed* because we have come to such an uninteresting and boring place.”

Thus was the pleasure of the evening turned into the annoyance of the morning. Apparently “the dark one” was being sought out in the dream. The place she lives seems to be somewhere in the Zürich Oberland, Esslingen actually—i.e., extremely provincial, only loosely connected with the city of Zürich, which is where I pursue my main activity, theoretical physics (represented by Bohr). The reason for my irritation seems to be the fact that I have to go off to such a remote, provincial setting to find the dark one.

Now what does this have to do with your book? Well, it has a lot to do with it, and I immediately saw a connection. The dark one for me has always been the counterpole to Protestantism, the “men’s religion that has no metaphysical representation of woman.”¹ The pair of opposites Catholicism-Protestantism has long tormented me in my dreams.² It is the conflict between an attitude that does not accept, or only partially accepts, the “ratio,” and another attitude that does not accept the anima. This pair of opposites has appeared repeatedly in many different forms, e.g. as

Fludd—Kepler

¹ *Antwort auf Hiob* [*Answer to Job*], pp. 160–61 [CW 11, par. 753].

² It actually also appears in a dream commented on by you in *Psychologie und Religion*, p. 45[–47] [CW 11, par. 40].

Psychology—Physics
 intuitive feeling—scientific thinking
 Holland—Italy³
 Mysticism—Science

It is a pair of opposites that seems to call for resolution by means of a *coniunctio*.

Now I knew beforehand that the new Catholic dogma about the Assumption into Heaven of the body of the Virgin Mary is discussed toward the end of the book *Antw.auf Hiob*. The declaration of this dogma had made even me sit up and take note, in one definite connection and in one definite light; that was the case from the very start and is still so today.

My source was mainly my (Protestant) colleague Gonseth,^c who had had discussions about this with Catholic intellectuals (especially Thomists) in Rome (in connection with the line of philosophy taken by him). He reported that these intellectuals were somewhat embarrassed because of the concretism of the pope and regarded the new dogma as a concession to the people and also as a "metaphysical maneuver" against Communism.

Now inasmuch as politics have always been a prerogative of the *princeps huius mundi*, and inasmuch as anyone involved in politics (and that applies to the greater part of the Catholic clergy) is, in psychological terms, in intimate "contact with the Devil," then the initiative for the new dogma (expressed in the terminology of your book *Antw.auf Hiob*) would actually have come from the Devil; it is a countermeasure against the Devil. Of course, in the 20th century I cannot really understand what the pope means when he says "Heaven" (and I am not the least bit interested in what *he* means). It does acquire some meaning for me if I identify "Heaven" here with the "place beyond Heaven," the nonphysical space in which, in accordance with *Platonic philosophy*, "Ideas" are to be found. This is probably not all that arbitrary inasmuch as historically, Christianity has taken over many words and expressions from Plato and the Platonists. The "maneuver" would then consist in the fact that a *concession to matter* was to be made, which, since the days of Neoplatonism, has counted only as the *privatio* of ideas and as evil, or as the Devil in Christian terms. One may harbor doubts as to whether this concession is enough, since in the new dogma it is actually strongly "disinfected" matter. To me, however, it seems to be a meaningful and acceptable approach in which a decline into materialism (politically: into Communism) will be avoided because the matter will be taken into the world of ideas, not in its inorganic form but only in connection with the soul, the "metaphysical" representation of woman. In this

³ This categorization corresponds to an illustrated function schema of my dreams projected onto a "country mandala."

form, the "maneuver" seems to be quite logical. In terms of social practice, doing away with soulless mental institutions would be a most beneficial consequence.

But as a symbol of the *monistic union of matter and soul*, this *assumptio* has an even deeper meaning for me. Any deeper form of reality—i.e., every "thing as such"—is symbolic for me anyway, and only the "manifestation" is concrete (see p. 16). It is true that in the empirical world of phenomena there must always be the difference between "physical" and "psychic," and it was the mistake of the alchemists to apply a monist (neutral) language to concrete chemical processes. But now that matter has also become an abstract *invisible reality* for the modern physicist, the prospects for a psychophysical monism have become much more favorable.⁴ Inasmuch as I now believe in the possibility of a simultaneous religious and scientific function of the appearance of archetypal symbols,⁵ the fact of the declaration of the new dogma was and is for me a *clear sign* that the *psychophysical problem* is also now constellated anew in the scientific sphere. The *hieros gamos*, whose dawn you see even from a distance, must also help with the solution to this problem.

I shall talk briefly about the fact that the parallels you draw between the new dogma and a definite stage of the individuation process⁶ also seem to me to provide strong support for this view. But first I should like to report on my further emotional reactions as I read your book to the end.

I did, of course, await with bated breath what you would have to say on the subject of matter and on the psychophysical problem when you came to the new dogma. To my disappointment, however, I found that there was no mention of the latter, and matter itself was alluded to only briefly in the expressions "creaturely man" and "incarnation of God," otherwise being basically ignored. I thought to myself, "I don't know what the pope means with 'Heaven,' but it is certainly not in this book, for matter has not been broached here." I attributed the failure to mention the connection with the psychophysical problem to your endeavor to get a discussion going with the theologians, which struck me as doomed to failure from the outset. It seems to me now that there are other factors involved as well (see under note 28).

II.

Having given vent to my wrath, I immediately realized that it was *the same feeling* as when I woke up after the dream I recounted earlier. On the one hand, the dream was an anticipation of my reaction after I had read your

⁴ Cf. my idea of the "neutral language" and your book *Aion*, pp. 372–73 [CW 9ii, pars. 41–42].

⁵ See the conclusion of my essay on Kepler.

⁶ *Answer to Job*, CW 11, par. 739.

book, and on the other hand it now led me back to the subject level. At that moment, I saw that there also "happened" to be a work by McConnell^d lying on my desk, and I immediately recalled that you had intentionally arranged for your two works *Antw.auf Hiob* and the one on synchronicity to be published at more or less the same time. The ESP phenomena now also reflect one side of the psychophysical problem (where does the psyche actually stop when it comes to matter?), and if one took both books together, there was a much less "provincial" atmosphere.

On the subject level, a special form of the "dark one" has long been appearing in dreams and fantasies as the tertium, above and beyond the Catholic-Protestant pair of opposites (or the analogous opposites on the list given)—namely, the *Chinese woman* (or the Exotic One) with the typical slanted eyes. These indicate a particularly holistic view, but one that is still insufficiently connected with my rational ego. As a feminine (anima) figure, however, she is linked with *emotional interest*, which is accompanied by a stimulation or animation of the pairs of opposites. She sees connections other than those of conventional time, yet there always appears to me a "figure"⁷ that has the tendency to reproduce itself (automorphism) and to be at the basis of the perceptions of the "Chinese woman." This "figure" (one can also, in a certain sense, call it "archetype," see under p. 12) is psychic and physical, which is why the Chinese woman first appeared as the bearer of "psychophysical secrets," ranging from sexuality to subtle ESP phenomena. I believe that an animation of *pairs of opposites* also lies at the basis of ESP phenomena (and with the mantic of the *I Ching*).

Now my attention was drawn to the strangers⁸ by whom the dark one was surrounded in the dream. They seemed to be pointing out inadequately understood ideas to me—i.e., preconscious ones—which are connected with that "Chinese" (holistic) aspect of the dark one. This was confirmed by the following dream:

Dream, 28 September 1952

"The Chinese woman walks on ahead and beckons me to follow. She opens a trapdoor and walks down some steps, leaving the door open. Her movements are oddly dancelike; she does not speak but only expresses herself in mime, almost as in ballet. I follow her and see that the steps lead into an *auditorium*, in which "the strangers" are waiting for me. The Chinese woman indicates that I should get up onto the rostrum and address the

⁷ I was very pleased to see that you yourself also used the word "image" in *Aion* [CW 9ii, par. 278], where you say: "There is, therefore, no justification for visualizing the archetype as anything other than *the image of instinct in man*."

⁸ When you were kind enough to comment on an earlier dream of mine in which "strangers" appeared, you interpreted them as not yet assimilated thoughts. (Your Letter [39] of 20 June 1950.)

people, apparently to deliver a lecture. As I am waiting, she "dances" rhythmically back up the steps, through the open door into the open air, and then back down again. As she does so, she keeps the index finger of her left hand and her left arm pointing upward, her right arm and the index finger of her right hand pointing downward. The repetition of this rhythmic movement now has a powerful effect, in that gradually it becomes a rotation movement (circulation of the light). The difference between the two floors seems to diminish "magically." As I am actually mounting the rostrum of the auditorium, I wake up."

This dream, which made a deep impression on me, marked a certain progress. First of all, there is the *motif of the auditorium*⁹ with *strangers*, in front of whom I am to hold *lectures*. This has cropped up in previous dreams and is closely linked to dreams that I had been offered a *new professorship* but had not yet accepted. For example, when I was traveling to India and heading south off the coast of Spain and Portugal, I had a dream that I was traveling to *Holland* to take up an appointment as a professor. The "stranger" was awaiting me there. See the table above for Holland as the counterposition to science.⁶ The Indian way of thinking more or less corresponds to this counterposition. The motif of the not-yet-accepted professorship seems to me very important, for it shows the resistance of the conscious to the "professorship." The unconscious is rebuking me for having kept something specific from the public, something akin to a confession that I had not accepted my appointment out of conventional forms of resistance.

These forms of resistance are sometimes virtually condensed into a *shadow figure*. In my case, this shadow was projected¹⁰ onto my father,⁴ but I later learned to distinguish it from my real father, with the dream figure becoming visibly younger. This shadow is always intellectual and lacking in feeling and mentally rigidly conventional.

It must be borne in mind that mathematical science for me, and anyone else who pursues it, involves an extremely close link with tradition—a typically Western tradition, by the way; it is a source of strength and at the same time a chain! Conversions such as that of R. *Wilhelm* to Taoism or A. *Huxley* to Indian mysticism are, I think, not likely to happen to a scientist. In the spirit of this tradition and my conscious attitude, everything that is part of the counterposition of the sciences was a private matter, being connected with feeling. By way of contrast, the people in the lecture hall are expecting a professor who will teach the sciences and also their feeling-intuitive

⁹ The auditorium is also a "meeting" place. Cf. the dream in *Psychologie und Religion* [CW 11, pars. 58–60].

¹⁰ Cf. Dream 15, in *Psychologie und Alchemie*, 2d edn., p. 108f. [CW 12, pars. 162–63].

counterposition, perhaps even including ethical problems. The people in the auditorium, despite my resistance, hold the view that this extended subject matter of the lecture, although personal, is nevertheless also of interest to the public.

Then the dream contains the motifs of the *dance*. On the basis of experience extending over a lengthy period of time, I came to the conclusion that the rhythmic sensation being expressed here is based on an inner perception of "archetypal sequences."¹¹ As the ordering principle of the pairs of opposites is not primarily a temporal one, the tempo is arbitrary, with both fast and slow rhythms.¹² After having seen the God figures on the island of Elephanta near Bombay, I am more or less convinced that the rhythmic movements of the transmigration of souls and the world age [*Weltzeitalter*] in India, especially Siva's dance, are based on similar experiences.¹³ To the Westerner, however, after he has gone through the scientific age, it seems naive and erroneous to project the experience in concretist terms into rhythmic processes in the physis.

It is true that the "Chinese woman" is above and beyond the Catholicism-Protestantism, mysticism-science pairs of opposites, etc.; she is herself that holistic union of psyche and physis that still appears to the human mind as a problem; she is "seeing" in a special way. But, being free of any rationalization processes, this also means she is not capable of the rational skills of my consciousness, such as logical thinking, mathematics, etc. This is why she seeks the logos (or me) as a *bridegroom* and does not yet represent the final stage of development. Thus, in a later stage of development, a new light-dark masculine figure appears as a superordinate authority: the "stranger." This later development is expressed in the following dream, for example:

Dream: 20 December 1952, in Bombay

"A major war is going on. There is a Chinese couple on my side. In the course of the fighting, I drive the opposition back. When I am finally alone with the Chinese again, I catch sight of the stranger. I demand a formal employment contract for the Chinese couple. To their delight he agrees."

It seems that a further stage has thus been achieved in the ongoing confrontation with the unconscious. But I am still a long way from being able to assimilate into consciousness the contents of the unconscious, which appear here as "strangers" and "a Chinese couple," and this is probably

¹¹ Cf. your book *Die Psychologie der Übertragung* [Psychology of the Transference] [GW/CW 16, pars. 353-539], and A. Jaffé, "Der Gold. Topf."⁶

¹² Cf. the "world clock" in *Psychologie und Religion*, chap. 3 [CW 11, pars. 108-68].

¹³ In the West, rhythms appear in the fire of Heraclitus (enantiodromia) and in the sphere music of the Pythagoreans.

what the task of the new "professorship" would be. All I could do at this stage was feel my way tentatively into the context associated with these contents.

III.

I am still constantly surprised at this insistence of the unconscious on the new professorship with its lectures in auditoriums and on my appointment, and I wonder what such a professor might say who does not just "hold the tail but grasps it in his hand"¹⁴ (namely, theoretical physics) but who also "grasps the head mentally"¹⁵ and not "just in dreams."¹⁴

I cannot anticipate the new *coniunctio*, the new *hieros gamos* called for by this situation, but I will nevertheless try to explain more clearly what I meant with the final part of my Kepler essay: the firm grip on the "tail"—that is, physics—provides me with un hoped for aids, which can be utilized with more important undertakings as well, to "grasp the head mentally." It actually seems to me that in the *complementarity of physics*, with its resolution of the wave-particle opposites, there is a sort of *role model or example of that other, more comprehensive coniunctio*.¹⁶ For the smaller *coniunctio* in the context of physics, completely unintentionally on the part of its discoverers, has certain characteristics that can also probably be used to resolve the other pairs of opposites listed on p. 3. The analogy is on these lines:

Quantum physics	Psychology of the individuation process and the unconscious in general
mutually exclusive complementary experimental setups, to measure position as well as momentum	scientific thinking—intuitive feeling
Impossibility of subdividing the experimental setup without basically changing the phenomenon	Wholeness of man consisting of consciousness and unconsciousness
Unpredictable intervention with every observation.	Change in the conscious and the unconscious when consciousness is acquired, especially in the process of the <i>coniunctio</i> .
The result of the observation is an irrational actuality of the unique occurrence	The result of the <i>coniunctio</i> is the <i>infans solaris</i> , individuation.

¹⁴ Kepler's words, see my article, p. 151 [156] above ["Der Einfluss Archetypischer Vorstellungen auf die Bildung Naturwissenschaftlicher Theorien bei Kepler"; tr. "The Influence of Archetypal Ideas on the Scientific Theories of Kepler," p. 200].

¹⁵ Fludd's words, *ibid.*, p. 152 [tr., pp. 196-97].

¹⁶ I had interesting discussions about these matters with Mr. M. Fierz, to whom I am most grateful.

The new theory is the objective, rational and hence symbolic grasping of the *possibilities* of natural occurrences, a sufficiently broad framework to accommodate the irrational actuality of the unique occurrence.

One of the means used to back up the theory is an abstract mathematical sign ($\psi/ ?$), and also complex figures (functions) as a function of space (or of even more variability) and of time.

The laws of nature to be applied are statistical laws of probability. An essential component of the concept of probability is the motif of "the One and the Many."

The atom, consisting of nucleus and shell.

The objective, rational, and hence symbolic grasping of the psychology of the individuation process, broad enough to accommodate the irrational actuality of the unique individual

The aid and means of backing up the theory is the concept of the unconscious. It must not be forgotten that the "unconscious" is *our symbolic sign for the potential occurrences in the conscious, not unlike that ($\psi/$)*

There is a generalization of the law of nature through the idea of a self-reproducing "figure" in the psychic or psychophysical occurrences, also called "archetype." The structure of the occurrences that thus come into being can be described as "automorphism." Psychologically speaking, it is "behind" the time concept.

The human personality, consisting of "nucleus" (or Self) and "Ego."

I should like to add just a few epistemological remarks to this provisional schema. By allowing for occurrences and the utilization of possibilities that cannot be apprehended as predetermined and existing independent of the observer, the type of interpretation of Nature characteristic of quantum physics clashes with the old ontology that could simply say "Physics is the description of reality,"¹⁷ as opposed to "description of what one simply imagines."¹⁷ "Being" and "nonbeing" are not unequivocal characterizations of features that can be checked only by statistical series of experiments with various experimental setups, which in certain circumstances are mutually exclusive.

In this way, the confrontation between "being" and "nonbeing" that was begun in ancient philosophy sees its continuation. In antiquity, "nonbeing" did not simply mean not being present but in fact always points to a *thinking problem*. Nonbeing is that which cannot be thought about, which cannot be grasped by thinking reason, which cannot be reduced to notions and concepts and cannot be defined. It was along these lines, as I see it, that the ancient philosophers discussed the question of being or nonbeing.¹⁸ And it

¹⁷ *Einstein's words.*

¹⁸ You got involved in this old discussion when you came across the Neoplatonist formula

was especially along these lines that the process of becoming and the changeable, hence also matter, appeared in a certain form of psychology as nonbeing—a mere *privatio* of “Ideas.” By way of contrast, Aristotle, evading the issue, created the important concept of *potential being* and applied it to *hyle*. Although *hyle* was actually “nonbeing” and simply a *privatio* of “form” (which is what he said instead of “Ideas”), it was potentially “being” and not simply a *privatio*. This is where an important differentiation in scientific thinking came in. Aristotle’s further statements on matter (he clung firmly to the Platonic notion of matter as something passive, receiving) cannot really be applied in physics, and it seems to me that much of the confusion in Aristotle stems from the fact that being by far the less able thinker, he was completely overwhelmed by Plato. He was not able to fully carry out his intention to grasp the potential, and his endeavors became bogged down in the early stages. It is on Aristotle that the peripatetic tradition and, to a large extent, alchemy is based (*vide* Fludd). Science today has now, I believe, arrived at a stage where it can proceed (albeit in a way as yet not at all clear) along the path laid down by Aristotle. The complementary characteristics of the electron (and the atom) (wave and particle) are in fact “potential being,” but one of them is always “actual nonbeing.” That is why one can say that science, being no longer classical, is for the first time a genuine theory of becoming and no longer Platonic. This accords well with the fact that the man who is for me the most prominent representative of modern physics, Mr. Bohr, is, in my opinion, the only truly non-Platonic

that evil is “nonbeing,” is simply a *privatio boni*. Your characterization of this statement as “nonsense” (*Antwort auf Hiob [Answer to Job]*, p. 39, n. 6) [GW/CW 11, par. 600, n. 13] I attribute more to the bad habit of modern theologians of using old words whose meaning they have long ceased to understand rather than to the original statement itself. For me personally, modern theologians are totally uninteresting, but on the other hand it seems to me *imperative* in such discussions to go back to the original roots of the words and expressions used.

What the ancients meant when they said “nonbeing” was what we would more accurately describe today as “irrational” or “dark.”

Now ever since Socrates and Plato, Good has been understood and considered as *Rational* (the virtues are even teachable!), unlike Evil, which does not lend itself to any conceptual definition—a great idea, or so it seems to me. According to this interpretation, the latter regards Good in the same way that matter regards the ideal (“being”) mathematical object. With Plato, matter is actually *defined* as that which distinguishes the empirical object from the ideal geometrical object. What they both have in common is the Comprehensible, the Positive, the Good in the empirical body; what makes them different—matter—is the Incomprehensible, later Evil. Hence, matter has only the *passive* function of adopting the geometrical ideas hypostasized as “being” (it is the “receptacle” or “wet nurse” of these ideas). Thus, in later Platonism the *privatio boni* means: Expressed in general terms and understood from the point of view of the “one,” unchangeable “being” idea, like Euclid’s geometry, Evil can be *rationally* characterized as the absence of Good, the lack of ideas.

(It is odd how reading your books always transports me back to antiquity. It is obviously a personal effect you have on me; before reading *Aion*, I was not all that interested in antiquity.)

thinker.¹⁹ even in the early '20s (before the establishment of present-day wave mechanics) he demonstrated to me the pair of opposites "Clarity-Truth" and taught me that every true philosophy must actually start off with a *paradox*. He was and is (unlike Plato) a *dekranos*²⁰ *kat exochen*, a master of antinomic thinking.

As a physicist familiar with this course of development and this way of thinking, the concepts of the gentlemen with the stationary spheres²¹ are just as suspect to me as the concepts of "being" metaphysical spaces or "heavens" (be they Christian or Platonic), and "the Supreme" or "Absolute."²² With all of these entities, there is an essential paradox of human cognition (subject-object relation), which is not expressed, but sooner or later, when the authors least expect it, it will come to light!

For these reasons I should like to suggest also applying the Aristotelean way out of the conflict between "being" and "nonbeing" to the concept of the unconscious. Many people still say that the unconscious is "nonbeing," that it is merely a *privatio* of consciousness.²³ (This probably includes all those who reproach you with "psychologism.") The counterposition is that of placing the unconscious and the archetypes, like ideas in general, in supracelestial places and in metaphysical spaces. This view strikes me as equally dubious and contradictory to the law of the Kairos. This is why I have opted for the third road in my analogy schema in interpreting the unconscious (as well as the characteristics of the electron and the atom) as "potential being."²⁴ It is a legitimate description by man for potential occurrences in the conscious and as such belongs to the genuine symbolic reality of the "thing in itself." Like all ideas, the unconscious is in *both man and nature*; ideas have *no* fixed abode, not even a heavenly one.²⁵ To a certain extent, one can say of *all* ideas "*cuiuslibet rei centrum, cuius circumferentia est nullibi*" (the center of all things—a center whose periphery is nowhere), which, according to ancient alchemistic texts, is what Fludd said of God; see

¹⁹ The English philosopher A. N. Whitehead [1861–1947] once said that the whole of European philosophy consisted of footnotes to Plato.

²⁰ "Double-head"—nickname for disciples of Heraclitus given by disciples of Parmenides.

²¹ I have *Parmenides* and *Kepler* in mind.

²² This is an allusion to Indian philosophy. Even those Indian philosophers who, like *Prof. S. Radhakrishnan* [1888–1975], avoid applying the word "illusion" to the empirical world have no other way of commenting on the *Mysterium* of the connection between "ultimate reality" and the empirical world, except to call it "Maya."

The Absolute always has the tendency to place itself at an immeasurable distance from man and nature. I happily quote your own words (*Antw. auf H. [Answer to Job]*), p. 167 [GW/CW 11, par. 757]: "Only that which affects me do I acknowledge as real. But what does not affect me may as well not exist."

²³ Cf. also *Psychologie und Religion*, p. 153 [GW/CW 11, par. 141].

²⁴ Cf. *ibid.*, p. 186 below [GW/CW 11, par. 165]: archetypes as formal possibility.

²⁵ This point of view was also put forward by Mr. Fierz in the discussion referred to.

my Kepler article, p. 174 [tr., p. 219]. As long as quaternities are kept "up in heaven" at a distance from people (however pleasing and interesting such endeavors, seen as omens, may be), no fish will be caught, the *hieros gamos* is absent, and the psychophysical problem remains unsolved.

The psychophysical problem is the conceptual understanding of the possibilities of the irrational actuality of the unique (individual) living creature. We can only come close to dealing with this problem when we can synthetically resolve the pair of opposites "materialism-psychism" in natural philosophy. When I say "psychism," I do not mean "psychologism" nor something peculiar to psychology²⁶ but simply the opposite of materialism. I could also have said "idealism," but that would have restricted it in time to the famous currents of philosophy prevailing in the 19th century after Kant. These currents (including Schopenhauer), as well as the whole of Indian philosophy, fall into this category of "psychism."

But as the alchemists correctly surmised, matter goes just as deep as the spirit, and I doubt whether the goal of any development can be absolute spiritualization. Sciences made by man—whether or not we wish or intend it and even if it is natural sciences—will always contain *statements about man*.²⁷ And that is also precisely what I was trying to express with the analogy schema in this section.

Thus the aim of science and of life will ultimately remain man, which is actually the note on which your book *Antwort auf Hiob* [*Answer to Job*] closes: In him is the ethical problem of Good and Evil, in him is spirit and matter, and his wholeness is depicted with the symbol of the quaternity.

It is today the archetype of the *wholeness* of man from which natural science, now in the process of becoming quaternary, derives its emotional dynamics. In keeping with this, the modern scientist—unlike those in Plato's day—sees the rational as both good and evil. For physics has tapped completely new sources of energy of hitherto unsuspected proportions, which can be exploited for both good and evil. This has led initially to an intensification of moral conflicts and of all forms of opposition, both in nations and in individuals.

This wholeness of man²⁸ seems to be placed in two aspects of reality: the

²⁶ As a psychologist, you have an understandable aversion to all forms of reality that are not just psychic. And just as everything that King Midas touched turned to gold, everything you looked at seemed to me to turn psychic and only psychic. This aversion to the nonpsychic was probably also one reason why you did not mention the psychophysical problem in your book *Antwort auf H.* [*Answer to Job*].

However, in the passage already quoted in *Aion* (p. 372) [GW/CW 9ii, pars. 412–13], you put forward a point of view on the ultimate unity of physis and psyche that coincides with mine. See also note 28 [below].

²⁷ Cf. my Kepler essay, p. 163, n. 7 [tr., pp. 208–12, n. 7].

²⁸ This gives rise to the question very closely connected with the psychophysical problem: Is the archetype of wholeness restricted to man, or does it also manifest itself in nature? See your

symbolic "things in themselves," which correspond to "potential being," and concrete manifestations, which correspond to the actuality of "being." The first aspect is the rational one, the second the irrational one²⁹ (I use these adjectives analogously, as you did in the typology theory for the characterization of the various functions.) The interplay of the two aspects creates the process of becoming.

Is it in keeping with the Kairos and the quaternity to call these fragments of a philosophy "critical humanism"?

This lengthy letter is a sort of treatise, but it is a personal one and is dedicated to you personally in the form of a letter so that it can be submitted to you for criticism from the viewpoint of analytical psychology. In section II especially I have provided quite a bit of relevant material. I certainly do not believe that this paper contains everything that those "strangers" wanted to hear from me; it is rather a preparatory clarification of my point of view, to enable me to deal with it at greater length.

Should you be able to reply to this letter at some point, it would give me great pleasure, but there is no hurry at all. Its length is partly due to the influence of India. Although the country had a very bad effect on my wife's health, for me, as it was itself a place of extreme contrasts, it was most

^a Jung, *Answer to Job*; CW 11, pars. 553–758.

^b Jung, *Psychology and Religion*; CW 11, pars. 1–168.

^c Gonseth: see Letter 53, note b.

^d Robert A. McConnell, "ESP—Fact or Fancy."

^e Pp. 9–10. See Holland table, above.

^f Wolf Pascheles, born in Prague, 1869, father of Pauli, had himself baptized as a Catholic, took the name of Wolfgang Pauli in Vienna (which is why our Pauli signs his earlier works "Wolfgang Pauli jun."). Doctor of medicine in Prague, university lecturer in Vienna, eminent colloid chemist. Further work in this field with Professor Karrer in Zürich. Died in Zürich 4 November 1955. First married to Bertha Camilla Schütz, Pauli's mother, known as "Maria," 1878–1927.

^g In Jung, *Gestaltungen des Unbewussten, Mit einem Beitrag von Aniela Jaffé*. Frau Jaffé's contribution was entitled, "Bilder und Symbole aus E.T.A. Hoffmanns Märchen 'Der Goldne Topf,'" pp. 239–64.

essay "Der Geist der Psychologie" [The Spirit of Psychology], *Eranos Jahrbuch* 1946, p. 483f. [rev. GW/CW 8, par. 440], where you treat the archetypes as not just psychic. [In two notes accompanying pars. 438–39, Jung acknowledges Pauli's help in his formulation.]

²⁹ The older ancient philosophers since Parmenides have correspondingly described concrete phenomena as "nonbeing." By way of contrast, all general concepts and ideas with unchangeable characteristics ("form" in Aristotle), especially *geometrical* concepts, were "being." There are ancient astronomical papers that set themselves the task of "*saving*" phenomena *ὁ ζειν τὰ φαινόμενα*. Apparently, they did not use the word "explain." I am not going into the question of pure mathematics here.

exciting in the way it brought to the surface all the opposites within myself. This is the second paper I have written since I returned from India, as befits the demands of the "tail" and the "head."

With best wishes for your well-being,

Yours sincerely, W. PAULI

59J

Küsnacht, 7 March 1953

[Typewritten carbon copy
with handwritten additions]

Dear Mr. Pauli,

I was very pleased to hear from you once again. It surprised me greatly that you should be looking at *Hiob*, and I am indebted to you for taking the trouble to report on it so thoroughly. It is indeed very unusual for a physicist to make observations on such a specifically theological problem. You can imagine the excitement with which I read your letter. That is why I am hastening to reply with the same attention to detail. As your letter raises so many questions, I had perhaps better take them point by point.

I very much welcome the fact that you generally give credit to the archetype of the feminine for influencing psychology and physics and—last but not least—the pope himself. Apparently your initial reaction to *Hiob*, as the dream indicates, did not contain or make conscious everything that might have risen to consciousness through the reading. Consequently, in the dream you unintentionally end up in an insignificant (inappropriate) place (Esslingen), but that is where you find what was missing in your reaction—namely, the *dark anima* and the *strangers*. As you will see below, it goes even further than that and includes the physical backside¹ of the *Assumpta*. Esslingen is indeed incommensurable with the theoretical physics that you pursue in Zürich and hence seems to be unconnected, haphazard, meaningless, and *négligible*. This is how the place of the dark anima looks when seen from the standpoint of consciousness. Had you known before that the dark anima lives or is to be encountered in Esslingen, the Forch railway would probably appear to you in a different light. But what good can come out of Nazareth (Esslingen)? Physics, on the other hand, resides up on the Zürichberg, on Gloriastrasse.² It is clear that the scales are weighted on the side of consciousness and that the dark anima is to be found at the foot of and on the other side of the Pfannenstiel hill. . . . *animula vagula blandula*. . . !

This state of affairs sheds light on your relationship to the dark anima and everything it stands for; I refer to your list, to which I should like to add the pair of opposites *psychology-philosophy*.

The dark anima has a direct connection with the dogma of the Assump-

¹ In analogy to the cabalistic *posteriora Dei*!

tion in that the Madonna is a one-sided light goddess, whose body (womb!) seems to have been miraculously spiritualized. The strong emphasis placed on such a figure brings about a constellation of the dark Opposite in the unconscious. The new dogma had an upsetting effect on many people and made even practicing Catholics (let alone Protestants!) believe it was some *political* maneuver. Behind this thought is the Devil, as you rightly point out. He is the father of this depreciatory interpretation. The one-sidedness of the light figure was what tempted him to insinuate this interpretation. Were the new dogma in fact nothing more than a political maneuver, then one would have to point to the Devil as the instigator. In my view, however, it is not a political trick but a genuine phenomenon, i.e., the manifestation of that archetype that much earlier on had occasioned the assumption of Semele by her son Dionysus.

But the dogma of the Assumption is *implicitly* a concession to the Devil, first because it exalts the feminine, which is related to the Devil (as *binarius*), and second because the assumption of the body signifies the assumption of Matter. It is true that the feminine is virginal, and the material is spiritualized, which you justifiably criticize, but the eternally renewed virginity, on the one hand, is an attribute of the goddesses of love, whereas the material is endowed with a living soul. I did *not explicitly* present these far-reaching consequences in Job but simply alluded to them through symbols, the reason being that within the framework of Job, the problem of Matter could not really be dealt with. But I did indicate it with the apocalyptic *stone symbolism* and with the parallelism of the Savior as the *sun and moon son*, i.e., as the *filii Philosophorum and Lapis*.

In my view, the discussion of Matter must have a scientific basis. That is why I pressed for *Hiob* and *Synchronizität* [Synchronicity] to be published at the same time, for in the latter I attempted to open up a new path to the "state of spiritualization" [*Beseeltheit*] of Matter by making the assumption that "being is endowed with meaning" (i.e., extension of the archetype in the object).

When I wrote *Hiob* I expected *absolutely nothing* from the theologians, and in fact, as anticipated, I have had only very little reaction; I was thinking much more of all those who have been put off by the meaninglessness and thoughtlessness of the Church's "Annunciation," of the so-called kerygmatics. It was from these people that I had the strongest reaction.

In your Part II [Letter 58] you yourself reach all these conclusions. The "Chinese woman" represents a "holistic" anima, for classical Chinese philosophy is based on the notion of an interplay of psychophysical opposites. ESP certainly belongs in this context, for if anything at all can be perceived in this field, it is based on the psychoid archetype, which, as experience has shown, can be express itself *both psychically and physically*.

In the dream, the Chinese woman seems to be uniting opposed positions,

which gives rise to "circulation"—i.e., *rotation*. Connected with the latter is a *change of space* in the sense of a *contraction*. This also leads to a *change in time and causality*; in other words, an ESP or synchronistic phenomenon brought about by the archetype. That is a tangible part of the teaching that you as a professor would have to advocate. Applied to the object of physics, this would lead to the definition of physics as a *science of ideas labeled as material* (or physical). (See below!)

Insofar as the Chinese woman as the anima represents an autonomous figure and the idea of union, the middle ground where the *coniunctio oppositorum* takes place is not yet identical with you but is situated externally—in the anima, which means that it is not yet integrated. The principle that endows the anima with its special significance and intensity is Eros, attractions and relatedness. (As an ancient Sabeian says, "*Attraxit me Natura et attractus sum.*") Where the intellect dominates, then what you have is primarily a feeling-centeredness or the acceptance (assumption) of feelings of connectedness. That is also the essential meaning of the Assumption B. V. Mariae, in contrast to the separating effect of the masculine logos. The union of opposites is not *just an intellectual* matter. That is why the alchemists said: "*Ars totum requirit hominem!*" For only from his wholeness can man create a model of the whole.

It is certainly an indisputable fact that the unconscious has a "periodic" character; there are waves and swells that often produce such symptoms as seasickness, cyclical recurrences of nervous attacks or dreams. Over a period of 3 years, from mid-December to mid-January, I have observed in myself similar dreams that have made a very deep impression on me.

Your compilation of physical and psychological statements is most interesting and illuminating. I should just like to add:

The smallest mass particle consists of corpuscle and wave.

The archetype (as structure element of the unconscious) consists of static form on the one hand and dynamics on the other.

As regards "being" and "nonbeing," it is clear that virtually all those who operate with the concept of "nonbeing" simply have a *different* understanding of "being," such as the concept of Nirvana, for example. That is why I never talk of "being" but of the *ascertainable* and the *nonascertainable*, and very much *hic et nunc*. As there is something sinister about the nonascertainable, the people of the ancient world (and the primitives) feared it, and because, when it materializes, it is always different from what one expects, it is even *evil*. Plato made this experience with the two tyrants Dionysius [Elder and Younger] of Syracuse (see *Symbolik des Geistes* p. 341.^b The incommensurable mixture of "Good" and "Being" and of "Evil" and "Non-being" seems to me essentially a relic of primitive indiscrimination.

By way of contrast, the potential "being" of Matter in *Aristotle* marks a major step forward. In my view, "being" and "nonbeing" are inadmissible metaphysical judgments that just lead to confusion, whereas "ascertainable" and "nonascertainable" take into account *hic et nunc* the relatedness of the actual and the nonactual to the indispensable observer.

Without wishing to cast aspersions on *Bohr's* originality, I should nevertheless like to point out that *Kant* had already demonstrated the necessary antimony of all metaphysical statements. Of course, this also applies to statements concerning the unconscious, in that the latter is in itself non-ascertainable. As such, it can either be "a potential being" or "nonbeing." I would, however, place these last two concepts in the category of metaphysical judgments, where in fact all concepts of "being" belong. *Aristotle* was not able to create sufficient distance from the influence of *Plato* to see the merely postulated character of his concepts of "being."

In that "spiritualism" and "materialism" are statements on Being, they represent metaphysical judgments. They are only admissible as necessary elements in the process of apperception; namely, as the labeling of categories of ideas, such as "that is of mental (or spiritual) origin" or "that is of physical (or material) origin." Metaphysical judgment, however, always places an element of the psychic in an external location, thus preventing a union of Idea and Matter. Only in a third medium (in the *τρίτον είδος* of *Plato*, see *Symbolik des Geistes* [*Symbolism of the Spirit*], p. 339ff. [CW 11, pars. 182-83]) can the union of the two spheres take place, where both Idea and Matter are removed from their "in and for itself being" and adapted to this third medium—namely, the *psyche of the observer*. Nowhere else but in the *psyche* of the individual can the union be completed and the essential identity of Idea and Matter be experienced and perceived. I view metaphysical judgments—forgive this heresy—as a relic of the primitive participation mystique, which forms the main stumbling block to the attainment of an individual consciousness. What is more, metaphysical judgments lead to one-sidedness such as spiritualization or materialization, for they take a more or less large or significant part of the *psyche* and situate it either in Heaven or in earthly things, and then it can drag the whole person along with it, thus depriving him of his middle position.

If, in epistemological self-limitation, we characterize Spirit and Matter "in and for itself" as nonascertainable, this does not detract in any way from their metaphysical Being, for it is absolutely impossible for us even to approach it. But we have prevented the projection of the psychic into an external location, thus promoting the integration of the wholeness of man.

The *psyche* as *τρίτον είδος* and as a medium participates in both Spirit and Matter. I am convinced that it (the *psyche*) is partly of a material nature. The archetypes, for example, are Ideas (in the Platonic sense) on the one hand, and yet are directly connected with physiological processes on the

other; and in cases of synchronicity they are arrangers of physical circumstances, so that they can also be regarded as a characteristic of Matter (as the feature that imbues it with meaning). It is part of the nonascertainability of their being that they cannot be situated in place. This is particularly the case with the archetype of wholeness—that is, of the Self. It is the One and the Many, *ἔν τὸ πᾶν*. As you rightly say, the wholeness of man holds the middle position, namely between the *mundus archetypus*, which is *real*, because it acts, and the physis, which is just as *real*, because it acts. The principle of both, however, is unknown and therefore not ascertainable. Moreover, there are grounds for supposing that both are just different aspects of one and the same principle; hence the possibility of setting up identical or parallel physical and psychological propositions on the one hand, and on the other the psychological interpretability of religious revelations. (Theologians have the same resistance to psychologists as physicists, except that the former believe in *Spirit* and the latter in *Matter*.)

The fact that on the whole our views coincide is very pleasing to me, and I am very grateful to you for presenting your opinions in such detail. It seems to me that you have done a great deal of thinking and have covered a lot of ground, which would give you quite a lot to tell the *strangers* about. If one moves too far forward, it is often impossible to remember the thoughts one had before, and then the public finds one incomprehensible.

If I have presented my views rather briefly here, much of what I say may sound apodictic, but that is not my intention at all. It is much rather that I am aware of how improvised and makeshift my definitions are and how much I am dependent on your goodwill and understanding.

I am not yet in the best of health. I still suffer from occasional bouts of tachycardia and arrhythmia and have to be especially careful not to over-exert myself mentally. This letter was already too much of an effort and one that I must avoid repeating for a while. The problem of the *coniunctio* must be kept for the *future*; it is more than I can cope with, and my heart reacts if I exert myself too much along these lines. My essay on the “Der Geist der Psychologie” [*The Spirit of Psychology*] of 1946^c resulted in a serious attack of tachycardia, and synchronicity brought on the rest.

I would be very interested to hear about your impressions of India sometime. I must just wait until my health is a little more stable. At the moment I can only receive visitors in the mornings, as I have to rest in the afternoon. I must practice patience and thus force others to acquire the same virtue.

With best wishes,

Yours sincerely, [C. G. JUNG]

^a Premises of the ETH Physics Department at the time.

^b Jung, *Symbolik des Geistes* [Symbolism of the Spirit], 1948, [CW/CW 11, par. 184].

^c Jung, in *Erano Jahrbuch* 1946, pp. 385–490; tr., rev., CW 8, pars. 343–442.

60 P

[Zürich] 31 March 1953

[Typewritten carbon copy
with handwritten additions]

Dear Professor Jung,

I should like to thank you very much for your lengthy and instructive letter in which you put forward your views in such detail. Much of what was in the letter—for example the interpretation of the *Assumptio Mariae*—needs no further comment since this question has now been cleared up for me in a perfectly satisfactory manner. However, I would like to make a few remarks with regard to questions of an epistemological nature, and especially to make it clear that I have no use at all for the “Being” definitions that you assign to metaphysical judgments¹ and can much better express what I mean with your terms “ascertainable” and “nonascertainable.” That is why I should like to start off by explaining what the epistemological state of affairs looks like from this viewpoint. This also gives me a good opportunity to say where I am coming from mentally, whereas in the second section of this letter I shall talk more about where I should like to go. There, working on the basis of your letter, I shall once again take up the discussion of the question that is so important to me—namely, the relationship between spirit, psyche, and matter. This will also implicitly make clear how I as a physicist actually came to respond “to such a specifically theological problem” as the one on which your book *Job* is based: Between the theologians and myself as a physicist there is the (“archetypal”) relationship of enemy brothers. As you hinted on p. 6 of your letter [Letter 59, par. 18], that is why there is the well-known “secret (unconscious) identity” between them. And in fact, the unconscious has shown me images and words in a purely physical language, the interpretation of which, even from an antimetaphysical viewpoint, will not be unlike many a theological statement. I shall demonstrate this in the second part of this letter by means of an example, and at the same time compare my own attitude with yours as regards the relationship spirit—psyche—matter.

1. THE CARD IN THE GOBLET

The labeling of ideas² as either of spiritual origin or physical (or physiological) origin and your corresponding definition of physics as a science of ideas of the second kind has revived memories of my youth.

¹ In connection with the already existing nonmetaphysical trends in epistemology, I am willing to forgo these Being statements. This corresponds, also psychologically, with the fact that with me the center of the mandala is empty.

² This also struck me earlier in your lecture on “Das Grundproblem der gegenwärtigen Psy-

Among my books, there is a somewhat dusty case containing a Jugendstil silver goblet, and in this goblet there is a card. A gentle, benevolent, and cheerful spirit from days of yore seems to be issuing forth from this goblet. I can see him shaking your hand in a friendly way, welcoming your definition of physics as a pleasing, albeit somewhat belated, indication of your insight and understanding; he goes on to add how suitable the labels are for his laboratory, and expresses his satisfaction at the fact that metaphysical judgments in general (as he was wont to say) "have been relegated into the realm of the shadows of a primitive form of animism."³ This goblet is a baptism goblet, and on the card it says in an old-fashioned ornate script: "Dr. E. Mach, Professor at the University of Vienna."^a It so happened that my father was very friendly with his family, and at the time totally under his influence mentally, and he (Mach) kindly agreed to take on the role of my godfather. He must have had a much stronger personality than the Catholic priest, with the apparent result that I was thus baptized in an antimetaphysical manner rather than in a Catholic one. Be that as it may, the card remains in the goblet, and despite all the great mental changes I went through later on, it remains a label that I myself bear—namely: "of antimetaphysical origin." And in fact, to put it in a somewhat simplistic way, Mach regarded metaphysics as the root of all evil in this world—in other words, in psychological terms, as the Devil himself—and that goblet with the card remained as a symbol of the *aqua permanens* that keeps evil metaphysical spirits at bay.

I do not need to describe Ernst Mach more closely, for if you look at your own description of the extraverted sensation type, then you will see E. Mach. He was a master at experimentation, and his apartment was crammed full of prisms, spectroscopes, stroboscopes, electrostatic machines, and the like. Whenever I visited him, he always showed me some neat experiment, already completed, partly so as to eliminate unreliable thinking, with the ensuing illusions and errors, and partly to support it and correct it. Working on the assumption that his psychology was a universal one, he recommended everyone to use that inferior auxiliary function as "economically" as possible (thought economy). His own thought processes closely followed the impressions of his senses, tools, and apparatus.

This letter is not meant to be a history of physics, nor the classical case of type opposites: E. Mach and L. Boltzmann,^b the thinking type.⁴ I last saw

chologie" [The Basic Problem of Contemporary Psychology] (see *Wirklichkeit der Seele* [Reality of the Soul], no. 1 [pp. 11–31, slightly rev., with English title change in CW 8, pars. 649–88]). At the time, it also had a similar effect.

³ See p. 5 of your letter [59, par. 16]. You will understand that I could not help smiling when I read your words: "Forgive this heresy."—Incidentally, it is only orthodoxy that I often have difficulty in forgiving; "heresy" is for me a rather mild term.

⁴ I should like to recount an anecdote here because I am sure you will really enjoy it. Mach,

Mach just before the First World War, and he died in 1916 in a country house near Munich.

What is interesting in connection with your letter is Mach's attempt to fall back on psychic facts and circumstances (sensory data, ideas) within the realm of physics as well and especially to eliminate as far as possible the concept of "matter." He regarded this "auxiliary concept" as grossly overrated by philosophers and physicists and viewed it as a source of "pseudo problems." His definition of physics basically coincided with the one proposed by you, and he never failed to stress that physics, physiology, and psychology were "only different in the lines of investigation they took, not in the actual object," the object in all cases being the constant psychic "elements" (he exaggerated their simplicity somewhat, for in reality they are always very complex).⁵ I was surprised that despite your sweeping criticism of what later came to be called "Positivism" (Mach used this term a great deal), there are nevertheless also fundamental similarities between you and this line of thought: In both cases there is the *deliberate elimination of thought processes*. And of course there is nothing at all wrong with these labels for ideas and the corresponding definition of physics, especially as it accords perfectly with the idealistic philosophy of Schopenhauer, who consciously uses "Idea" and "Object" synonymously. But it all depends on *how one proceeds*. What Mach wanted, although it could not be carried out, was the total elimination of everything from the interpretation of nature that is "not ascertainable *hic et nunc*." But then one soon sees that one does not understand anything—neither the fact that one has to assign a psyche to others (only one's own being ascertainable) nor the fact that different people are all talking about the same (physical) object (the "windowless monads" in Leibniz). Thus, in order to meet the requirements of both instinct and reason, one has to introduce some *structural elements of cosmic order*, which "in themselves are not ascertainable." It seems to me that with you this role is mainly taken over by the archetypes.

It is right that what one does or does not call "metaphysics" is, to a certain extent, a matter of taste. And yet I agree with you totally that in practical terms, great value is to be attached to the demand that metaphysical judg-

who was by no means prudish and was most interested in all the intellectual trends of the day, once pronounced judgment on the psychoanalysis of Freud and his school. He said: "These people try to use the vagina as if it were a telescope so that they can see the world through it. But that is not its natural function—it is too narrow for that." For a while this became a popular quotation at the University of Vienna. It is very typical of Mach's *instrumental* way of thinking. For him, psychoanalysis immediately conjures up the vividly concrete image of the wrongly applied instrument; namely, the female organ where it does not belong.

⁵Mach's main achievement in physics is his criticism of absolute space. In the question of the contraction of space through archetypes there is thus a further connection between Mach and the contents of your letter, but this is not the place to go into that.

ments be avoided. What is meant by that is that the "not in themselves ascertainable" factors (concepts) that have been introduced do not completely escape the controlling, checking mechanism of experience, and that *no more of them may be introduced than is absolutely necessary*: They serve the purpose of *making statements about the possibility of ascertainments hic et nunc*. This was the sense in which the concept of "possibility" was meant, and it was in this sense that I called such concepts "*symbolic things in themselves*" and the "*rational aspect of reality*." As you rightly point out, *there is absolutely no need to make statements of Being in the metaphysical sense about these "things in themselves."* In the natural sciences, one makes the *pragmatic statement of usefulness* about them (in order to understand the ordering system of the ascertainable); in mathematics there is just the *formal logical statement of consistency*. In psychology, those "not in themselves ascertainable" concepts include, the unconscious and the archetypes, and in atomic physics, they include the totality of the characteristics of an atomic system that are *not all simultaneously "ascertainable hic et nunc."*

In my last letter, I referred to that which is actually "ascertained *hic et nunc*" as "concrete phenomenon" and the "irrational aspect of reality." It is always present in the psyche of an observer, whatever the "label of origin" might be. At this point, however, the question arises of whether the description "psychic" or the term "psyche" can go *further* than the "ascertainable *hic et nunc*." I am inclined to reply to this question in the negative and to take the "not in themselves ascertainable" structures, which are introduced as conceptual indications of possibilities of the ascertainable, and give them the definition "*neutral*" and *not the definition "psychic."*

To me, this view also seems to be supported by Plato's expressions *meson* (middle) and *tritoneidos* (third form), which both meet my requirements for "neutrality" (=middle position), nay, actually seem to *emphasize* it. Plato certainly had the word "psyche" at his disposal, and if he opts to use a different word instead, then it must be one with a deeper meaning, one that calls for careful consideration. For me, this deeper meaning lies in the need to make a clear distinction between the experience of the individual, which exists in his psyche as something ascertainable *hic et nunc*, and the general concepts, which, "nonbeing ascertainable in themselves," are suitable for taking up a middle position. Your *identification of psyche = tritoneidos* thus seems to me a *retrograde step*, a loss in terms of conceptual differentiation.

With my call for "neutral" general concepts, I find myself in agreement with your article "Der Geist der Psychologie" [The Spirit of Psychology], which struck me as fundamental, especially when you say:⁶ "The archetypes have . . . a nature which one cannot definitely describe as psychic. Although

⁶ *Eranos Jahrbuch* 1946, pp. 483-84 [CW 8, par. 440].

by the application of purely psychological considerations I have come to question the solely psychic nature of the archetypes, etc." I feel that you should certainly *take these doubts seriously and not once again* make too much of the *psychic factor*. When you say that "the psyche is partly of a material nature,"⁷ then for me as a physicist this takes on the form of a metaphysical statement. I prefer to say that psyche and matter are governed by common, neutral, "not in themselves ascertainable" ordering principles. (Unlike the psychologist, the physicist has no problem, for example, with saying "the U field" instead of "the unconscious," which would thus establish the "neutrality" of the concept.)

But I wish to make it quite clear that my hope that you might agree with this general point of view is based on the impression that some of the *pressure needs to be removed* from your analytical psychology. The impression I have is of a vehicle whose engine is running with overloaded valves (expansion tendency of the concept "psyche"); that is why I should like to relieve some of the pressure and let off steam. (I shall come back to this later on p. 10 below [par. 24]).

I would also hope that a clarification of the scope of the concept of the psyche might include your *de iure* recognition of the fact that the heart is not just a psychological symbol but also a conception labeled "of physical origin." Economy with the inferior function on the lines of *E. Mach* often serves to fulfill a function, even if it is not actually that of thinking!

2. HOMO-USIA

I believe in fact—not as a dogma but as a working hypothesis—in the essential identity (*homo-usia*) of the *mundus archetypus* and physis as you formulate it on p. 6 of your letter [Letter 59, par. 18]. If this hypothesis is valid—and the possibility of physical and psychological parallel statements supports this—then it must be expressed conceptually. In my view, this can happen only by means of concepts that are neutral in relation to the opposition psyche-physis.

Now in fact such concepts do exist—namely, mathematical ones: The existence of mathematical ideas that can also be applied in physics seems to me possible only as a consequence of that *homo-usia* of the *mundus archetypus*. At this point, the archetype of number always comes into operation, and this is how I account for the extremely Neopythagorean mentality of my unconscious (especially the figure of the "stranger"). No one is likely to say

⁷ Your letter, p. 6. This statement seems to me alarmingly close to the definitely *meaningless* statement that "everything is psychic"! For "psychic" to acquire any meaning, there must also be something nonpsychic involved, and this is where the "not in itself ascertainable" seems to me suitably *neutral*.

that the *object of mathematics is psychic*,⁸ for a distinction has to be made between the mathematical concepts and the experiences of the mathematicians (which certainly occur in their psyches). On the other hand, it seems to me important that the archetypal background of the number concept should not be neglected. (Among mathematicians themselves there was for quite a while an odd tendency to degrade mathematical statements into mere tautologies. This endeavor seems to have failed, since it was not possible to understand the consistency of mathematics in this way.) It is this number archetype that ultimately makes possible the application of mathematics in physics. On the other hand, the same archetype has a connection to the psyche (cf. trinity, quaternary, mantic, etc.), so that here I feel lies a crucial key for a conceptual expression of the *homo-usia* of physis, psyche, and also of the spirit (ideas, etc.). This is how I explain to myself the emphasis on number and mathematics in general in my dreams.

The correct conceptual language for expressing this is, I think, not yet known. Taking a dream from the year 1948 as an example,⁹ I would nevertheless like to compare different, albeit *not equally complete*, ways of expressing similar or closely related facts and circumstances.

a) *Physical symbolic language of my dream*

My first physics teacher (A. Sommerfeld)^d appears to me and says: "The change in the splitting of the ground state of the H atom is fundamental. Bronze tones are engraved on a metal plate." Then I go off to Göttingen.

(The splitting, as the following dream showed, consisted of a sort of mirror image. In other dreams it was called "isotope separation" instead of "splitting," and "absence" of "the heavier isotope" instead of "mirror image.")

b) *Theological metaphysical language.*¹⁰

In the beginning was a God who is a *complexio oppositorum* (Heraclitus, Nicholas of Cusa). This God shines down once again in the dark world, which is a likeness of the God (Hermes Trismegistus), even a second God (Plato).

⁸ I would regard such statement as *meaningless*.

⁹ This is to be found in an essay of June 1948 entitled "Modern Examples of Background Physics,"^c followed by a further dream indicating a path to quaternary wholeness. At the time, you were kind enough to discuss these dreams with me in great detail, so I need not bother you with them again now.

¹⁰ I am thinking here not so much of *contemporary* theologians, who strike me as a singularly uninteresting lot; rather, I see theology here as something beyond the mere denominational, in fact as "metaphysical." As role model for the theologians speaking here, I think of *Plato* on the one hand, and *Fludd* on the other (cf. my essay on Kepler, p. 148 [tr., pp. 192-93]). Theology in general has a connection with matter; it is only in the Age of the Fish that it is so markedly

This likeness of God can be "perceived in a mirror image of man" (Fludd). The fundamental change is God becoming man, the consequence of which is that the *complexio oppositorum* is found again in man as form (idea)—matter, and always produces the *infans solaris* in the middle sphere.

c) *Language of the psyche, or analytical psychology*

What is going on in the dream is a psychic reality—the individuation process—that can happen to everyone. The process is very similar to the one in Plato's *Timaeus*.¹¹ The initial stage is a dyadic archetype whose proton corresponds to the "same one" and whose electron corresponds to the "other one."¹² Through "reflection" of the unconscious,¹³ a quaternity is produced. The metal plate, as a symbol of the feminine-indestructible and the physis, corresponds to the physically "divisible"¹⁴ of the *Timaeus*, the tones, as fleeting-spiritual, correspond to the male principle and the "indivisible." The "Self" that appears here in the form of the physics teacher states that the physis carries permanently with it the image (*eidolon*) of the tones (*eides*), so that there is a consubstantial unity (*homo-usia*) of both. The journey to Göttingen—the city of mathematics—at the end of the dream, signifies that the tones are immediately followed in Pythagorean manner by numbers and mathematical formulas (symbols), which is confirmed in the next dream.

The reflection or development of consciousness *doubles* the original archetype in a (timeless) aspect, which is not assimilable to consciousness, and a further aspect, which, as a reflection of the new consciousness content, is located in close proximity to the ego (and time). This is why the splitting, as well as the "isotope separation" (with its absence of the heavier element), is a symbol of the *incarnation* of the archetype, which also ac-

spiritualized. The elder Stoa had a physical theos (cf. also *pneuma* as fine matter), and in Christianity there were always material-friendly heretical undercurrents: In the Middle Ages it was alchemy, which of course goes back to the ancient "Increatum" for matter, today it is Communism that strikes many (including myself) as a heretical Christian sect (especially because of the eschatological expectations attached to it).

¹¹ See *Symbolik des Geistes* [Symbolism of the Spirit], pp. 334–50 [GW/CW 11, pars. 179–93]. As a result of your letter, I read through this section 3 very carefully once again. I read Plato's letters—which reveal his attitudes to the two Dionysius tyrants of Syracuse—in Howald's⁶ new edition two years ago in Sicily itself: a veritable book of meditation for the colleagues involved in politics!

¹² It seems to me important that in the Neopythagorean speculation of late antiquity, which relates specifically to the *Timaeus*, the odd numbers (as a whole) are identified with the "Same," and the even numbers are identified with the "Other."

¹³ Cf. *Symbolik des Geistes* [Symbolism of the Spirit], p. 387 esp. n. 8 [GW/CW 11, par. 235, n. 9].

¹⁴ *Ibid.*, bottom of p. 343 [GW/CW 11, par. 186].

counts for the numinous character of this symbol. This is a brief outline of the three languages: the metaphysical one, the psychological one, and the physical dream language. I do not doubt that in the psychological language there is significant truthfulness to be found; nor do I doubt that you yourself could handle this language much better than I could.

Yet I am of the opinion that this is not the ultimate truth, either. It does not express everything that dream symbols express—for example, not the fact that the atoms of individual element isotopes have *masses* (atomic weights) characterized by numbers.

Now in dreams, *gravity* often signifies the *energetic gradient* of the unconscious content toward consciousness (e.g., gentle oscillation = end of this gradient and corresponding feeling of being released of consciousness). Thus the unconscious has the tendency to characterize this *energetic gradient of the archetype* quantitatively by means of a number, so that the (momentary) mass value would measure the *attraction or affinity between archetype and consciousness* (i.e., also to space and time!) according to their degree. But numbers in dreams are not just scalars (i.e., as opposed to vectors), as in physics, but are also individual entities, consisting of individual figures, which in turn form a sum total. In short, such numbers are loaded with further unconscious contents. This is where Neopythagorean elements of the unconscious are involved, which might be a subject for further research.

But the decisive factor for me is the fact that the dreams carry on using physically symbolic language and not psychological language. I must confess that this contradicts my rational expectations. Being a physicist by day, I would have expected that nocturnal dreams would behave in a compensatory manner and speak to me in psychological terms. If they did so, I would accept it without hesitation, but they do not. They have rather the tendency to extend physics into the indefinite and to leave psychology aside.¹⁵ So ultimately there is the tendency for my unconscious to take something away from psychology, to *relieve its burden*. Since this is what my dreams have looked like for several years, as if there was a *reflux* or flowing back of physics from analytical psychology (direction of the gradient: *divergence* from psychology), I would venture to make the following diagnostic and prognostic conjecture: The “steam” mentioned on p. 6 [above, par. 11] turns out to be unconscious physics, which has accumulated over a period of time in your analytical psychology without you having intended it. Under the influence of the flow of unconscious contents directed away from psychology, future development must entail such an *extension of physics*, possibly together with biology, so that the psychology of the unconscious can become part of this development. But it is not capable of development on its own and when

¹⁵ It was a *physicist* who spoke the decisive words in the dream quoted, *not* a psychologist!

left to its own devices. (I would suspect that your work always brings on your heart condition whenever you unwittingly swim against this current).

In line with this approach, and urged on by the unconscious, I have already begun to take the two languages—the physical dream language of the unconscious and the psychological one of consciousness—and relate them to each other in the opposite direction as well. If one has a *lexicon* for communicating between two languages, then one can translate in *both* directions. In order to communicate with you, I shall (as far as my abilities allow) attempt to translate the language of my dreams into that of your psychology. On my own, I actually often do it *the other way round*. I can then see better where there seems to be a gap in the concepts of your psychology (never used in my dreams). These seem to me to be long-term problems for the future.

The situation with the three languages reminds me vividly of the famous story of the *three identical rings*¹⁶—a story that has been handed down in folklore and used and extended by *Boccaccio* (and later by [Gotthold] Lessing [1729–1781]); the genuine ring, however, “the one as the fourth,” used to be there but has got lost and has not yet been found. It was originally invented to symbolize the relationship between 3 denominations, and I have the impression that we are experiencing it again with spirit-psyche-matter (physis) and their languages, but on a higher plane.

There is an interesting possibility as to the whereabouts of this genuine fourth ring—namely, in human *relationships* (and not at all on the intellectual conceptual level), an argument that you presented so cogently in your letter (bottom of p. 3, top of p. 4 [Letter 59]). Where the feminine is active, it always involves Eros and relationships; the “incarnation” of an archetype (isotope separation) is thus always a relationship problem. Such problems are certainly present with me in various ways and play a part in the utterances of my unconscious. As I hinted in my last letter, there is, for example, a relationship problem with my wife, who, since our trip to India, has had various physical ailments, from which she is making only a slow recovery.

But there is also a problem of relating to your psychology that which cannot be separated from you as a person.¹⁷ I shall conclude with the assurance that in this respect, too, I shall continue to allow myself to be guided by the unconscious (be it “psychic” or “neutral”). It seemed to me right and proper to be frank in all I had to say on the subject of your last letter. Bearing in mind your state of health, I would, however, request you not to reply immediately to this letter, for it is intended as part of a *long-term* exchange

¹⁶ References for the story in *J. Burckhardt's* [1818–1897] [Die] *Kultur der Renaissance* [in Italian], vol. 2, chap. 3. Also see footnote.

¹⁷ PS. I am now quite sure that the general relationship of the “Homousia”—that between the 3 rings and between people—is the *one* genuine ring that encircles the “center of emptiness.” I feel as if I had found my own myth!

of ideas. Perhaps there will be an opportunity to continue this discussion at a later date.

With thanks for all the trouble you have taken, and with all best wishes,

Yours sincerely, W. PAULI

^a Ernst Mach (1838–1916), eminent physicist, professor at the universities of Prague (1867–1895) and Vienna. The baptismal goblet is today kept in the “Pauli room” at CERN, Geneva.

^b Ludwig Boltzmann (1844–1906), Vienna. Mach’s successor, founder of statistical thermodynamics.

^c See Appendix 3.

^d Arnold Sommerfeld (1868–1951), Munich. Much respected by Pauli, who liked to refer to him as his “first physics teacher.” His main work: *Atombau und Spektrallinien*.

^e Ernst Howald, *Die Briefe Platons* [Plato’s Letters], 1923.

61J

Dear Mr. Pauli,

[Zürich] 4 May 1953

[Typewritten carbon copy]

I found your lengthy account of your relationship with Mach most interesting. Please accept my sincere thanks. It goes without saying that one can never be content with the ascertainable alone, for then, as you rightly point out, one would not understand anything at all. What is more, the greatest challenge to our thinking comes from the nonascertainable, and the same is true of our scientific curiosity and sense of adventure. The real life of knowledge and understanding is played out on the borderline between the ascertainable and the nonascertainable. It is just that under these circumstances it is rather difficult to see where I should be “positivist” and consequently “eliminate thought processes.” Seeing that I describe physics as a science of ideas with a material label, the material place of origin of these ideas is no more denied than is the place of origin of “intellectual” ideas. All that is meant by this observation is an epistemological definition, not a practical one. There will continue to be speculation and intuition about the realm of the nonascertainable, and ascertainable elements will continue to plucked from it as before. But it should always be borne in mind that the area between the perceived and what is not ascertainable *hic et nunc* is the area of the psyche. The fact that I as a psychologist am more preoccupied with archetypes is just as natural as the physicist’s preoccupation with atoms. I do not extend the concept of the psychic to include the nonascertainable, for here I use the speculative concept of the *psychoid*, which represents an approach to *neutral* language in that it suggests the presence of a nonpsychic essence. It is a matter of choice whether one fills up this “essence” with the term “matter.” From the point of view of logic, one can understand Plato’s

τρίτον εἶδος as the neutral concept, for which I, as I said earlier, would not use the term "psyche"; yet I would assign to the psyche a mediatory "Third" position, more or less on the lines of how—in another sense—the alchemists viewed the anima as *ligamentum corporis et spiritus*. For the psyche is the "medium" (i.e., the "Third"), in which ideas of corporeal or intellectual origin occur. The Platonic concepts of the Same and the Other have nothing to do with his psyche, which is a metaphysical concept, which is also why he had no occasion to identify the *τρίτον εἶδος* with the psyche. For us, however, *τρίτον* and *εἶδος* are psychological matters. And the psyche is not a metaphysical concept but an empirical one. So if we want to solve this dilemma of the "Third," we have to realize that matter and spirit are two different concepts that indicate opposites and—as *ideas* of different origins—are psychic. But their intention is to depict the nonpsychic. Insofar as the psyche introduces the two metaphysical—i.e., not immediately ascertainable—essences as concepts, it unites the two opposing essences by endowing them both with a psychical form of existence and thereby raising them to a conscious level. In this way, one can metaphorically depict the psyche as *τρίτον εἶδος*, and that is what I originally meant. But if we now take the actual Platonic concept of this thing, then it is a metaphysical matter, one dealt with by the demiurge. In view of this situation, the psychological explanation must relate the statement of the *Timaeus* to a background process in which the demiurge represents the "consciousness maker" and the four characteristics to be mixed represent a distinctive quaternio necessary for the development of consciousness. The consciousness maker can be understood vaguely as a tendency toward the development of consciousness and the quaternio as four functional aspects. This ascertainment is of necessity vague because we are talking here about metaphysical dimensions or postulates. In this way they are specifically neither transformed into something psychic nor robbed of their metaphysical existence. This explanation does justice to the actual concept of the *τρίτον εἶδος*.

The *metaphorical* conception of the Third mentioned initially corresponds to what you wish to distinguish from the general concepts as the *experiencing of the individual*. The latter corresponds to the *metaphysical* conception of the Third.

You are perfectly correct when you say that my remark concerning the material nature of the psyche is a metaphysical judgment. It was, of course, not meant as such and is not to be taken literally. The remark is simply intended to point out that the nature of the psyche is involved in both hypothetical conceptions, spirit and material, and, like them, is not ascertainable. The aim of the remark is to indicate that whenever something material exists, the psyche is also partially involved. When it comes to the overall judgment, the following sentence needs to be added: Wherever the spiritual exists, the psyche has its part to play. This participation is ascer-

tainable in that there are conceptions that are labeled partly as spiritual and partly as of material origin. But just what form this participation actually takes cannot be ascertained because material, psyche, and spirit are in themselves of an unknown nature and thus are metaphysical or postulated. Thus I fully agree when you say "that psyche and matter are governed by common, neutral etc. ordering principles." (I would simply add "spirit" as well.)

Under these circumstances, I simply fail to see—with the best will in the world—how psychology can be "overburdened" with me, or what form an expansionist tendency of my concept of the psyche is supposed to take.

We can say of an object that it is psychic when it is ascertainable only as a concept. But if it has features that indicate its nonpsychic autonomous existence, we naturally tend to accept it as nonpsychic. This we do with all our sensory perceptions, unless they are "purely" psychic—for example, in the form of illusion. As you point out, this applies to *numbers* and to the archetypes in general. They are not just psychic, otherwise they would be *fabrications*. But in actual fact they are "in themselves being" (or psychoid) *existences* whose autonomous existence corresponds to that of the material object.

All these statements concerning the material or spiritual aspect of the psyche or the autonomous existence of the objects are of great heuristic significance, which I by no means underestimate. The psyche is certainly our only instrument of cognition and is thus indispensable for any statement or perception. But the objects of its perception are only very slightly psychic. It is true that all objects are conceived in and through the medium of the psyche, but they are not integrated into its substance, thus forfeiting their existence.

So far, I believe, we are basically in agreement. When you bring up the subject of overburdened psychology and take as your starting point the nonpsychological tendency of your dreams, then it must be pointed out that this is a subjective situation that can be explained in many different ways.

1. Your dreams are physical because this is your natural language, on the principle *canis panem somniat, piscator pisces*, but in fact the dream means something different.
2. The unconscious has the tendency to confine you to physics or keep you away from psychology, because psychology, for whatever reason, is not appropriate.

I never have dreams related to physics; they are usually related to mythology; in other words they are *also unpsychological*. Just as your dreams contain symbolic physics, mine contain symbolic mythology, i.e. Jungian individual mythology. What this means, on closer observation, is *archetypal theology or metaphysics*. But this only becomes clear when I make the effort to find out what the archetypal symbols are referring to. In this case, what

I do is to translate the dream figure into the language of consciousness, thus reducing the dream meaning to my subjective situation. But as a metaphysician I could also examine the dream statement for its objective meaning—in other words, not psychologically—which would take me into the sphere of what one might call the spirit or the mind, and from there it might be possible for me to have a sense of archetypal physics.

It is true that the unconscious produces psychology, but the more it does so, the more it is against it, which is the case with both you and myself. Psychological tendencies in the unconscious are found only where psychological insights are urgently necessary. The process of developing consciousness is a very demanding one and is by no means a popular matter in nature. This is why physics or metaphysics is usually preferred, although in both cases the *fascinosa* consists of the constellated archetypes. These archetypes more or less free us from psychology in the sense that psychology is "elieved of its burden." However important and interesting it may be to deal with the nonpsychic—especially with its archetypal stage—there is nevertheless the risk that one may lose oneself in the notion itself. But then the creative tension disappears, for it comes into being only when the acknowledgement of the nonpsychic is brought into relation with the observer. What I mean by that is, for example, that the product is studied critically, not just from the point of view of its objective associations but also its subjective ones. In physics this means the determination of the role played by the observer or the psychological prerequisites of a theory. What does it mean if Einstein establishes a world formula but does not know which reality it corresponds to? Hence, it would have been better if C. A. Meier^a had asked what the psychological significance was of the myth and cult of Asclepios—i.e., what psychic reality do they correspond to? With the perception of the archetypal prerequisites in Kepler's astronomy and the comparison with Fludd's philosophy, you have taken two steps, and now you seem to be at the third one—namely, the question of *what Pauli says about it*.

If the formulation of the question is a partial one, as is the case with Asclepios, then the self-reflection of the doctor is an adequate reply. But if the formulation of the question concerns the principles of the physical explanation of nature and hence is a cosmic and universal one (as is the case with Einstein), then this is a challenge to the microcosm in the person answering the question, i.e., the natural wholeness of the individual. This is why the problem of the dark anima within you presents itself to you on the other side of the Zürichberg,^{*} and it is also why "master" figures appear in your dreams.

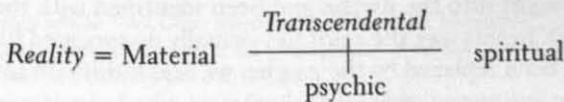
As a consequence of my professional work with psychology, I am more

frequently confronted with the mythological aspect of nature, i.e., with what one might call the *spirit* (or the mind). Consequently, I have impressive dreams about animals (elephants, bulls, camels, etc.) that *do not wish to be observed*, and when I intervene they lead to me having a tachycardia attack. (The connection between my heart disturbance and synchronicity is an indirect one. It is a nonspecific form of exhaustion. That is why there are lots of other causes of attacks—e.g., the interchange of continental air masses with maritime ones, digitalis medicaments, mental effort, etc.)

I am actually supposed to make the animals conscious and integrate them, which, of course, is impossible, animals being unconscious and not capable of consciousness. According to my dreams, these animals seem to be building a road through the primeval forest and do not wish to be disturbed. So I have to dispense with psychology and wait to see whether the unconscious itself produces something.

Your Sommerfeld dream (p. 7ff. of your letter)^b is also a good illustration of what I mean. What the dream ascertains in the physical sense (a) is short and to the point. The "theological-metaphysical" conception (b) is somewhat more thorough, and the psychological one (c) sums everything up in general terms. "And yet," as you write, you are "of the opinion that this is not yet the ultimate truth." Certainly not, for it contains only that which can be conceived of and represented in psychic terms. When compared with the whole truth, the psychic picture is also as incomplete as is the ego compared with the Self, but it is *the* conception of truth that we have. As I have said, it is clear that there are potential realities that lie beyond our conception, for experience has shown that our world-picture seems to be capable of unlimited expansion, and natural science consists, so to speak, of an abundance of evidence that our conception corresponds commensurately to the thing-in-itself. But nowhere can we arrive at a more complete truth than that very picture which is conceived. That is why I say that we are virtually sealed off in the psyche, even though it is within our power to extend our prison to the big, wide world outside. It was this thought that gave Leibniz the idea of the windowless monads. I must say that I do not agree with the idea of "windowlessness" but believe that the psyche does have windows and that from these windows we can perceive ever broader realistic backdrops.

For these reasons, I am of the view that the psychic aspect of reality is to all intents and purposes the most important one. Once again we are obviously dealing with a classical *quaternio*:



i.e., as usual 3 + 1, with the fourth one determining the unity and the whole.

Your explanation of the consciousness *quaternio* is interesting and, I would say, correct. This is also where the "origin" and "primordial home" of the number is probably to be found. At any rate, this is where it begins to make its presence felt. The world of discrete things begins with the four *στοιχεία* or elements.

Inasmuch as the number is an archetype, it can be safely assumed that it: (1) has substance, (2) has an individual form, (3) has meaning, and (4) has relationship connections to other archetypes. About a year ago, I actually started examining the characteristics of the cardinal numbers in various ways, but my work ground to a halt. (Is there actually no systematic compilation of the mathematical properties of the numbers 1-9?) The mythological formulations are interesting but unfortunately call for a great deal of work in comparative-symbolism research, and I cannot afford to get involved in that.

Appropriately enough, you recall Lessing's play *Nathan den Weisen* [*Nathan the Wise*]. But it seems to me that you did not have three but only two rings in your hand: physics and psychology (see p. 10 of your letter [Letter 60, pars. 25-26]). The third ring is the spirit that is responsible for theological-metaphysical explanations. In the spirit of Lessing, you see in the fourth ring the human connection that, being the fourth, establishes the unity with the Three. On the psychological level, this is certainly correct as the solution to all problems through the *agape* or *caritas christiana* (albeit free from the insidious influences of the Christian denominations!). But the synthesis of the Many through *caritas* is basically a reflection of transcendental unity, a harmonious *praestabilita*, the materialization of which in our sublunary world is a challenge to all Christian virtues and hence is slightly beyond the scope of moral powers. What it calls for above all is individuation and thus the acknowledgment of the shadow, the releasing of the anima from the projection, the coming to terms with this, and so on. This is a task that we cannot take on without psychological strain and stress, for the stream always flows from psychology into the opposites, but this provides relief only for the first moment. In this way, psychology will be "relieved of its burden" in a completely natural manner. Nor would it detract from it in any way if it were taken up in the framework of physics and biology. The world-picture is always and everywhere a conception—i.e., psychic.

What is often a great stumbling block when it comes to the notion of thinking is that the opposition is not physis versus psyche, but physis versus pneuma, with psyche the medium between the two. In recent history, the spirit has been brought into the psyche and been identified with the function of the intellect. In this way, the spirit has virtually disappeared from our field of vision and been replaced by the psyche; we find it difficult to attribute to the spirit an autonomy and reality that we ascribe to matter without

a moment's hesitation. I do not know whether my inclination to symmetrical points of view is pure prejudice, but it seems to me essential to think in a complementary way: to matter belongs nonmatter, to above below, to continuity discontinuity, and so on. The one is a condition of the other.

With best wishes,

Yours sincerely, [C. G. JUNG]

^a Cf. C. A. Meier, *Antike Inkubation und moderne Psychotherapie*.

^b Letter 60 [pars. 16–20].

62 P

[Zürich] 27 May 1953

[Typewritten carbon copy
with handwritten additions]

Dear Professor Jung,

1. Many thanks for answering my letter after all. Your latest letter has once again cleared up a lot of questions, especially your acknowledgment of the necessity of the nonascertainable (p. 1 [Letter 61, par. 1]), your clarification of the approach to the neutral language through your concept of the psychoid, which suggests the presence of a nonpsychic essence (p. 1 [ibid.]), your agreement with my statement that “psyche and matter are governed by common, neutral, not in themselves ascertainable ordering principles,” to which you have added “the spirit” bottom of p. 2 [ibid.], your opposing of the psychic to the transcendental (in the *quaternio* on p. 5), which was quite new to me. All this seems clear to me now and I do not feel the need to come back to these questions.

As regards the relationship of spirit and psyche, like you I make a clear distinction between spirit and intellect. On the other hand, I have not yet fully made up my mind as to what extent psyche and spirit can be separated. The best thing here is probably to go back to archetypal images. One of them is that of mother-son incest, and closely related to it is the image of a mother of the spirit that is at the same time its daughter.¹

My dream figure of the “stranger” (master figure)¹ in these images shows how close the analogies are with the alchemical Mercury. Like Mercury, he also “emerged from the river,” and in the dream it became quite clear that the river was also the mother. On the other hand, he once—“in the tempest”—split off a woman from his body, as in the myth in which Athena

¹ Cf. your article “Der Geist Mercurius” [“The Spirit Mercurius”] in *Symbolik des Geistes* [Symbolism of the Spirit], esp. p. 112 where, to my great satisfaction, the Grail legend is also quoted (note 131) [CW 13, par. 272, n. 22].

¹ Marginal note by Jung: ancient Son of the Mother.

sprang from the head of Zeus. This is the archetype of the woman who is motherless but is herself a mother. Such images instinctively seem to me to provide good models for the relationship psyche-spirit.

The mother archetype also seems to me to correspond to an instinctive-unconscious *human* relationship, which the unconscious life belongs to anyway as *inner* reality. *In this case, your psychoid archetype would probably be a special aspect of the mother archetype*—namely, the unconscious, corporeal, practical, or symbolic being (life).

I am pleased to see that our correspondence is not going around in circles but is moving forward. But this is precisely why I am writing to you again at such length, particularly about the whole question-complex of the relationship between physics and psychology and the problem of wholeness that this gives rise to. I fully agree with you that “only out of wholeness can man create a model of the whole” (your letter of 7 March [Letter 59], p. 4 [par. 10]), that the products of the unconscious “must be examined critically—both with regard to their objective and their subjective relationship,” and that “the acknowledgment of the nonpsychic must be brought into relationship with the person observing” (p. 4 of your letter [Letter 61, par. 10]). At the end of this letter, I will return to the idea of how, in my case, the problem of wholeness in the interpretation of nature is very closely and very directly related to the problem of the wholeness of the individual psyche (microcosmos)—i.e., with the individuation process.

We do, however, differ when it comes to the interpretation of my physical-symbolic dreams. (These dreams started in about 1934 and make up roughly one third of all my dreams). When you say (p. 3 of your letter [ibid., par. 7]) that “this is a subjective situation” and add:

- “1. Your dreams are physical because this is your natural language, on the principle *canis panem somniat, piscator pisces*, but in fact the dream means something different.
2. The unconscious has the tendency to confine you to physics or keep you away from psychology, because psychology, for whatever reason, is not appropriate.”

then it seems to me that you are missing the essential point. In fact, your first statement rather upset me. The linguistic use of physical and mathematical terms in my dreams seemed to me initially to be the exact opposite of natural; what was most familiar actually struck me as most strange, and for years I attempted to explain away the physical part of the dreams as something not real. But the reactions of my unconscious were unfavorable and insistent, so that finally I had to cast aside all my *reductive* explanations and accept that there is actually a connection with physics in the dreams. Having said that, the dreams do not simply refer to modern, traditional physics but synthetically construct for me a sort of *correspondentia* between

psychological and physical facts. *In this process, the physical and mathematical terms are symbolically extended to the unconscious in general and to the individual psyche in particular.*² I abide by my view that this is an objective situation, even if it is presented in a subjective form.

As regards your second statement, then it all depends what the reasons are that make "psychology unsuitable." For a start, this second statement is so general that it *also* covers my own view, according to which the reasons are: the system of concepts for mathematics and physics is more extensive, more differentiated, and has a broader capacity compared with that of psychology; on the other hand, my connection with the latter has to remain alive and active in feeling terms and not degenerate into the merely intellectual.

Although I have formulated a working hypothesis that there is a flowing of psychological contents into physics and mathematics, and that this has to continue until psychology can be adopted by physics (possibly together with biology), it was nevertheless always clear to me that—as you rightly say on p. 6 of your letter [*ibid.*, par. 18]—this would not "detract . . . in any way" from the reality of psychology. What springs to mind more readily here as a model is chemistry, for example, which can already be said to have basically been adopted by physics.³ Of course, this certainly does not mean that there are no longer any chemists around (on the contrary!) or that since then the reality of chemistry has in any way been diluted.⁴ And yet when such a fusion in the system of concepts of two hitherto separate scientific disciplines has taken place, then there is a distinction between *the one that has been adopted and the one that does the adopting*. The adopting one is the one that has the more extensive system of concepts and lends itself more readily to generalization; but it is also always the one that undergoes the more radical and more sweeping changes, precisely because it is being extended. Thus it was that physics had to undergo great changes after the discovery of Planck's quantum theory, with the ensuing development from classical physics to modern quantum physics, before chemistry could be adopted. My working hypothesis is that in the case of the relationship between psychology and physics, the former is developing in the direction of the one adopted, and the latter in the direction of the one doing the adopting. In the second part of this letter, I shall attempt to give my reasons for this observation.

And now a few remarks about your dreams, which you were kind enough

² The final meaning of these dreams may be that of having the scientific approach appear as the conditional special case (see below, p. 6) of the transcendental.

³ To a lesser degree, such a fusion took place in physics in the last century, when optics were taken up into the more general field of electrodynamics.

⁴ *The same* reality is now given a different *name*. Instead of valence lines, people talk, for example, of electron pairs and their spatial-density distribution, etc.

to mention in your letter, and which I found very interesting. (I realize that with the following conjectures I shall be laying myself open to your criticism much more than in the rest of my letter.) What first struck me was that animals building a street in the primeval forest is an activity with a sense of purpose and that furthermore elephants represent a *dynamis*, one that man cannot oppose with impunity. Thus my initial conjecture is that your dreams represent a suprapersonal, objective, psychic, or spiritual development in the collective unconscious but one that has not yet reached the surface of general consciousness. My second conjecture is that your images relate to exactly the *same* development as the one that I see as the flowing of contents from psychology into physics. A river is also a *dynamis* that man cannot oppose with impunity, although it is possible to swim with the current, whereas one can hardly run around with wild elephants. The same objective situation is just represented subjectively differently, in a very appropriate way, as befits the fact that you are a psychologist and I am a physicist. Of course, I would never have dared to draw any conclusions from this. But when you yourself arrive at the conclusion that the animals do not wish to be observed by you and that you simply have to wait passively, then I am happy to concur with your own verdict. In fact, it seems to fit in extraordinarily well with my own image of psychology developing along the lines of a science to be adopted. In such a case I would *a priori* expect a psychologist to have mythological dreams because he is supposed to wait passively; a physicist, however, would not be expected to have either psychological or mythological dreams, but physical ones, because he is supposed to be actively involved in extending the concepts of his science.

2. For the purpose of the discussion of my physical dream symbolism, it seems to me a good idea to go back to the time when it came into being, with its characteristic constellation of objective spiritual problems in physics and subjective problems in my personal life. These recollections came back to me very vividly in particular connection with the name of *Einstein*, which you threw at me, as it were, in your letter (p. 4 [ibid., par. 10]).

When the new theory of wave mechanics was perfected in 1927, bringing a solution to the old contradictions concerning waves and particles, in the sense of a new complementary way of thinking, Einstein was not fully satisfied with this solution. Again and again he came up with brilliant arguments representing the thesis that the new theory may have been correct as far as it went, but was *incomplete*. *Bohr*, by way of contrast, demonstrated that the new theory contained all the regular laws that can be formulated meaningfully within its range of validity. Justice was done to the *objective* aspect of the physical reality adopted in wave mechanics and its statistical natural laws, with the aid of the following premises, which any physicist would take for granted:

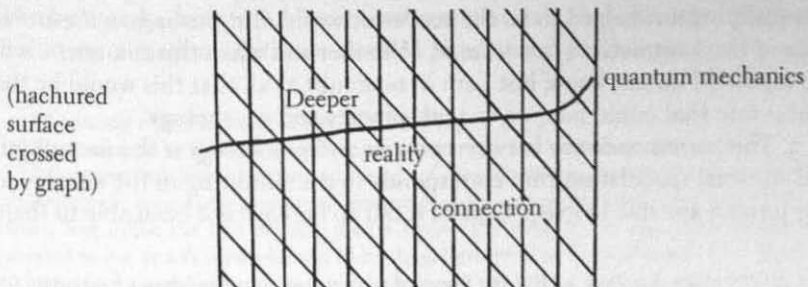
1. Individual characteristics of the observer are not found in physics.

2. The measurements' results cannot be influenced by the observer, once he has selected his experimental setup.

The physical theory did, however, have a subjective aspect as well, inasmuch as it is no longer possible to define a state of microphysical objects that is dependent on how (with which setup) these objects are measured. Bohr's arguments were convincing, and I was immediately on his side, as I saw Einstein's objections as a *regressive* tendency to return to the old ideal of the detached observer.⁵ I remarked to Bohr at the time that Einstein was regarding as an imperfection of wave mechanics within physics what in fact was an imperfection of physics within life. Mr. Bohr readily agreed with this statement. Nevertheless, I had to admit that there was an imperfection or incompleteness somewhere, even if it was outside the realm of physics, and since then Einstein has never stopped trying to bring me around to his way of thinking.

Today I know that this is the pair of opposites *completeness versus objectivity* and that despite Einstein's claims it is not possible to have both at the same time. Here once again is the situation of "*sacrifice and choice*," as in the uncertainty relation in quantum physics itself. Although I was not in a regressive direction, like Einstein, I was still faced with the same dilemma. I could not deny that *what is in principle a statistical way of describing nature also requires a complementary understanding of the individual case*; but at the same time I saw that the *laws of probability* of the new theory were the most that could be hoped for within an objective (i.e., nonpsychological here) framework of the laws of nature.

In the meantime, problems with feelings had brought on a severe personal crisis for me and led to me becoming acquainted with analytical psychology. It was, unless I am mistaken, in 1931 when I got to know you personally. At the time, I experienced the unconscious as a whole new dimension. It was soon after I married in 1934 and my analytical treatment was over that this physical dream symbolism began. Among others, I had the following dream *at the time*, and it preoccupied me for years: "A man resembling Einstein is drawing the following figure on a board:

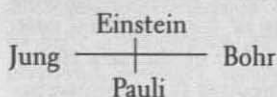


⁵ Cf. my Kepler essay, p. 165 [tr., p. 211].

This was apparently connected with the controversy described and seemed to contain a sort of response to it from the unconscious. It showed me quantum mechanics and so-called official physics in general as a one-dimensional section of a two-dimensional, more meaningful world, the second dimension of which could be only the unconscious and the archetypes. Today I do in fact believe that it is possible for the same archetype to be in evidence both in the selection of an experimental setup by an observer as well as in the result of the measurement (similar to the dice in Rhine's experiments). I also now believe that Einstein played the role of the shadow⁶ but that the dream showed me how the "Self" was also contained in the shadow.

Since that time, initially against extremely strong conscious resistance, the unconscious has synthetically constructed for me a *correspondentia* between physics (with mathematics) and psychology. Unlike modern physics and complementary to it, the point of view of the unconscious sacrifices the aforementioned traditional requirements of objectivity (which it actually finds to be disturbing) and selects completeness instead (in accordance with nature!).

Accordingly, I can attempt to represent my relationship to physics and psychology through the *quaternio*



in which the people stand for mental attitudes and you, of course, represent your analytical psychology.

It is the inevitable fate of physics, which operates with statistical laws of nature, that it has to strive for completeness. But in so doing, it will necessarily come up against the psychology of the unconscious, since precisely what it lacks is this unconscious and the psyche of the observer.

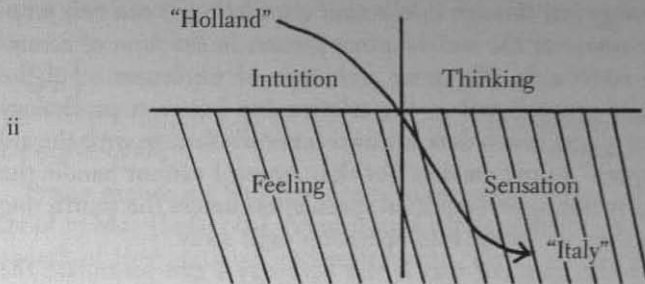
Just as physics seeks completeness, your analytical psychology seeks a home. For there is no denying the fact that psychology, like an illegitimate child of the spirit, leads an esoteric, special existence beyond the fringe of what is generally acknowledged to be the academic world. *But this is how the archetype of the coniunctio is constellated.* Whether and when this *coniunctio* will be realized I do not know, but I am in no doubt at all that this would be the finest fate that could happen to both physics and psychology.

3. This *correspondentia* between physics and psychology is the metaphysical-spiritual speculation that corresponds to the third ring in the allegory in my letter. I am able to grasp some of it but so far have not been able to share

⁶ A truly major discovery, such as the theory of relativity, may later result in a fixation on the past. A similar thing seems to have been the case with Freud.

it with anyone. For I do not know anyone who, like you, has the maturity and psychological experience to understand the products of my unconscious and who also has a background in mathematics and physics. Thus the "third ring" drives me into spiritual loneliness (the problem of sharing remains unsolved), but the fourth ring, the one of human relationships, has a compensatory function.

This leads me directly to your demand that I should bring all the products of the unconscious into relationship with the observer. The personal problem with me on the subject level is the "problem of opposites," which you describe in your book *Psychologische Typen* (esp. chap. V [Poetry, GW 6, pars. 261-526/CW 6, pars. 275-460]). With me the functions schema looks like this:⁷



The hachured sections are the less differentiated (more unconscious, inferior) functions, and the problem of opposites arises between the left and right halves. (If I could paint, I would place Esslingen on the left, the Pfannenstiel in the middle, and Gloriastrasse⁸ on the right). Here once again *the right side is seeking completeness, but the left side is seeking a home*. The latter observation is true inasmuch as intuition has brought forth characteristics and psychic factors that initially seemed alien to my conscious world and my established values.⁸

In the course of the individuation process, which is never purely intellectual but is always accompanied by feeling-toned experiences, a medium between these pairs of opposites gradually becomes visible. The products that thereby emerge from the unconscious are precisely those that gradually reveal to me a medium between modern physics and psychology, by means of

⁷ Cf. also my earlier letter of 27 Feb. [Letter 58], part 3.

ⁱⁱ Marginal note by C. G. Jung: Why opposite, or right and left?

⁸ When the dark anima appears to me as a Chinese woman, that means above all that subjectively she seemed alien *even to me*, meaning not the way one is at home. It is just the same when I first called the now familiar master figure "the stranger." In 1946, for example, he appeared to me as a Persian who was trying to get accepted at the Technical University as a student, which caused quite an uproar. It is precisely the holistic that is initially strange. Cf. "the strange people."

a symbolic extension of physics. Thus, both come together for me in the empty center ("Self"), in full accordance with your remarks on the wholeness of the individual *qua* microcosmos as a requisite of a model for the wholeness in the interpretation of nature. Only for discriminating consciousness is the aforementioned pair of opposites psychology-physics different from the pair of opposites of the left and right half of the 4 functions ("Holland" versus "Italy"); for the unconscious psyche, however, both are completely identical. This can also be demonstrated by means of a spatial model so that the quaternion of the previous section (p. 8 [above, par. 18]) is placed on a *vertical* circle, and that of this section on a *horizontal* circle, with both circles having one common center.

This is also why it is impossible for me to find this correspondencia between physics and psychology just through intellectual speculation; it can only properly emerge in the course of the individuation process in the form of accompanying objective statements. The same archetype of wholeness or of the coniunctio, which is constellated in the relationship between psychology and physics, also arranges and orders my own inner wholeness, with the aid of the "master figures" in my dreams. For that reason I cannot handle the "third ring" of the metaphysical-spiritual speculation unless the fourth ring in the relationship has also come into operation right away.

I think that for the moment this is the best way I can formulate the relationship of the products of my unconscious with the objective wholeness of nature on the one hand and with the subjective wholeness of myself as observer on the other.

I very much look forward to the book on the *coniunctio* that you are working on at the moment,^b for I have no doubt that there will be a lot in it that applies to my problems.⁹

In the hope that in these letters, too, a medium between us will gradually emerge, I remain with sincere thanks and all good wishes

Yours sincerely, W. PAULI

^a Pfannenstiel: a range of hills above the Lake of Zürich; Gloriastrasse: the premises of the Physics Department of the ETH at the time.

^b Jung, *Mysterium coniunctionis*, 3 vols. [vols. 1–2, CW 14; vol. 3, *Aurora Consurgens*, by M.-L. von Franz, was published a supplement to CW 14].

⁹ *Alchemy* at any rate contains important keys to the understanding of my physical dream symbolism, too (such as the idea of the "opus" in the laboratory as the symbol of the individuation process, "nucleus" ~ lapis, "master figure" ~ Mercurius, etc.).

63J

Dear Mr. Pauli,

[Küsnacht-Zürich] 23 June 1953

[Typewritten carbon copy]

Please forgive me for not yet having thanked you for your interesting and friendly letter. I had hoped to be able to reply promptly. Recently, however, I have been under a lot of pressure and have not felt one hundred percent fit, so that it has not yet been possible for me to do so.

I beg of you to be patient.

With best wishes,

Yours sincerely, [C. G. JUNG]

64J

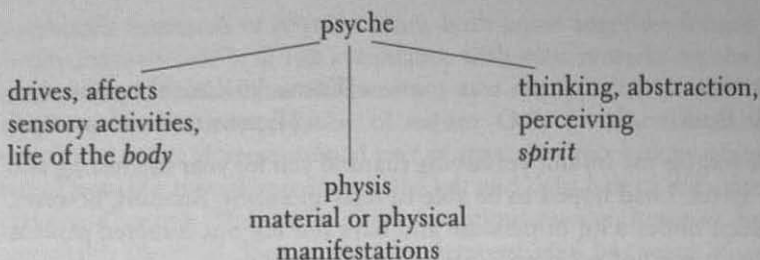
Dear Mr. Pauli,

[Küsnacht-Zürich] 24 Oct. 1953

[Typewritten carbon copy]

Please excuse my lengthy silence in response to your very substantial letter of 27 May [Letter 62]. Apart from a whole series of external reasons, such as lack of time, fatigue, and poor health, the main reason for my delay in replying was the sheer abundance of problems raised in your letter. I did not feel equal to the task of giving you an adequate response. I doubt whether I can do so even now. We are hovering here on the borders of what is conceivable and perceptible. Your letter has touched things in me that are vaguely unsettling and which I have in the meantime striven hard to get a grasp of. I have returned repeatedly to your letter, considering the contents from every angle, and have done so again today. I have the feeling now that I might be able to attempt to reply. Having said that, I am still not quite clear as to which method I shall adopt. Should I follow the thread of your letter, step by step, or should I describe the whole convolution of problems as I see it?

Whichever I do, I must start off by taking up some of the points in your letter, especially the question of *psyche and spirit*. *Psyche* is for me, as you know, a general term indicating the "substance" of all the phenomena of the inner world. *Spirit*, however, characterizes a specific category of this substance—namely, all those contents that cannot be derived either from the body or from the external world. Sometimes they are graphic, vivid processes that lead to abstract ideas, sometimes conscious and deliberate abstractions. Something on the following lines:



Psyche could be placed parallel to the physical term of *matter* (corpuscle + wave). Like matter, psyche is also a *matrix* based on the mother archetype. Spirit, in contrast, is *masculine* and is based on the *Father archetype*, in consequence of which, favored by the fact that we are living in a patriarchal age, it claims precedence over both the psyche and matter. But with *Sophia* as his consort he also has a feminine aspect, which emerges more clearly the closer one gets to the unconscious. In this *matriarchal* sphere, the spirit is the son of the mother (alchem. the "primeval son of the mother").

The spirit (pneuma) has, since time immemorial, stood in opposition to the body. It is turbulent air, in contrast to the earth (matter or hyle). The "soul," however, is regarded as *ligamentum corporis et spiritus*. Into this ancient trichotomy, the elevation of the spirit to a divinity has introduced a certain disorder, thus disturbing the equilibrium. A further complication was caused by the identification of the pneumatic divinity with the *summum bonum*, which forcibly led to matter slipping into the vicinity of the *malum*. These theological entanglements must be avoided in my opinion, and the psyche must be given a middle or superior position.

Psyche and matter, as a "matrix," are both an X—i.e., a transcendental unknown quantity and thus indistinguishable in conceptual terms, which makes them *virtually identical*; only on a secondary level are they different, as different aspects of Being.

Among the things that are part of the substance of the psychic are *psychoid archetypes*. The characteristic that is peculiar to the archetype is that it manifests itself not only psychically-subjectively but also physically-objectively; in other words, it is possible that it can be proved to be both a psychic inner occurrence and also a physical external one. I regard this phenomenon as an indication of the fact that the physical and psychic matrix is identical.

If you now ascertain that in your dreams "the mathematical and physical terms are symbolically extended to the unconscious in general and to the individual psyche in particular" (p. 3 of your letter [ibid., par. 8]), then it seems to me that this phenomenon is based on the implied same identity; otherwise such an extension would be utterly impossible, owing to the incommensurability of the psychic sphere. But if this extension is possible, then it proves that in the field of psychology there are processes or regulari-

ties which, if the occasion arises, can be expressed in physical terms. The analogy of *chemistry* that you use here [ibid., par. 10] strikes me as a particularly happy one (moreover chemistry, thanks to their common mother, Alchimia, is the sister of psychology). Tempting though the analogy is, there are processes going on in psychology that are absolutely indispensable in physics (which cannot be said of chemical processes); namely, observing, thinking, and perception.

In consequence of the indispensability of the psychic processes, there cannot be just *one* way of access to the secret of Being; there must be at least *two*—namely, the material occurrence on the one hand and the psychic reflection of it on the other (although it will be hard to determine what is reflecting what!).

Given these circumstances, the task facing these two disciplines is to locate and describe that region which is indisputably common to both. My dreams and my intuition have both referred me to natural numbers. These seem to be the simplest and most elementary of all archetypes. That they are archetypes emerges from the psychological fact that simple whole *numbers*, given the chance, amplify themselves immediately and freely through *mythological statements*; e.g., 1 = the One, absolute, nondivisible (advaita \triangle two-less [Zweitlose]) and thus the unconscious, the beginning, God, etc. 2 = the division of the One, the pair, the connection, the difference (agens-patiens, masculine-feminine, etc.), counting, etc. 3 = the renaissance of the One from the Two, the son, the first masculine number, etc. In addition to this, whole numbers possess that characteristic of the psychoid archetype in classical form—namely, that *they are as much inside as outside*. Thus, one can never make out whether they have been *devised or discovered*; as numbers they are *inside* and as a quantity they are *outside*. Accordingly, the possibility can be predicted that equations can be devised from purely mathematical prerequisites and that later they will turn out to be formulations of physical processes.

I therefore believe that from the psychological point of view at least, the sought-after borderland between physics and psychology lies in the secret of the number. Hence the saying, fittingly enough, that man made mathematics but God made the whole numbers.⁹

Just as in the psychological sphere number represents an elementary archetype, and the spontaneous symbolism of the Self undoubtedly goes back to this (especially 1-4), it is also the key to cognition of physics.

For more than a year now, I have been most fascinated by the secret of numbers, which is why I would like a complete description of all the characteristics of whole numbers with absolutely everything listed—e.g., details such as the fact that equations to the *fifth* degree cannot be resolved or the preference for certain numbers in certain fields, or the amplifying statements that freely result from certain whole numbers. In other words, I am

not interested in what the mathematician can do with numbers but in what the number itself does when given the opportunity. This is certainly the method that has proved particularly fruitful in the field of archetypal ideas.

I am thus inclined to regard the connection between psychology and physics under the aspect of two initially incommensurable fields, even though physical points of view can undoubtedly be applied to the psychic sphere. Any classification of psychology into a general theoretical form of physics, as has happened with chemistry, is out of the question in my opinion, because of the fact that psychic processes cannot be measured, quite apart from the epistemological difficulty mentioned above. Thus, I believe that there is more to be gained by examining more closely what the two fields have in common, and it seems to me that it is here that the mysterious nature of numbers is the most obvious thing for forming a foundation for both physics and psychology. I see the position of psychology in relation to a general form of physics more or less as you indicate it in your *quaternio* (Einstein-Bohr-Pauli-Jung). Just as in the axiom of Maria Prophetissa 4 (*τέταρον*) signifies the One (*τὸ ἓν*), so it is that in the concept of *synchronicity* (as the fourth) space, time, and causality are relativized or neutralized, *de facto* and *per definitionem*.

Synchronicity is, alongside numbers, a further point of contact for physics and psychology. In this case, the *meaning* of what they have in common seems to be (relatively) simultaneous events. It also looks as though there is frequently (or regularly?) an archetypal prerequisite for the meaningful parallelism.

Insofar as the two bridges linking psychology and physics are of such a singular nature and so difficult to grasp—with the result that no one dares to tread them—psyche and its science have been suspended in a bottomless room, and, as you so rightly say, are “homeless.”¹ You suppose that it is through this that the archetype of the *coniunctio* is constellated. That is true inasmuch as precisely for the past 10 years I have been more or less exclusively preoccupied with this subject. I have succeeded in tracking down a 16th century alchemist who tackled this question in a particularly interesting way. His name is GERARDUS DORNEUS,^b and he is a remarkable man in many ways. For him, the objective of the alchemical opus is, on the one hand, self-knowledge, which is at the same time knowledge of God, and on the other hand it is the union of the physical body with the so-called *unio*

¹ When you place me in your *quaternio* as the representative of the psychology of the unconscious as fourth to the three physicists, you are repeating the dilemma of Plato, who has his Demiurge, the fourth, “forced” into the mixture of the cosmic opposites, apparently because it is so made that it is not easily absorbed into the mixture (cf. *Symbolik des Geistes*, p. 343ff. [CW 11, pars. 186–92]). The transition from 3 to 4 is often an awkward matter, in that according to historical symbolism either the three deny the fourth or the fourth neutralizes the three into a whole (as in the axiom of Maria, for example).

mentalis, consisting of soul and spirit, which comes about through self-knowledge. From this (third) stage of the opus there emerges, as he states, the *Unus Mundus*, the *one world*, a Platonic prior or primeval world that is also the future of the *eternal world*. We may safely interpret this world as the one which the unconscious sees and seeks to produce, more or less corresponding to that synthesis which your dreams aspire toward. The final chapter of my book *Mysterium Coniunctionis* is the representation of this alchemistic endeavor.

It seems to me that in your "Holland-Italy" schema you are suggesting something similar. But you come out with it very clearly when you consider the *individuation process* as a *conditio sine qua non* for the validity of holistic statements. Here I agree wholeheartedly.

It means a lot to me to see how our points of view are getting closer, for if you feel isolated from your contemporaries when grappling with the unconscious, it is also the same with me, in fact more so, since I am actually standing in the isolated area, striving somehow to bridge the gap that separates me from the others. After all, it is no pleasure for me always to be regarded as esoteric. Oddly enough, the problem is still the same 2,000-year-old one: How does one get from Three to Four?

With best wishes,

Yours sincerely, [C. G. JUNG]

^a Leopold Kronecker (1823-1891), speaking at the Mathematics Conference in Berlin in 1886 said: "Whole numbers have been made by God; everything else is the work of man." This was an extreme philosophical point of view, and his remark is directed polemically against Dedekind and above all against Cantor. The latter, to whom his ideas on infinite propositions came as revelations, was deeply upset by Kronecker's attacks.

I wonder whether there is any way of knowing exactly what has been made by God and what by man?

[Cf., e.g., Dirk J. Struik, *A Concise History of Mathematics*, p. 159.]

^b Gerard Dorneus, Paracelsian doctor, Frankfurt late sixteenth-century; see esp. *Clavem philosophiae chemicæ*.

65 J

[Küsnacht-Zürich] 5 Dec. 1953

Dear Mr. Pauli,

[Typewritten carbon copy]

I am forwarding a letter that concerns you, and I would kindly ask you to attend to it.

With best wishes

Yours sincerely, [C. G. JUNG]

1 enclosure [missing]

66 P

Zürich 7/6, 23. XII. 1953
[Handwritten]

Dear Professor Jung,

Although I would like to postpone to a later date a detailed reply to your last letter, especially with regard to the Numbers archetype (partly also because we leave for America on 5 January till the middle of April), it occurred to me today to express my thanks for all your trouble and your constant interest in my problems by sending you an informal, improvised Christmas greeting.

In doing so, I should like to stress my basic agreement with your demand for a middle or superior position for the psyche in relation to body and spirit and also with your adopting of *two* roads to the secret of Being. I have indeed seen that the *same* relationship problem shows up between the different aspects of the Self on the one hand and the different aspects of the anima on the other, both in my personal problems and in the problem of physics with other sciences and life as a whole.

As the natural sciences nowadays take their *dynamis* from the archetype of the quaternity, this is how the ethical problem of evil is constellated, which has become particularly manifest through the atom bomb. Now it seems to me here that, compensatorily from the unconscious, the tendency is being developed to bring physics much closer to the roots and sources of life, and that what is happening is ultimately an assimilation of the psychoid archetypes into an extended form of physics. In this way, the ancient alchemical idea that matter indicates a psychic state could, on a superior level, experience a new form of realization. I have the impression that this is what my physical dream symbolism is aiming at. In connection with the physical archetypes, you yourself (in your article "Der Geist der Psychologie" ["The Spirit of Psychology," rev., *GW/CW* 8, pars. 343–442] used physical symbolism when you talked of moved masses and spectral colors. Obviously with me being a physicist, the relevant symbolism is embellished with much greater detail. Alongside this line of development, which aims at an adoption of parapsychology into physics, there is also a second one, which leads to biology and is connected with your concepts of "absolute knowledge" and synchronicity, although I cannot go into too much detail about that at the moment.

Dorneus's idea of the *unus mundus*, which you referred to in your letter, seems to me to be directly connected both with these lines of development into an extended form of physics and also with the psychological relationship problems in marriage. The moment that marriage is no longer a naive anima and animus projection, it seems to emerge more and more in the course of life that marriage *should be* a model for that *unus mundus*. At any rate, I was given the strong message from the unconscious that only *in twos*

can I "go home," which I took to refer to both marriage and your "two roads." It is also clear to me that in my case that *unus mundus* has long been projected onto China, which is particularly suitable, being the "Kingdom of the Middle."

With warmest greetings to you and your wife for Christmas and the New Year

Yours, W. PAULI

67J

[Küsnacht-Zürich] 10 October 1955

Dear Mr. Pauli,

[Handwritten]

I have finally managed to find time and leisure to write to you about your paper in the *Dialectica*.^a I studied it with great interest, duly admiring the completeness of your parallelisms. I would not know what I could add of any consequence to what you have written, with the exception of the secret of numbers, but I feel so incompetent in this matter that I fear I could not come up with anything that would make sense. However, the Poincaré readings (*Science et Méthode*)^b gave me heart inasmuch as he draws attention to the unconscious, or begins to suspect its importance. Unfortunately, failing to receive any support from the psychology of his day, he consequently became bogged down in the early stages and was not able to move on from those initial confusions and contradictions. However illuminating the similarity or sameness of the physical and psychological formation of concepts may be, it is nevertheless based more on the epistemological difficulties entailed in dealing with a nonvisual object than on either a perceived sameness or similarity of factual background, or one that could at least be postulated. My feeling is that the common ground shared by physics and psychology does not lie in the parallelism of the formation of concepts but rather in "that ancient spiritual 'dynamis'" of numbers that you point out on p. 295. *The archetypal numinosity of number* expresses itself on the one hand in Pythagorean, Gnostic, and Cabbalistic (Gematria!) speculation, and on the other hand in the arithmetical method of the mantic procedures in the *I Ching*, in geomancy and horoscopy. Even mathematicians cannot agree among themselves as to whether numbers have been discovered or invented, a fact that finds its counterpart in the modern dilemma of whether the archetype is acquired or is innate. (In my view, both are true.) "In the Olympian host, Number eternally reigns" is a valuable acknowledgment from mathematicians as to the numinosity of number. Accordingly, there is sufficient justification for bestowing on number the characteristic of an archetype. Consequently, number also acquires the *autonomy* of the archetype ("dynamis" of number). For the mathematician, this feature of

number is rather unwelcome and virtually unknown, since he uses it simply as a means to an end for counting and measuring, defining it as $1+1+1$, etc. This is also the fate that befalls the archetype in (academic) psychology and is a clear effect of the prejudice against the unconscious in general. But given the indisputable numinosity of number, this resistance loses its validity, and one is forced to draw certain inevitable conclusions—namely, those same ones that psychology can no longer bypass: The autonomy of a psychic factor lies in the fact that thanks to its dynamic force, it is capable of making its *own* statements. As was to be expected, this is where your own criticism logically comes in. You describe my expression “psychic statement” as a pleonasm, which is undoubtedly correct in relation to “general statement.” But I usually adopt this expression not for statements of ratio but for those of the *psyche*, i.e., those that do not have their source in the conscious *ratiocinatio* but spring directly from the objective psyche itself, such as myths, dreams, delusions, and so on. If consciousness is a factor at all here, it is indirect and lacking in authority, whereas the *ratiocinatio*—if it possibly can—suppresses everything that is unconscious, consequently limiting everything psychic as far as possible to what is universally valid and sensible.

Thanks to its “*dynamis*,” number as archetype is capable of making mythical statements. If it is permitted to express itself at all, then it will produce “psychic statements.” In the eyes of the psychologist, these are among the indispensable characteristics of number, even if the mathematician merely views them as a means of counting. One might compare them to the diamond, which on the one hand has great technical and industrial significance but has much greater value to the connoisseur because of its beauty. The numinosity of number has less to do with its mathematical applicability and more with your “inevitable” statements, which have to cope with all the resistance that is offered to anything to do with the unconscious.

In psychology, we let the archetypes amplify themselves or we even observe the amplification process in dreams. The same experiment is possible with numbers. Here we also have common ground where physics and psychology meet, for on the one hand number is an indispensable characteristic of natural things, and on the other hand it is also undeniably numinous—i.e., psychic.

With regard to the “sacrifice-parallelism,” I asked myself whether the choice of the term “sacrifice” is an accurate one for the formulation of the physical question. For the physics experimenter, it is basically just a *decision* and only metaphorically a “sacrifice.” He cannot have both at the same time. Granted, one can choose or decide between two possibilities, but it would probably be a rhetorical exaggeration or a pejorative use of the term “sacrifice” to describe that action as such, for “sacrifice” means giving up possessions *à fonds perdu*.

The idea of "absolute knowledge" came to me while reading *Hans Driesch*^a (*Die Seele als elementarer Naturfaktor* [The Soul as an Elementary Factor of Nature], 1903, p. 80ff.). Connected to this is the problem of reversed causality: the future event as cause of the past one. To me this feels like a pseudo-problem in that, by definition, the principle of cause and effect cannot be reversed, no more than the flow of energy can. All this does is avoid the issue of the inexplicability of foresight. When biochemical processes are induced, for example, it is not chemistry—as biology is starting to realize—but an archetypal selection of "suitable" connections.

Your work is highly stimulating and creditable. It is to be hoped that your train of thought will also have an enhancing effect on your own special field. Psychology at the moment is lagging so far behind that there is not much of value to be expected from it for quite a while yet. I myself have reached my upper limits and am consequently hardly in a position to make any contribution of note.

Your courage in tackling the problem of my psychology is a great source of pleasure to me and fills me with gratitude.

Yours sincerely, [C. G. JUNG]

^a "Naturwissenschaftliche und erkenntnistheoretische Aspekte der Ideen vom Unbewussten"; also in Pauli, *Aufsätze und Vorträge über Physik zur Erkenntnistheorie*; tr., "Ideas of the Unconscious from the Standpoint of Natural Science and Epistemology," in Pauli, *Writings on Physics and Philosophy*, pp. 149–64.

^b Henri Poincaré (1851–1912), French mathematician, *Science et Méthode*, 1908.

^c Hans Driesch (1867–1941), biologist, Neovitalist (Entelechy), later philosopher (also interested in parapsychology).

68

A. Jaffé to Pauli

[Küsnacht-Zürich], 27 August 1956

Dear Mr. Pauli,

[Typewritten carbon copy]

On returning from my holiday, I have found a copy of your letter to Dr. J. B. Rhine about Mr. Hare's work. I should like to thank you, on behalf of Prof. Jung as well as myself, for dealing with the matter so thoroughly.

I am assuming you are now in Italy and shall expect your call when the equinoxes are here.

With best wishes,

Yours, A. Jaffé

(*Myst. Conj.* II is out, and I shall send you a copy at once. J. will probably wish to write an inscription!)

Zürich, 23 October 1956
 [Typewritten carbon copy
 with handwritten notes in the margin
 by C. G. Jung (i)-(xiii)]

STATEMENTS BY THE PSYCHE

Dedicated to Prof. C. G. Jung
 in Thanks for his *Mysterium Coniunctionis* I and II
 and in Response to his Letter of 10 October 1955,
 with unaltered Faith in the Unconscious.
 by W. Pauli

Dream, 15 July 1954

I am in Sweden, where Gustafson (professor of theoretical physics in Lund) is present. He says to me; "This is a *secret* laboratory in which a radioactive isotope has been isolated. Did you know anything about it?" I reply that I knew nothing about it.

Context. Gustafson has sent many students to me in Zürich, among them one who was particularly gifted, Dr. G. Källén. He was in Zürich in 1952; I remained in contact with him, and in 1955 we published a paper together.¹ I mention this because Källén will play a role in what follows now, in a special context. I am in closer touch with Lund than with other Swedish universities. Not long before this dream occurred, I received a letter from them informing me that they had awarded me an honorary doctorate. On this occasion, incidentally, one is given a *ring*, which I mention because of the symbolism always associated with a ring.

What is more important, however, is that the dream occurred only a few weeks after my *trip to Lund and southern Sweden*. Apart from wishing to thank them for the honorary doctorate and wishing to attend a spectroscopy congress, there was another reason for this trip: *the total eclipse of the sun* in southern Sweden on 30 June 1954. The sky was overcast, and so I did not see the corona, and yet it was still very impressive when darkness fell during the day. Such an astronomical occurrenceⁱ easily produces "synchronistic" reactions in the psyche, which might explain both the appearance of Sweden in the context of the dream and also the "radioactivity" of the isotope in the dream.¹

ⁱ (Occurrence = basically isotope isolates separation and "definition" of the Self.)

¹ With regard to "eclipse of the sun," cf. C. G. Jung, *Mysterium Coniunctionis*, vol. 2, p. 228

Sweden, by the way, has played an important role in my dreams for a long time (as has Denmark, but there is always a clear distinction between the two). For example, a dream occurred at the beginning of my analysis (about 1931, if my memory serves me correctly) in which "Children in Sweden" appeared. The motif recurred frequently in the course of the analysis, especially toward the end (1934), but was never clarified. And that is precisely why I still think about it a lot.ⁱⁱ

Isotope separation is familiar to me as a symbol of the individuation process (doubling motif, cf. the two brothers Castor and Pollux, Christ is God and Man, and so on), which always appears when progress is being made in the development of consciousness and is connected with the "incarnation" of an archetype. The word "radioactive" is used in my dream language to mean the same as C. G. Jung's term "synchronistic." The characteristic of *radioactivity* is always temporary, provisional, an intermediate state, and not a stable final state.ⁱⁱⁱ

What occurred to me at once about the laboratory is that the unconscious is a laboratory in which the individuation process takes place. The secret nature of the laboratory immediately upset me, and I determined to work on bringing it out into the open—i.e., making it conscious. That was also the "point" of the dream. The motif of the laboratory crops up again later. Here I should like to point out that *working on my own dreams is an "experiment"* for me: First of all, I register the dream before waking up, then I make the associations, and then I reflect on them. This reflecting reacts on the unconscious, which then expresses itself in the motif of doubling and in the image of the laboratory.² The best thing about this introductory dream is accordingly the following dream series.

Dream, 20 July 1954

I am in Copenhagen, at the home of Niels Bohr and his wife, Margarethe. He makes an announcement to me, a very official one: "Three popes have given you a house. One of them is named *John*; I don't know the names of the other two. I have made no secret of the fact that we two do not share their religious beliefs but have nevertheless persuaded them to offer you the gift."

[GW 14ii, par. 322; CW 14, par. 657], where it is given as a symbol for the "darkened" moment of the synthesis.

I should like to put forward for discussion the hypothesis that conversely, with the real eclipse of the sun, the l.c. processes described are occurring in the unconscious, even if they are not being directly observed

ⁱⁱ (North-Intuition, "Children's Land, Land of Dreams)

ⁱⁱⁱ (radioactive = numinous constellated archetype)

² With me the laboratory is always connected with the "mental state outside the ego," which is how Jung interprets the processes in the alchemist's retort in *M. Coniunctionis*, pp. 47-48 [GW 14ii, pars. 70-71; CW 14, pars. 410-11].

He then presents me with a sort of document of the gift, and I *sign* it. At the same time, I am given a train ticket by Bohr and his wife to ride to the new house.

I regret very much that my wife is not present, for what can I do in a new house without her?

(Here I wake up briefly but soon go back to sleep. The dream continues.)

A late uncle of mine from Austria, a Catholic, appears to me in the dream, and I say to him: "The new house is for you and your family. I hope you will enjoy it."

Context. This dream is a very fundamental one, and I cannot actually say that I have "understood" it. Niels Bohr stands for the idea of complementarity and for theoretical nuclear physics. In real life, he does actually have the ability to overcome people's resistance and convince them of practical measures that he considers right. His own house is a *focal meeting point for many people*; his wife enjoys organizing large parties and does so extremely well. The Bohrs also have several grandchildren (not 19 but 11), some of whom are often there.

Now comes the archetypal part of the dream. As for the three popes, it occurred to me that this was an earthly representation of the Trinity and also a linkup with a Catholic tradition. This is also represented later by the Catholic relatives. In contrast to the dogmas, the *rites* of the Catholic Church have preserved *several* experiences of a "magical" nature that may be of value in parapsychological terms and that arouse my interest. I am thinking, for example, of the Sacrifice of the Mass, an "experiment" that involves the transformation of the person experimenting. *My dreams actually make no basic distinction between "laboratory" and "church"* (see below and cf. alchemy!), so the new house could be both. The pair of opposites in this dream is natural science (physics)—Catholic tradition. The new house is always *the place where a union of pairs of opposites takes place, a coniunctio*.

As for John, I think of the Evangelist and hence gnosis, although of course the Evangelist was not a pope. Otherwise, the three popes are rather indeterminate, but the Trinity—supplemented by Bohr *and his wife*—fits in well with the *coniunctio*.^{iv}

The absence of my wife or her loss (disappearance into the unconscious), or the fact that I am in a place where I try in vain to reach her by telephone is a motif that often turns up in my dreams.^v I should like to *propose an interpretation on a subjective level*, for the simple reason that, as far as I can judge myself, it seems to correspond to reality. My wife is a *sensation type*, whereas with me the *fonction du réel* is the *inferior function*. But this has the

^{iv} (these triads, threefold crowns father and mother rex and regina)

^v (P here is like an alchemist who does it in the retort and does not realize that he himself is in the process.)

characteristic of not being present when it is needed, of remaining behind or disappearing into the unconscious, etc., as my wife often does in my dreams. And this inferior function would need to work better in the new house, otherwise there would be no real connection between me and the outside world. And in fact, in real life I leave all that to my wife to a large extent.

In this connection I should like to point out that in my case, as far as I am in a position to judge, the evaluation of the functions in the general function schema has shifted somewhat in the course of my life. It seems to me that in earlier years the thinking function was the most differentiated one, and feeling was correspondingly the inferior function. These days, I regard intuition as my most differentiated function, and accordingly it seems to be going better with the feeling side, and *the inferior function is extraverted sensation*.^{vi}

Generally speaking, I attach fundamental importance to the appearance of women in the dreams of physicists. They represent an *inner reality* that seems to defy expression in any sort of conceptual language. In relation to masculine consciousness, they also seem to symbolize the *consciousness-transcendent unity beyond the pairs of opposites*.^{vii} Unlike borderline areas such as parapsychology, I regard the specifically feminine sphere as "irreducible" with regard to any attempt to adopt an approach outside the psychological one.

Dream, 18 August 1954

I am in Sweden, where I come across an important *letter*. I cannot recall the beginning of the letter very well. But then at one point it says in the letter that with me there is something essentially different from C. G. Jung. The difference is that with me *the number 206 has changed to 306, but not with Jung*. I keep seeing 206 turn into 306. The letter is signed: "Aucker."

Context. This is a very puzzling dream, one that I have not been able to do much with in the past. I have no idea what to make of "Aucker." It seems likely that with me there is some form of *repression* going on here, which is also suggested by my inability to remember the beginning of the letter. I think "Aucker" is some sort of camouflage, and *I have the feeling that the real meaning of the dream must be rather unpleasant*. Out of sheer habit I noted that the factorization of the numbers $206 = 2 \times 103$; $306 = 2 \times 3 \times 3 \times 17$.^{viii}

^{vi} (The weak link with reality.)

^{vii} (Projection of the Self onto the woman)

^{viii} $(2+6 = 8 = 2$

$3+6 = 9 = 3$

Father and mother

Progression of suspension from mother to masculinity to lack of action in realization (inferior function!) keeps everything in the unconscious laboratory.)

The second number is much more complicated, although the latent 17 seems favorable, whereas 103, being too large an irreducible number (prime number), strikes me as unnatural. Whenever C. G. Jung appears in my dreams, I tend *not* to relate this to him personally. I am rather inclined to think that it is more a matter of *my* attitude to analytical psychology. The transformation from 2 to 3 seems positive, indicating some sort of realization.³ The negative side would be that my attitude to analytical psychology has not been part of this change. As a working hypothesis, I would like to venture the interpretation that, in my case, analytical psychology has remained in the dependent relationship of the *younger brother* (that is an association made today, it was not in the dream)⁴ on the natural sciences (elder brother) and has not moved on from there. Analytical psychology perhaps should represent the *Fourth* and hence the whole—i.e., 4:3 instead of 2:3. Proportio sesquitertia *instead of* sesquialtera!⁵

This interpretation is probably correct, for I know that two years ago I would never have admitted that. Today, I feel much more strongly *that all these dreams cannot be automatically translated into scientific treatises* and that it is much more a question of one's own wholeness (individuation).

Dream, 28 August 1954

I am riding on tram #5 to a *large new house*; it is the ETH in new premises. From the tram stop, I take a footpath that winds slowly up a hill and finally leads into the house. In the house, I find my office and on a table there are *two* letters. In one of the letters, signed Pallmann,^b it says: "*Ferry dues settlement.*" The bill is very long, with lots of + and - additions. The final total is 568 Swiss francs, which I have to pay. The *second* letter is in an envelope, on which it says: "philosophical choral society." I open it and find beautiful red cherries, some of which I eat.

Context. Once again, in the new house there is a union of *opposites*^{ix}: *two* letters. This time, the new house is a reformed ETH, where the ordinary physics and mathematics departments are *also* to be housed, and something else is new: I am apparently supposed to be teaching there. For the ETH is not private but public. I do not really know what *the connection is between the new house and the public. It is a major problem for me.* I do not regard the dream Pallmann as the real Pallmann but as the "master," a familiar dream figure for me. (I used to call him the "stranger," but in the meantime he has lost all his strangeness.) He is often an official superior.

³ The fact that this dream also takes place in Sweden indicates that the transformation 2 → 3 has already "secretly" begun there.

⁴ See dream of 12 April 1955 [below], which indicates progression in this direction.

⁵ 2 can also be interpreted as a "feminine" number (Chinese: "Yin number"). Analytical psychology would then be "maternal"; from the unconscious comes the "son," depicted as 3—namely, physics. The following conclusions, however, remain the same.

^{ix} (Double?)

I immediately factorized the figure 568* into factors 8×71 . The latent 17 from the previous dream has changed into the latent 71. The sum of the digits of the numbers $7 + 1$ is again 8, so that the 8 is both strongly latent and also manifestly represented as the the last number of 568. On the whole, this figure makes a favorable impression, also because of the slow and steady rise in the numbers (with even the glaringly obvious missing 7 appearing potentially in 71). This gradual increase makes it possible to pay the bill, and the demands of the "master" can be met.

I have used the expression "philosophical choral society" in my waking life ever since it cropped up in the dream. For my impression is that the philosophy of the *contemporary* philosopher specialist is not really produced with and for the intellect but comes across as a complex and involved emotional attitude. Compared with music, however, I regard it as a regression into the undifferentiated, falling between two stools. Even in my early dreams there was evidence of a certain satirical element.

So in this dream it looks as though I did not take seriously the second envelope with the red cherries (I think it really should have been music), whereas the first letter I did take seriously.

The synthesis of the two letters is not yet achieved,^{xi} since the ferry dues have not yet been paid. Such a synthesis has to go back as far as the emotional source of the natural sciences, which also means going back to the archetypes on which they are based and their dynamic force.

However amusing the philosophical choral society was, eating the red cherries had serious consequences, as can be seen from the next two dreams, which I shall comment on.

Dream, 2 Sept. 1954

A voice says: "At the place where Wallenstein atoned for his sins with his death, a new religion shall arise."

Dream, 6 Sept. 1954

A major war is being waged. "Political" news that I wish to send to people is censored. Then my *mathematics* colleague A. appears, with his wife (I know both of them from the old days in Hamburg). A. says: "Cathedrals should be built for *isomorphy*." Then, from Mrs. A., come more words that I cannot understand and written texts that I cannot read. (I wake up in great excitement.)

Context. I view these dreams as really *fundamental*. They relate to the problem of the synthesis of the two letters in the last dream and hence the problem of the relationship between the new house and the public.

* $(5+6+8 = 19)$
 $(1+9 = 10 = 1)$

^{xi} (not "whole" = *One*.)

Cathedrals are also open to all. This gets back to the very foundations of my culture and my existence. Thus the situation is a *dangerous* one, and it is understandable that a conflict (war) should arise, together with resistance on the part of conventional consciousness.

Even with the first dream, I have to dig deeper. Wallenstein takes me back to the 17th century, to Bohemia, to Kepler and my work on him, to the Thirty Years War, which brings the Reformation to a standstill with a general cultural split (dissociation). My feeling attitude to this is that it is the bad end to a bad start. The history of the religion of love, of Christianity, has been permeated with blood and fire ever since the time when the Athanasians refused to turn the other cheek to the Arians. The noble intentions of the founder of Christianity were thus completely changed to the contrary, he himself being the exponent of a stream of unconsciousness that was caused by the circumstances of the times and which tore apart all the pairs of opposites into extremes of good and evil, spiritual and material, Apollonian and Dionysian. New forms of evil, specific to Christianity, came into the Western world, such as sectarian wars and religious persecution. The outcome was the open conflict between *reason* and *rite*, which is how I view the Reformation. The nonfunctioning of the religious tradition thus strikes me as the distinctive characteristic of the West in the Christian era, and it is my belief that contrary to the claims of Christian theologians, all the hopes of mankind must be geared to the fact that Christianity will prove to be something *not* unique but merely a particular manifestation of the *religiosum* and *numinosum* caused by prevailing circumstances.

As a characteristic Westerner (meaning as opposed to someone from India or China) of the 20th century, I may be outside convention from the religious point of view, but I must have my roots in some tradition or other. In my case, it is mathematical science, which has developed so rapidly since the 17th century, with consequences for technology that are becoming threatening. When even this tradition starts to rock, then the situation becomes critical. And, indeed, it is now a fact that tradition does not carry the same weight as it used to, for its ethical foundations in particular have lost credibility. Behind it, as a "shadow," is the will for power (Francis Bacon: "Knowledge is power"), which is becoming more and more independent. In fantasy images, it expresses itself to me in such a way that the "light anima" has entered into a secret relationship with the shadow (Devil, *princeps huius mundi*), and this is precisely why this light female figure *has become* so suspect for me.⁶ In my view, only a *chthonic*, instinctive wisdom can save mankind from the dangers of the atom bomb, which is precisely why the material-chthonic, ostracized by Christianity as unspiritual, acquires a

⁶ Dr. Hurwitz^c pointed out to me that this situation has a certain analogy with the expelling of the Schechina from the throne of God in the Jewish tradition.

positive value sign. This manifests itself particularly in the fact that the dark-chthonic anima now seems to me superior, and its connection with the light (spiritual) side of the "Master" is a source of hope. So, for me, light and dark no longer coincide with good and evil. Down in the dark depths of the earth an *assumptio* is required of the woman, not far from the person in heaven.

In this uncertain situation, where everything can be destroyed—the individual by psychosis, civilization by nuclear wars—the saving aspect also grows, the poles of the pairs of opposites draw closer together again, and the *archetype of the coniunctio* is constellated. *The new house is the place where the union of opposites, the coniunctio, takes place*, and laboratory, university, cathedrals are just different aspects of the same house.

In the new house, *the opposition between rite and reason* is removed (see context to the dream of 20 July 1954 [above]). But the surmising of this possibility leads the individual into a sphere beyond the possibilities of contemporary civilization. In this sphere, there is, for example, no nonmedical treatment of dreams, connected with an objective-scientific study of the repercussions of this treatment on the manifestations of the unconscious (that does not exist at the C. G. Jung Institute, either).^d In our civilization, the transformation of the observer and the sacrifice is not established in scientific practice, and the word "sacrifice" is only just beginning to force itself from the unconscious onto the physicist who is listening to it.⁷ Nor is there any religion today that attaches more value to the transformation of man through immediate experience than to an old book (the Bible) or to dogmas (such as the uniqueness of the divine incarnation).

Matter-friendly undercurrents in Christianity, such as *alchemy*, have probably known or suspected all of this, as well as something of the following, for they knew about the *coniunctio*. Modern times, however, are expected to present the old views in a new form, one that befits our current scientific knowledge and our current situation.

This is what the word "isomorphy" deals with in the second dream. I would like to point out that in general my dreams do *not* use the language of analytical psychology; words such as "archetype," "Self," do not crop up. Instead a language has been systematically created in the dreams that contains words such as "spectral lines,"^e "isotope," "radioactivity," "nucleus," "isomorphy," or "automorphy." Through 20 years of listening, I have gradually learned large chunks of this language (even though some of the finer points still escape me). For me, this language is perfectly satisfactory when it comes to describing processes in the unconscious, and for myself I would

⁷ See my essay in *Dialectica*, 1955 ["Naturwissenschaftliche und erkenntnistheoretische Aspekte der Ideen vom Unbewussten"; tr., "Ideas of the Unconscious from the Standpoint of Natural Science and Epistemology," in Pauli, *Writings on Physics and Philosophy*, and C. G. Jung's letter of October 1955 [Letter 67].

have no need to translate it into the language of C. G. Jung's psychology, since I regard the latter as less differentiated than my own dream language.

However, as I am the only one who understands this mathematical-physical dream language, I am forced to translate it into another language if I wish to make my experiences and conclusions accessible to others. To a certain degree, a translation into the terminology of C. G. Jung's analytical psychology is possible, and I have just given one example ("radioactive isotope"). (Cf. below, p. 18f: Linguistic Symbolism [see below, dream of 1 October 1954, psychological-context section].)

With the word "isomorphy" (identity of form, reproduction of the same form), which is taken from mathematics, I am in a good position as a translator. For soon after I had learned the word from dream language, C. G. Jung's book *Aion* appeared, part XIV of which—especially the formula on p. 370 [GW/CW gii, par. 410]—describes the thing indicated by the word. In the dream with the commentary, it is the secret of the multiple forms of appearance of the archetypes, the *multiplication* with the *coniunctio* known to the alchemists. Here we find the very dangers I have just described. The mathematician A. (who knows what isomorphy is) thus advises me in the dream to *ritually capture the multiplicatio in cathedrals*, so that there will *not* be a pointless and aimless, psychotic or catastrophic repetition from the *coniunctio*, but rather *a new form with inner isomorphy* (automorphy), as illustrated, for example, in *Aion* in the place quoted. Cathedrals, incidentally, are themselves a *multiplicatio* of the original and unique new house.

So these dreams—and hence the new house—are really of significance for people in general, but the realization of these "intentions" of the unconscious, which today only vaguely and sketchily force their way into the consciousness of the individual, may require just as great an effort on the part of many people in what may be a distant future as has the development of science and technology in the last 300 years.

The following dreams depict further aspects of the *coniunctio*.

Dream, 30 Sept. 1954

Together with my wife I am in a house that is located in the Tropics. A cobra rises up from the floor of the room. I can see that it will not harm me. I try my best to be friendly toward it and to show that I am not frightened, and in this I succeed. As a result, it leaves us alone.

But then a second cobra rears up out of the *ground* in front of the window. I can see that it is looking for the first cobra and not for us. The snakes are a pair, a male and a female.

Once I have got accustomed to the presence of the two cobras, I can hear the voices of two physicists of my acquaintance, B. (Swiss) and K. (Dutch). Later, I then see them in front of the house.

Comments: The Tropics are a reminder of our trip to India (1952), as are the cobras. With the first cobra, I am put in mind of the Gnostic identification of the *Nous* with the serpent in Paradise, and with the second cobra, which is of chthonic origin, I think of Physis. According to Gnostic legend, the union of *Nous* and Physis led to the creation of the first seven hermaphroditic creatures and the seven metals. Together with the two physicists, who belong to the conscious sphere, the two cobras, which represent the deeper layers of the unconscious, form a mandala into which my wife is also incorporated.

The two snakes can be brought into relation with the mirror-image quality and the complementarity relationship of Physis and Spirit stressed by Jung in *M. Coniunctionis* II, p. 282 [GW 14ii, par. 379; CW 14, par. 722]. The dream seems to be saying that the possibility of Physis rests on these facts. But this situation seems to be pressing for the inclusion of the psyche "outside the ego." The following dream deals with this, and I shall comment on it at length.

Dream, 1 October 1954

Bohr appears and explains to me that the *difference between v and w* corresponds to the difference between Danish and English. He says I should not just stick with Danish but should move on to English. He then invites me to a *big party* in his institute, which has been newly refurbished (new house). More people appear, some of them strangers, some of them known to me, and they are all going to the party. In the background, I can now hear *Italian* voices. An elderly Dane whom I do not know is there with his wife, and also my colleague *Jost*^f from Zürich (extraordinarius professor for theoretical physics and a close fellow worker). I can see that the party is an important event.

I wake up excited and the word *vindue* immediately comes into my mind, so that I count it as part of the dream.

A *philological postlude*. The dream immediately aroused particular interest, and I began to think about the linguistic symbolism: yes, in the 10th and 11th centuries (when England was ruled by the Danish King, Canute the Great), a lot of Danish words passed into English. In Danish, the letter *w* does not exist, but in English those Danish words that begin with *v* (it is pronounced like the *w* in modern German, never like *f*) were always written with *w*. One example is the word for the German "*Fenster*": (from the *Latin fenestra*): *vindue* (Danish) → *window* (English). Other examples spring to mind:

Meaning	Danish	English
verkehrt	vrang	wrong
Welt	verld	world

By way of contrast, English words of Latin origin, such as "view" are written with *v* at the beginning. I wanted to know more about the history of the letter *w*, which does not exist in the Latin of classical antiquity. How did this *doubling* actually come about? In the dream it is apparently the same motif as the separation of isotopes. But nothing occurred to me. I also regretted not knowing anything about medieval Danish (this old Norse is similar to the language still spoken today in Iceland), but unfortunately I don't.

I immediately saw in my mind's eye the chthonic mandala of countries, which can always be applied to my dreams whenever countries or nationalities appear. The English language, incidentally, is itself a synthesis of Latin and German, and an example of *coniunctio* symbolism could be clearly seen. (See below p. 18 [the section on psychological context].)

So far, so good—but there was more to this *v* and *w* than first met the eye. I once had occasion to write to *Abegg*⁶ about something else, and I asked him about the history of the *w*. He recommended that I consult the Anglicist Prof. *Dieht*, but as I did not know him, I let the matter drop.

In February 1955, there was a meeting of the mathematics-physics student association. When it was over, late in the evening, I suddenly had the idea of going down to the Kronenhalle at Bellevue, where I thought I might bump into someone I knew. I never normally go there alone, by the way. In the entrance, a tall, well-built man came striding up toward me. If I had not moved out of his way, he might have knocked me down. I recognized him as Prof. *Straumann*,^h the Anglicist. I smiled and suggested we might have a drink together, and he happily agreed. He had just returned from America and was in a good mood.

When I turned the conversation to the question of the letter *w*, he waxed expansive on the subject: "You must have noticed that the name of the letter in English is 'double U.' Furthermore, the pronunciation of the letter *w* in English is different from that of the *v*, in that with *w* there is a *u* sound at the end. The *w* is first found in Old High German in ancient documents, and from there it came to England. It would be safe to assume that the phonetic difference in English between *v* and *w*, which has been preserved in English, was also present in Old High German. In German, however, it gradually faded away and disappeared."

All sorts of ideas crossed my mind on hearing this: Among physicists I sometimes use the term "U field" for the unconscious, and I have suppressed it too strongly with *V*, which is why it did not occur to me. In the dream, the Danish probably stood for the simple language of the ratio, whereas in the English *w* was a dream symbol, and the unconscious and the conscious were to resonate together in a new synthesis. From that point on in the conversation with *Straumann*, I had the illusion that he was a superior analyst, always catching me unawares and finding me guilty. But of course I never mentioned any dream.

What I did do, though, was to turn the conversation to the relationship between Danish and English and the English word "window." Straumann certainly knew about the Danish origin of many English words but said at once that he did not know the Scandinavian languages at all. His attention was soon drawn to the *second* syllable of the word "window." He said that this syllable had been "eroded" but must actually be an independent root. He thought for a while and then said: "it must mean *windeye*. Can you tell me what 'eye' is in Danish?" I thought about it and then said: "Yes: *øjne* = eyes (plural), *øje* = eye (singular). (The letter *ø* corresponds to our German *ö*) That might be right."⁸ Straumann was satisfied. When we parted, he said to me: "But you didn't use to be so interested in philological matters. Mr. Pauli." I was evasive in my response: "Well, when you get older, you get interested in all sorts of things."

Next morning, when I got on the tram #5, I found myself sitting opposite Prof. Straumann again (doubling). This did not surprise me. He was on his way to his lecture. I mentioned that I had checked the Danish word for "eye" in the lexicon, and it was correct. "Well, I'm glad," he said, "that I could make something of it that is of interest to me." He said good-bye and got out. And I have never spoken to him again.

But that is not the end of the story. In September 1955 I was at a social gathering in Copenhagen when my aforementioned Swedish colleague Källén "happened" to make the following remark: "Every Swede who has attended high school knows the old Swedish word *vindoga*⁹ for *fönster* (that is new Swedish) from the old sagas. *Windauga*, I said in German, and Källén replied: "Of course. This meaning is clear to us Swedes." Naturally, I did not know the *old* Swedish word. Straumann's etymology of "window" was placed beyond all doubt. But I never had the opportunity to pass on this information to him.

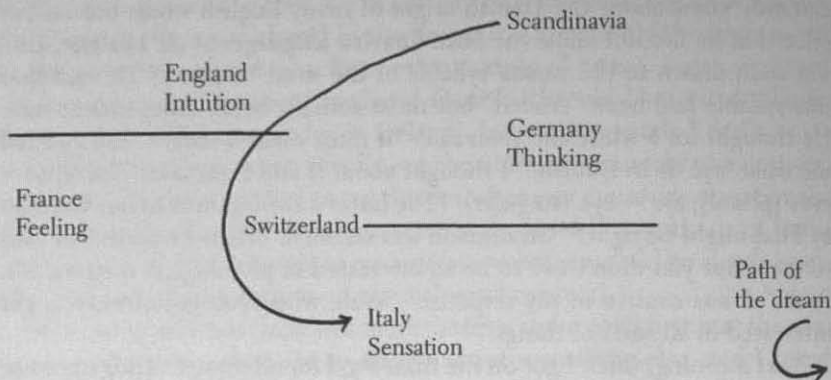
Psychological context. If I now had to make a summary (of the dream and postlude), I would make this tentative conclusion: *The dreams and their images are "Windaugen" for me: With the resonating of a subliminal pneuma (wind), which is protective and protected, and its synthesis with normal everyday language, it produces in these dreams and images a new type of visual faculty.*

There never used to be linguistic symbolism in my dreams, but it reappears in a later dream (see below). I am also reminded of some old drawings of a doubling of the eyes, dating back to 1934, as well as a dream from the same period about a "church festival where there is a lot of talk about Grottenholm." The party in Bohr's institute in this dream forms a parallel with the church festival. The arrangement of the pairs of opposites is

⁸ Swedish: *öga*.

⁹ In Swedish, the final syllables are also clearly pronounced, whereas in Danish they are swallowed, as in *vindue*.

explained by the *countries mandala*, which can be related to the schema of functions:



The other countries can be placed in between as further subsections, according to their geographical location.

The *w* probably comes from the *doubling* of *v*, not split up into two parts but forming a new, single sound (which has been preserved in English).

The linguistic symbolism of this dream is apparently related to the problems of the physical dream language and its connection with *physical* everyday language, which was pointed out earlier (pp. 12–13 [see above dream, of 6 September 1954, pars. 8–13, and dream of 30 September 1954]). *The analogy seems to be Danish–everyday language, English–dream language.* This also fits in with the fact that the Physics Institute in the dream is in Denmark. I am also inclined to think that the dream commented on here is trying to make me see an analogy between the beginning of physical dream language with me (since about 1934 and 1935) and the historical process of the assimilation of many Danish words into English after the Danish invasion of England in the 10th and 11th centuries.^{xiii} The *insular* nature of England might then be compared to the “island of consciousness”¹⁰ that came into being with me in about 1934 and in which the technical physics terms from the mainland, as it were, force their way in so that they can be assimilated. This led to the synthetic formation of a new unity that can be compared to the double letter *w* in English, a unity that contains both conscious (*v*) and unconscious (*w*) elements, with neither dominating the other.

^{xiii} ($v = 5$
 $w = 2 \times 5 = 10 = 1$)

¹⁰ The Scandinavian word for island is *ö*, which corresponds to the German word *Au* (also meaning island), as in *Ufenau*.¹ There is a possible connection between *ö* and *öga*, and also in *Au* and *Auge*, in that the meaning “demarcated area with a border” is common to both words.

Dream, 12 April 1955

I am in California, on the Pacific Coast. There is a special new house there—a laboratory. Experiments are being carried out on the first floor, and a voice says “with two neutrinos.” Along come experts from various fields. C. G. Jung is leading the way, running nimbly up the steps; he is followed by 2 physicists and—the youngest in the group—a biologist. I do not actually see much of the experiments this time, for the apparatus is rather unusual—consisting of shades and screens, etc., without any special technology, and it is also rather dark in the room. One of the physicists says it is a “nuclear reaction.”

I walk out of the house and drive north in a car with the “unknown woman.” We have left the scholars behind. The unknown woman sits on my left, and the sea, the Pacific, is also on the left, for we are heading north. I do not know of any specific destination. Finally, I pull up in a very nice spot that I really like the look of. On the left, between the road and the sea, I can now see a hill, dotted with houses, and on the way up there is a restaurant under the trees. I wake up with a most pleasant feeling.

Context. The laboratory that appeared in the dream first recorded here (15 July 1954) [above] is no longer a secret. I regard this as a success, even if not much of the experiments is visible. In the “new house” there is a synthesis of analytical psychology (which leads the way), physics, and biology, with the four scholars forming a *mandala*. The “two neutrinos” could possibly be translated as “two nonpolar unconscious contents in only very weak interaction with the conscious” (for neutrinos are a specially penetrating form of radiation). “Nucleus” usually refers to what C. G. Jung calls the “Self.” The reaction is going on *there*, not in the ego, which has simply been an onlooker.

Yet the reaction gives me an impetus that leads me to a pleasant place, one of natural beauty but already inhabited and civilized.

I have given much thought in recent years to fundamental questions about *biology* and its relationship with the other sciences represented in the mandala. Since I wrote the article for *Dialectica* in 1955 [see n. 7 above], I have repeatedly observed that young nuclear scientists, who show no inclination within the field of physics to return to the old determinism, are of the view that our modern nuclear physics would basically suffice to understand the biochemical and physiological processes in living organisms. Bohr, Heisenberg, myself, and others, who experienced the radical change that physics underwent in 1927, do not share this view at all; cautious biologists leave the questions open. My own impression is that one should not be deceived by the fact that every single physical-chemical process, *when observed in isolation*, has to work according to the established rules of

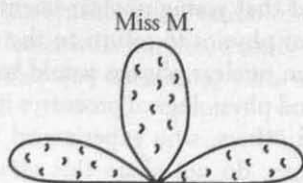
quantum chemistry, regardless of whether this takes place within or outside of a living organism. It is the *interplay* of many physical-chemical processes and *how they are controlled* that is characteristic of life. Even what the geneticists call a *gene* will probably turn out to be a complex interplay of several chemical reactions, although the translation of the language of geneticists into the language of chemistry is still in its early stages. A hierarchical structure of biochemical patterns arranged one on top of the other is what is likely, and little is known of how they come into existence and how they are transformed. My feeling is that it is highly unlikely that these patterns would come about simply by applying the laws of today's nuclear physics to the inorganic.

On the other hand, it is precisely for this reason that biochemistry seems to have great development potential, and I regard it as possible that from the point of view of the material processes it could arrive at a conceptual formulation of the laws of life at some point in the future; these concepts could then be brought into a more direct relation with those of the psychology of the unconscious—especially with the concept of the “archetype”—than is possible today. (It seems relevant here to mention the remark made to me by Prof. Jung in the letter of 10 Oct. 1955 [Letter 67, par. 5], about the “archetypal selection of ‘suitable’ connections” in biochemical processes.)

I see in this a wealth of possibilities for future developments, which leads us on to the *children* in the following dream. The fact that they appear in connection with the “clover leaf” archetype (plants, *lower Trinity*) probably fits into this context, since biology deals with the *material* substratum of life.

Dream, 20 May 1955

Once again I am in a laboratory, and this time Einstein is conducting the experiments. All they consist of is intercepting rays on a screen. Above the screen is the “unknown woman” (this time resembling a certain Miss M.) On the screen, there now appears an optical diffraction pattern, consisting of one central and two subsidiary maxima. This is how I describe the image as a physicist; it looks something like this:



The picture resembles a leaf. Marks now appear on the “leaves,” then the woman fades away and finally disappears. But now *children* appear on both

sides of the picture; the woman has gone and is forgotten—only the children and the picture are important.

Context. I regard Einstein as a manifestation of the “master.” I cannot see what is behind the screen. It is the unconscious, which is visible only when it comes up against a material object (screen). And yet it has its own autonomous energy, such as rays, against which the screen is also a protection.

I regard the image as a lower, *chthonic triad* (ace of clubs, *trèfle* = clover = *trifolium*), and it now looks to me like the *lower reflection of the three popes* from an earlier dream (20 July 1954). The appearance of the 3-leaf image and the disappearance of the “anima” are parallel actions; conversely: the more unconscious the lower triad becomes, the greater the power of the dark anima over the ego. What happens to the children remains to be seen.

Dream, 12 August 1955

A new house is officially placed at the disposal of my wife and myself in “Enzdorf” or “Lenzdorf.” I spend a long time discussing with my wife what we should do with our house in Zollikon. We finally decide not to give it up but to keep visiting it, and so we accept the “call” to the new house.

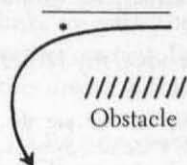
I now come to a path that has been cleared in the countryside, leading across meadows and fields into a new area. It is populated, and there are houses around. I meet my close colleague Jost, who joins us. At the side of the path, I then also meet the “master.”

Context. After the 3 popes from the previous year had been reflected downward as a clover leaf, my wife is now present (having been absent the previous year), and the new house can become reality. Lenz,^j by the way, is the name of my former superior in Hamburg; Enz^k is my present assistant.

After I had started reading Jung’s new book, *M. Conjunctionis I*, the previous night, the following fundamental dream occurred.

Dream, 24 October 1955

I am on a journey. An image appears on which a deviation* around an obstacle is represented; there then appears a timetable for a very fast train, which is due to depart at 17:00 from a place not specified, and does not stop very often.



Along come my wife and a Swiss friend (not a physicist)—let's call him X. My wife says we should go and listen to the sermon of a very famous preacher. X immediately complains that it would surely be very boring.

We all three go into the church, where some strangers are waiting. At the front, there is a blackboard, and on it I write lengthy formulas. Some of them deal with the theory of the magnetic field and have a lot of + and - signs. One expression is $+ \dots \mu H N/V \dots$ (H always indicates the strength of the magnetic field.)

Now comes the "major unknown figure," the famous preacher we have been waiting for, the "master."

He does not look at the people, goes to the blackboard, glances at the formulas, is very satisfied with them, and starts speaking in *French*:

"*Le sujet de mon sermon sera ces formules de M. le prof. Pauli. Il y a ici une expression des quatre quantités*" (he points to: $\mu H N/V$).

Then he pauses. The voices of the strangers can be heard shouting louder and louder: "*parle, parle, parle. . . !*" At this point, my heart starts beating so fast that I wake up.

Context. I shall come back later to the journey and the express train. Mr X. would have behaved just like that in real life. In principle, he is very much in favor of the Landeskirche [established church], but as he himself says, the preachers and their sermons are so boring that he has not been to church for ages. Here he represents my own conventional resistance to something that "does not exist," since it is neither science nor religion in the conventional sense of the term. What all this is about is the problem raised in the dream of 28 Aug. 1954 of getting right to the archetypal source of the natural sciences and thus to a new form of religion. French as the language of the country of feeling (*mandala* of countries) corresponds to the eating of the two *red* cherries in the earlier dream. In my dreams, by the way, I often speak somewhat better French than I do when I am awake.

After the upper and lower Trinity, there now appears the quaternity. As for the "magnetic field," I cannot come up with a good translation, but at any rate it is a field produced by polar sources; in the dream, it is often the producer of "magic" effects.¹¹

In the church—the new house—I was free from the pairs of opposites, *at one with myself*. My wife was with me, of course, and there were no longer *two* letters or *two* languages, but everything was related to *one* central point, the preacher. If I had not woken up with such a strong affect, he would probably have gone on talking.

A private postlude on death and rebirth. On 4 November 1955, my father

¹¹ Jung interprets the "magnet" as "Self" (*M. Coniunctionis*, vol. 2, p. 263 [GW 14ii, par. 360; CW 14, par. 700]). Cf. also *Aion*, chap. 13 ("Gnostische Symbole des Selbst" ["Gnostic Symbols of the Self," GW/CW 9ii, pars. 287-346]).

died of a weak heart at a ripe old age. This leads to a considerable change in the unconscious, and I suspect that in my case it also means a transformation of the shadow. For the shadow with me was projected onto my father for a long time, and I had to learn gradually to distinguish between the dream figure of the shadow and my real father. Accordingly, the bond between the light anima and the shadow or Devil (mentioned above on p. 10 [see dream above, 6 September 1954, par. 4]) often used to appear projected onto the "wicked stepmother" (my father's much younger second wife) and my father. The inner archetypal situation behind the external situation was always very clear with me.

I spent the three days of 29, 30 Nov., and 1 Dec. in Hamburg, where I had not been for a long time. I had been invited to give a lecture there, and my name and the hotel I was staying at was in one of the newspapers. This led to a romantic incident: A woman I had known in Hamburg 30 years earlier but had completely forgotten contacted me. I had lost track of her when, as a young girl, she became addicted to morphine, and I had given her up for lost. She telephoned me on 29 Nov. at about 17:00, and I spent two hours with her on 1 Dec.; she then accompanied me to the station, where I was to catch the *express sleeper train* to Zürich. In the course of those two hours, a whole lifetime of 30 years passed before me—her cure, a marriage, and a divorce, with war and National Socialism as a historical background.

But as in a tale by E.Th.A. Hoffmann, it seemed to me that parallel to this an internal, fairy-tale, archetypal story was being played out. I thought especially of "Die Wiederkehr der Seele" [Return of the Soul] (see *Die Psychologie der Übertragung* [Psychology of the Transference]);¹ 29 November, by the way, was a full moon.¹² 30 years ago, my neurosis was clearly indicated in the complete split between my day life and my night life in my relations with women. But now it was very human, and as we parted on the platform, it seemed to me like a *conjunctio*. Alone in the express train to Zürich, my mind went back to 1928 as I took the same route toward my new professorship and my great neurosis. I may be a little less efficient than in those days, but I think the prospects are a bit brighter as regards my mental and spiritual well-being.

The end of 1955 saw a certain rearrangement going on in the unconscious, and the section of the unconscious processes presented here has come to an end for the time being.

And finally, by way of a review and preview, just one short dream, which links up with the one commented on at length of 1 October 1954. In the earlier context, I probably said all that needed saying, so that I shall end with this dream without further comment. What is interesting is the expression

¹² For moon symbolism and birth from the moon, see Jung, *M. Coniunctionis*, vol. 2, pp. 110, 111 [GW 14ii, pars. 163–66; CW 14, pars. 498–501]. Also for king symbolism.^m

"seeing English and Danish" (not "speaking"), which, like the expression "apparatus," should be understandable in the light of what was said earlier about *Windaage*. It is also connected with the internal and external story just mentioned. But there is no "preacher" outside.

Dream, 26 December 1955

There is an official announcement about the visit of a "king." He actually appears and talks to me with great authority, saying "Professor Pauli, you have an apparatus that enables you to see both Danish and English!"^{xiii}

* G. Källén and W. Pauli, "On the Mathematical Structure of T. D. Lee's Model of a Renormalizable Field Theory." Cf., Danske Videnskabernes Selskab, *Math.-Phys. Medd.* 30, 1955. Gunnar A. O. Källén, born 1926, professor for theoretical physics in Copenhagen, later at the University of Lund, died 1968.

^b President of the ETH at the time.

^c Siegmund Hurwitz, born 1904, dentist in Zürich, pupil of Jung.

^d See Appendix 8.

^e This is the so-called Zeeman Effect; named after *Peter Zeeman* (1865–1943), Dutch physicist, a professor in Leiden and Amsterdam. He discovered the effect, which is the splitting of the spectrum lines in the magnetic field, in 1896, for which he received the 1902 Nobel Prize, jointly with *H. A. Lorentz*, who established the theory.

^f Res Jost, born 1928, Pauli's assistant 1946–1949, professor at the ETH 1959–1983, died 3 October 1990 in Zürich.

^g Emil Abegg (1885–1962), professor of Indology, University of Zürich.

^h Heinrich Straumann, born 1902, professor of English literature, University of Zürich, also rector, died 26 February 1991.

ⁱ Island in the Lake of Zürich.

^j Wilhelm Lenz (1888–1957), professor of theoretical physics, University of Hamburg, 1921–1956, where Pauli was his assistant from 1922 on.

^k Charles P. Enz (born in Zürich, 1922) was Pauli's last assistant at ETH. In 1959, he left the ETH and for two years was a member of the Institute for Advanced Study in Princeton, following which he was appointed professor of theoretical physics at the University of Neuchâtel. After a spell at Cornell University, he was appointed to the University of Geneva, where he still works.

^l Jung, published in 1946; *GW/CW* 16, pars. 353–539.

^m See below.

^{xiii} (Seeing double: Seeing into one another externally and internally. $v = 5$. A natural person, who, with perceptive consciousness gets caught in the extension $w = 1$ the *One* whole person, sees "double"—namely, the external form and also the inner "meaning" or breadth of meaning.)

70

A. Jaffé to Pauli

Küsnacht-Zürich] 15. 12. 56

[Typewritten carbon copy
with handwritten additions]

Dear Mr. Pauli,

As I was getting ready to send off J's letter to you, a letter arrived from Fordham^a with the request that you be asked whether you could send him a reply. This strikes me as a genuine synchronistic phenomenon, as you wanted to make one dependent on the other. May I ask you to attend to this matter.

Wishing you a Merry Christmas and a happy 1957, I remain

Yours, [A. Jaffé]

^a Michael Fordham (1904-1995), an English analytical psychologist, one of the editors of the CW.

71J

[Küsnacht-Zürich], December 1956

[Typewritten carbon copy
with handwritten additions]

Dear Mr. Pauli,

I should like to express my most sincere thanks for your detailed account of the development of your dream problem. Your interpretations are usually on the mark, and your carefully compiled "contexts" also enable me to gain adequate insight into the structure of the dream. Given the fact that you yourself have done the bulk of the work, it only remains for me to make just a few remarks about details in certain dreams:

Dream of 15 July 1954

As you rightly assume, the eclipse is to be understood as *nigredo*—i.e., as a darkening of consciousness, which always occurs when crucial things are going on in the unconscious. Although it is not actually stated explicitly in your dream, it is certainly there in your "context" account, where you talk about Sweden. Sweden, like all the North—England, northern Germany, and Scandinavia—is the region of intuition. These are areas that (with the exception of England in the narrower sense) are historically characterized by the fact that below the Protestant surface they still have a clearly perceptible heathenness; this, moreover, is the hallmark of the essence of intuition, for

intuition perceives the potential of not only the external physical world but also the inner world.

The isolated radioactive isotope probably relates to an essential element of the contents of the unconscious, which is almost certainly the Self. The fact that the Self is depicted as an isotope shows that it is still a variant of a familiar element—i.e., has not yet attained an absolutely central and dominant position. Nevertheless, the fact that it is isolated is such a numinous event that it brings about an eclipse of consciousness (= Sun). The association "Children in Sweden" probably indicates that Sweden is somehow connected with the land of children, where all those contents are housed that in later life lose their relevance.

For me, the term "radioactive" is the equivalent of "numinous," which in a secondary form can also be "synchronistic." Radioactivity as a temporary characteristic would correspond to a "constellated archetype." This, so it would seem, produces synchronistic effects, which latent archetypes do not.

Dream of 20 July 1954

The three popes probably form the lower triad; John the Evangelist would be the Gnostic, author of the Apocalypse, a prophet, as presbyter or bishop and author of the Epistles, a herald of love, and there is a legend that Pope John XXII was a woman, became pregnant by a chamberlain, and gave birth to a child during a procession. Hence the phrase: *Papa pater patrum, Papissa peperit partum.*

Just as the three popes represent the lower Trinity, Niels Bohr and his wife represent father and mother, Adam and Eve, *rex* and *regina*. Their appearance paves the way for the appearance of your wife. In this dream, they are like the alchemist who observes the transformation *mysterium* in the retort, who works alone and does not realize that he himself is part of the process of transformation.

As you rightly suppose, the absence of your wife in the dream points to the fact that the inferior function—that of sensation—is not working, and without that there can be no "realization."

Generally, the woman is a symbol of *realization* in that she realizes the potential powers of the man in the form of a child. Thus, she has a very special numinous significance because she is, so to speak, the mother of the Self. (Maria — Christus)

The name *Aucker* could also be *auctor*.

When it comes to the interpretation of numbers, I have often found the adding up of the digits to be a useful procedure; namely,

$$2 + 0 + 6 = 8 = 2(2^3)$$

$$3 + 0 + 6 = 9 = 3(3^2)$$

These numbers mark a progression from 2 to 3; i.e., from the material to the masculine; that is, to the son. —206 characterizes the state in which psychology represents a sort of uterus, in which the still unborn son is suspended (3 is indicated a power number); 306 represents the born son, who signifies masculinity, action, and realization. But the absence of cooperation from the inferior function results in the fact that this process is suspended in the unconscious—i.e., in the laboratory. (Incidentally, *laboratorium* and *oratorium* are both aspects of the alchemical working process.)

Dream of 28 August 1954

The motif of duality usually signifies the visible and invisible aspects. In this case, the one aspect is the "philosophical choral society," which seems to represent the consciousness aspect, whereas the invoice for SFr 568.—, being significantly less pleasant, presumably refers to the conscious aspect. You will recall your earlier dream in which it said he "refused to pay the tax" (Dream 53). What this means is the fare, specifically the transport across the "Great Water." (*I Ching*, the obolus given to Charon, Sanskrit for *Mercurius* = *Parada*, i.e., "granting access the other side.")

"The new house" is probably a new relationship to reality. The total of the digits of 568 = 19 = 1+9 = 10 = 1, i.e. *ars requirit totum hominem*, in that 1 is the One and the Whole, hen to pan, One, the Universe—i.e., the whole person, the microsmos corresponding to the macrocosmos.

The cherries are definitely concrete eroticism, sublimated in the "philosophical choral society."

I noted with satisfaction the expression "philosophical choral society." It is typical of you to choose to convert the envelope with the red cherries into music, whereas I am afraid that it is meant in very specific terms. The fare, according to the evidence of the total of the digits (=1), probably means that the task can only be solved by the fact that the One, which is also the Whole, has been attained, i.e., that one advances—as you would put it—as far as the archetypes and their dynamis, meaning that one must draw practical conclusions from one's perceptions; this, of course, is not strictly scientific but *science appliquée*. Just as physical perceptions find their practical expression in technology, psychological perceptions do so in their application to life itself. And just as technology can only hope to be successful if it conscientiously and systematically takes physical perceptions into account, the practical application of psychological perceptions can only lead to success if they are conscientiously and meticulously put into practice. This idea of "conscientiously and meticulously" is what is meant by *religere*, the word from which the Romans derived the term *religio*. (The derivation of *religare* = to bind together again, comes from the Church fathers.) The eating of the cherries is a serious matter in so far as it has its prelude in the apple in Paradise, which, as is commonly known, led to the *peccatum*

originale, to the *felix culpa*, which is responsible for redemption. This is why the next two dreams, which deal with the consequences, are—as you very rightly feel—of fundamental importance.

The Reformation actually came about as a result of the resistance to the fact that the rites were based on magic. It marks a progress in critical awareness over the primitive attitude that the spirit *eo ipso* is imbued with a *specific power*, capable of upsetting the natural order of things.

I doubt whether you are very much at home in the field of natural science. Natural science is some 300 years old, and that hardly counts as tradition. If you are at home anywhere at all, then, like any Westerner, it is in classical Judaean-Christian principles, which themselves are based on the premises of the Neolithic period. The socialization of *science* and *power* is an expression of the fact that the age of natural science has increasingly experienced a loss of critical spirit. It may well have command of the intellect, but it has not found any adequate expression for the spiritual aspect of emotional life. Now, as the traditional spirit that we know has been contaminated with greed for power, spiritual perception has to come flowing to us from a place that natural science has dispossessed of all meaning from the start—namely, nature itself, from the earth and its apparent nonspirituality. So you do well to opt for “chthonic wisdom” and for a union of *oratorium* and *laboratorium*, although this has nothing to do with church or polytechnic, but rather with the issue of the real and actual life of the individual.

Of course, the results of such an undertaking could be presented in any language, even a physical one—just as a doctrine can be translated into German, French, and Japanese. But as language means communication, a form must be found that enables it to be understood by everyone.

Dream of 30 September 1954

The union of the two cobras indicates that the real *coniunctio* is still in the state of the *spiritus Mercurialis* and is marked out only in the unconscious. Nor can it actually come about unless the opposites that are to be united are present in the form that penetrates chthonic depths.

With regard to the next dream—that of 1 October 1954—I would like to add that V is the Roman 5 and that in German the double V = W = 2 x 5 = 10, and 10 = 1, so that here the W (double V) is probably the One and the Whole. —Incidentally, I was most impressed by your forays into linguistics.

In the dream of 24 October 1955, there appears the union in the new house, where, “free from all pairs of opposites,” you feel at one with yourself.

The important thing about the dream of 26 December 1955 is the double vision. This is a distinctive characteristic of the human being who is at one with himself. He sees the inner and outer oppositeness, not just V = 5, which is a symbol of the natural person who, with his consciousness based on perception, becomes ensnared in the world of sense perception and its

vividness. W (double V), by way of contrast, is the One, the whole person who, although himself not split, nevertheless perceives both the external sensory aspect of the world and also its hidden depths of meaning. Thus the split is based on the one-sided ensnarement in one or the other aspect. But if man has united the opposites within himself, there is nothing to stop him perceiving both aspects of the world in an objective manner. The inner psychic split is replaced by a split world-picture, and this is inevitable, for without this discrimination, conscious perception would be impossible. It is not in actual fact a split world, for facing the person who is united with himself is an *unus mundus*. He has to split this *one* world in order to be able to perceive it, always bearing in mind that what he is splitting is still the *one* world, and that the split has been predetermined by consciousness.

Thanking you once again for the thoroughness of your communication, I should also like to congratulate you on the amazing progress revealed by your letter. With best wishes I remain,

Yours sincerely, [C. G. JUNG]

72 P

Zürich 7/6, 22. III. 1957

Dear Professor Jung,

[Handwritten]

On the occasion of the spring equinox, I should like to thank you most heartily for your detailed letter of 15. XII. 1956. It was most encouraging for me, in my own interpretation of the manifestations of my unconscious, to see that basically I am on the right track.

At the moment, physics is preoccupied with mirror images, which used to be the case with my dreams, and actually parallel with mathematical work that has now become topical. But I need time to digest all that.

In the meantime, I am sending you a special edition of a lecture first delivered in Mainz, "Die Wissenschaft und das abendländische Denken,"^a which tackles the problem of the relationship between science and mysticism and sets it in a historical framework. Since my work on Kepler, this problem has really caused me to rack my brains.

With all best wishes for your health, and once again my warmest thanks.

As ever, W. PAULI

^a Published in M. Göhring, ed., *Europa—Erbe und Auftrag*, pp. 71–79; tr., "Science and Western Thought," in Pauli, *Writings on Physics and Philosophy*, pp. 137–48.

73

A. Jaffé to Pauli

[Küsnacht-Zürich] 29 May 1957

Dear Professor Pauli,

[Typewritten carbon copy]

I am writing today on behalf of Prof. Jung, who begs you to excuse him for asking you a favor. It concerns the MS of a young American, van Dusen,^a whose letter I enclose. Prof. Jung assumes that it will not take you very long to be able to assess the merit, or lack of merit, of the work; he would be most grateful if you could glance through it and drop him a line with your impressions. The writer's claim that Einstein read the work but did not really understand it does not exactly ring true. Even the letter itself seems to be the product of a fevered imagination.

Prof. Jung thanks you in advance. He is in Bollingen, totally absorbed in his work. Letters and everything else have been put on one side for the time being.

I shall send the MS tomorrow, to which I add my own best wishes.

Yours, Aniela Jaffé

^a See Pauli's letter of June 1957 [Letter 74 below], reviewing W. M. van Dusen, "Mind in Hyperspace."

74P

Dear Professor Jung,

[Zürich] June 1957

[Typewritten carbon copy]

In accordance with your wishes, I have had a look at "Mind in Hyperspace," the work of W. M. van Dusen, specifically chaps. IV and VII, paying special attention to fig. 2, p. 103, and the tables on pages 122 and 133.

1.) The author does not seem to have much of a grounding in mathematics. The only mathematical term that crops up in his work is dimension number; there is no mention of equations or any other mathematical ideas. When quoting Einstein's theory of relativity, he fails to see the difference between a metric space and one characterized only by topology (i.e., structurally poor) (topology here as a mathematical discipline). The 4-dimensional space-time of the theory of relativity is essentially of the first-mentioned (metric) type, for which the concept of curvature is also characteristic.

In topology, by way of contrast, this concept does not exist; everything is identical that evolves through reversible, clearly defined, continuous figures.

In the following two figures, attention should be directed not onto the bodies but onto the surfaces (dimension number 2) delimiting them. Topologically, surfaces are always characterized by whole numbers, aside from the dimension number and also by others (such as the number of loops). I need not go into that definition here.

All I wish to do is to point out the *absence* of a length and hence of a curvature in the manifolds characterized by topology, in contrast to the spaces or hyperspaces of physics.

2.) The application of the mathematical concept of dimension to the psyche seems to me to lack real foundation. For this implies placing psyche (or mind) and physis alongside each other in a somewhat dubious analogy to the relationship of space and time. In reality, physis and psyche are probably two aspects of one and the same abstract fact. This is why a *mirror-image* principle is a natural way of giving an illustrative representation of the psychophysical relationship. (Cf. *Psychologie und Alchemie*, 2d edn., Dream 26, pp. 239-42 [CW 12, pars. 227-31]).

The total absence of any suggestion of mirror-image symmetry is quite striking, and I am inclined to associate this with the absence of the curvature of space. If you are interested and if you have time, I would like to write to you again about physical and psychological mirror-image questions, independently of Dusen's work.

3.) I would now like to venture a few psychological conjectures on Van Dusen himself, and pass them on to you for your consideration.

The open sequence of growing dimension numbers stretching into infinity is reminiscent of Gnostic systems (especially Markos). But it is typical of the author that he would like to stop at seven, although (see final chapter) he does not completely succeed in this. Table 2 (p. 133) clearly represents a *process* that closes with the *unus mundus* (No. 0, below).

It is thus my impression that the author's series of hyperspaces is a *hypostasis* of successive stages of the individuation process. But by projecting this objectively onto the cosmos, *he himself is not fully integrated* (see above: psyche poorly accommodated, absence of space curvature and mirror image). It would thus not surprise me if writing such works actually hindered the proper development of this process in the author. The *projection of a path to healing* onto hyperspaces is what comes across very clearly. Paths to healing can be projected not only onto material but also onto mathematics, especially when the latter is not sufficiently well known. From a study of the mathematical writings of Nicholas of Cusa (albeit a rather cursory one), I have the impression that with him there has been such a rationalizing projection of a path to healing onto mathematics (at the time, of course, no research had been done into the concepts of limit and infinity).

With every good wish,

As ever, [W. PAULI]

75 J

[Küsnacht-Zürich] 15 June 1957
[Typewritten carbon copy]

Dear Mr. Pauli,

My warmest thanks for your letter and especially for the trouble you took to read through and assess the MS of Mr. W. M. *van Dusen*. Your comments are most valuable and will help me to form my own judgment.

I was particularly pleased to hear that you shortly intend to write to me on the subject of physical and psychological mirror images. I am keenly interested in the problems involved, especially the deviations from symmetry, which I have recently been reading about.

At the moment I am very busy with preparing an essay on the “round” in general and UFOs (Unidentified Flying Objects)^a in particular. So I shall not have time to study the ideas in your letter more closely until I go to Bollingen early next month.

Once again, warmest thanks and best wishes,

Yours sincerely, [C. G. JUNG]

^a Published as *Ein moderner Mythos von Dingen die am Himmel gesehen*, 1958; tr. “Flying Saucers: A Modern Myth of Things Seen in the Sky,” CW 10, pars. 589–824.

76 P

[Zürich] 5 Aug. 1957
[Typewritten carbon copy
with handwritten additions]

Dear Professor Jung,

After your letter of 15 June [Letter 75], I shall now attempt to write to you about mirror symmetry, a curious mixture of physics and psychology.

1. PHYSICS

It was accepted that the laws of nature show exact symmetry in relation to

- a) interchange of left and right = mirror-image effect (often indicated by P, an abbreviation for “parity”).
- b) changing of the sign of the electrical charge (positive exchanged for negative = charge conjugation C for “charge”).
- c) time reversal, without any change in the sign of the charge (indicated by T).

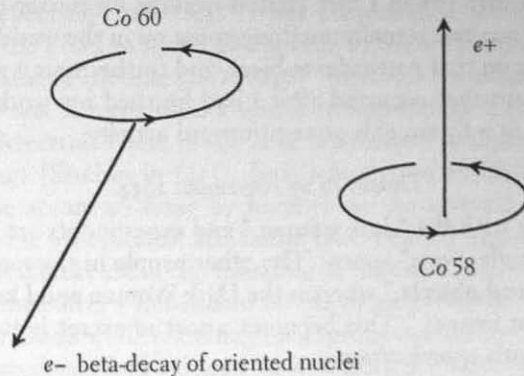
Yang and Lee^a pointed out in 1956 that there is insufficient empirical evidence for the *individual* existence of these three forms of symmetry, es-

pecially with the so-called weak interactions, which govern the beta radioactivity (the spontaneous electron emission from nuclei, which occurs with both signs e_+ and e_-)* and the reactions of the neutrino. They also indicated experiments suitable for testing this symmetry. I myself was aware of the fact that they were being carried out but was reluctant to believe in the failure of this generally accepted law of symmetry, especially as there seemed to be no theoretical reason—still the case today—why it was precisely the *weak* interactions that were to show less symmetry.

Now I am glad that I did not go so far as to wager a bet on the results of the experiments (which some physicists did). I might have lost a lot of money. For the experiments have revealed beyond doubt the violation of the individual symmetry operations P and C. It is still an open question as to whether the combined operation CP (*both* right with left *and* $+e$ with $-e$ interchanged) is maintained. If CP is valid, then T should also theoretically be possible (see below).

I am enclosing a newspaper report (*New York Times*, Jan. 16 [1957]),^b which was written by physicists and is authentic. When it was first published it was named the “Chinese revolution” in physics, as the non-Chinese participants (Ledermann^c and staff) were persuaded by Lee over a Chinese lunch to carry out the experiment. I met Mrs. C. S. Wu^d in Berkeley in 1941 and was very impressed by her (both as an experimental physicist and as an intelligent and beautiful Chinese young lady. In the meantime, she has married a Chinese and has a son).

Further experiments have been carried out since the ones described in this report, all with similar results. The most impressive ones (but by no means the simplest) are perhaps the ones on oriented nuclei. The following two figures refer to these experiments. (Co = Cobalt); the circular area is to be thought of as horizontal



* In the German edition, these signs were given as e_+ and e_- ; context seems to indicate that e_+ and e_- were intended.

and—when seen from above—as indicating the direction of the spin of the oriented nuclei in an anticlockwise direction. The mirror image on the horizontal level leaves the direction of spin of the nuclei unchanged. According to this, there exists a *preferred* direction of the emitted electrons, for negatrons (e_-) downward, for positrons (e_+) upward. The later experiments are not described in the report and were carried out and published later by C. Gorter^c and his staff in Leiden.

So now it is definite that “God is a weak left-hander after all”—as I like to put it—but it is possible that He has the positron (e_+) in His left hand and the negatron (e_-) in His right hand. But we do not know “His reasons.”

Until January of this year, I would never have dreamed that such a possibility existed. And yet in 1954 I wrote a theoretical paper on mirror images (it is to appear in 1958 in a Festschrift for N. Bohr),^f and in it—among other things—I discussed and generalized a mathematical fact initially clearly acknowledged by a young German theoretical physicist, G. Lüders.^g The combination CPT of all three parity operations explained above is correct under much more general assumptions (i.e., deducible, demonstrable) than the operations C, P, and T taken individually.

My contribution to the Bohr Festschrift has become very modern since the 1957 “coup,” and the “CPT theorem” is on everybody’s lips.

2. PSYCHOLOGY

After all these events in January, which had come as quite a shock to myself and other physicists (Fierz, for example), Mr. Fierz^h asked me how it was that in 1954/55 it had occurred to me to start working on the mathematics of mirror images, and he felt that there must have been psychological factors involved. I replied that in all likelihood that was the case, for, on the one hand, between 1952 (when I first started working on mirror images again) and 1956 there was not actually anything going on in the world of physics to justify focusing on that particular subject, and furthermore I recalled a very impressive dream that occurred after I had finished my work, work which had struck me as a thoroughly straightforward activity:

Dream of 27 November 1954

I am in a room with the “dark woman,” and experiments are being carried out in which “reflections” appear. The other people in the room regard the reflections as “real objects,” whereas the Dark Woman and I know that they are just “mirror images.” This becomes a sort of secret between us. This secret fills us with *apprehension*.

Afterward, the Dark Woman and I walk alone down a steep mountain-side.

Previously, there had been dreams related to biology, and afterward (January 1955) I dreamed that "the Chinese woman" had a child, but "the people" refused to acknowledge it. The "Chinese woman" is a special aspect—maybe a parapsychological one—of the "Dark Woman," whereas "the people"—as in the dream of 27 November 1954—represent collective opinion, i.e., my own conventional objections. It is clear that there is *no* symmetry of "objections" and "reflections" in this dream, since the whole point is about distinguishing between the two.

Let us now return to the period at the beginning of this year when I received such a *shock* with the latest experiments on the violation of the parity law. In subsequent discussions with Fierz, I was very upset and behaved irrationally for quite a while, and he told me that I had a "mirror complex." He was certainly right, and I admitted as much. Mathematics is an objective science, and we were soon in full agreement about the purely mathematical aspect. But I was still left with the task of acknowledging the nature of my "mirror complex."

The first thing that occurs to me on the subject of reflection is the psychophysical problem. (See also the dream in *Psychologie und Alchemie*, 2d edn. 1952, Dream 26, pp. 239–42 [CW 12, pars. 227–31], already quoted in my last letter [Letter 74].) The *Nous* in the myth is gazing at his reflection in the water and is then devoured by Physis. And in March—that is, *after* the parity experiments—I was sent a paper by my friend M. Delbrückⁱ about a one-cell, light-sensitive mushroom, known as a *phycomyces*. The problem of the relation between physics and biology is seen to be still unresolved. With the paper there was a card in which D. asked me to return the favor by sending him a copy of my Kepler work. That itself was a form of reflection.

Later, about Easter time, Mr. Kerényi^j managed to bring me back to the psychophysical problem, and it was quite odd how it all came about. With the words "reflection" and "fear" I was immediately reminded of earlier dreams in which I had to spend a long time in the constellation of Perseus. Here is the variable (double star) "Algol" (rhythm, periodicity of light and dark), and in fact Perseus used a mirror to accomplish his heroic deed of decapitating Medusa. Then, in vol. II of *Studien zur Analytischen Psychologie* C. G. Jung's [Studies in C. G. Jung's Analytical Psychology] (Rascher, 1955),^k I came across an essay by Kerényi on the very subject of Perseus (p. 199). I read it with interest and found that it ended with a play on words by the ancient Greeks about the founding of the city of *Mycenae* by Perseus; it was called thus after a mushroom by the name of *Myces*, which the hero is said to have found while searching for a spring. And so I was back with the same Greek word that had cropped up in Delbrück's work on *phycomyces*.

Connections with synchronistic phenomena are obviously crucial factors here. To understand the language of the 1954 dream recorded above, one

could assume that generally speaking all multiple manifestations of an archetype can very well be described as "reflections," whereas the archetype itself remains in the background as an invisible reflector; this is why it is regarded as nonexistent by rationalistic-scientific-conventional collective opinion, whereas the "Dark Woman" knows all about it. From the situation described here, I would conclude that this is also of importance with regard to the psychophysical problem.

In connection with this, I am adding two further dreams, the first of which occurred immediately after my reading of Delbrück's work.

*Dream of 15 March 1957**

A youngish, dark-haired man, enveloped in faint light, hands me the manuscript of a work. I shout at him: "How dare you presume to ask me to read it? What do you think you are doing?" I wake up feeling very upset and irritated.

Comment: The dream once again shows my conventional objections to certain ideas—and my fear of them. For only someone who is afraid can shout as loudly as I did in the dream (cf. the "separating secret" of the Nov. 1954 dream). But with such methods as the ones used in this dream, my ego is always guaranteed to lose against the unconscious. The unconscious in fact reacts immediately with the following *dream of 15 May 1957*:

I am driving along in my car (n.b.: in real life I no longer have one), and I park it at a spot where parking seems to be permitted. There is a department store. Just as I am about to get out of the car, someone gets in on the passenger side; it is the young man who had handed me the manuscript in the dream three days earlier. He is now a policeman: "Come with me!" he says to me brusquely, sits at the wheel, and drives off with me. (Sudden thought: the car driver Krishna.) He pulls up in front of a house, which seems to be a police station, and pushes me into the house.

"And now I suppose you'll be dragging me from one office to the next," I say to him. "Oh no," he says. We come to a counter where an "unfamiliar dark woman" sits. Turning to her, he says in the same brusque, militaristic voice as before: "Director *Spiegler* [Reflector], please!"

On hearing the word "*Spiegler*," I am so taken aback that I wake up.

But I fall asleep again, and my dream continues: The situation has changed completely. Another man comes up to me; he bears a faint resemblance to C. G. Jung, and I take him to be a psychologist. At great length I explain to him the situation in physics—the one that has come about as a result of the recent experiments on the violation of the parity law—for I

* H. van Erkelens compared Pauli's original letter with the typescript copy by Frau Jaffé and noticed that in Pauli's version of the letter the dream occurred on 12 March 1957 and that the second dream cited below as 15 May actually occurred on 15 March, Frau Jaffé apparently having mistaken *Mai* for *März*.

assume that he is not familiar with the situation. His replies are rather brief, and when I wake up I cannot remember them.

So much for the dream. For me personally, the relationship between physics and psychology is that of a mirror image, which is why the appearance of the psychologist in the dream is the work of "Director Spiegler" [Reflector], who remains out of sight in the background.

At the end of the dream, there is a certain dissociation of my mental faculties, first of all into a narrower Self that can master physics but is not fully aware of the archetypal background of this new situation, and second into a fantasy figure of a psychologist who typically knows nothing about physics. Obviously, the "Spiegler" [Reflector] is attempting to bring the two together, and in the manuscript of the young man, which I refused to read, there must have been something about that.

Today, when I take another look at the situation in physics in connection with these manifestations of the unconscious, what strikes me is that the phenomena that go more into depth do not permit any partial mirror images, whereas parity is restored when one takes into consideration enough of the variables characterizing the phenomenon (such as in the "CPT theorem," right-left, charge sign, time reversal). If the parapsychological phenomena go deeper, then the psyche has to be taken into consideration so as to be able to see the full symmetry of the phenomenon. With the light-sensitive mushroom phycomyces, there is a pattern with a chemical aspect that consists of a complicated interaction of various enzymes, but in my view it is not basically distinguishable, *qua* interaction, from the archetype of a phycomyces-collective psyche.

For the instinct of the "Dark Woman," there seems to be no essential difference between mirror symmetries in radioactive beta decay and multiple manifestations of an archetype. For her, the latter are just "reflections" of the "one invisible One" or "*unus mundus*," which is then responsible for the symmetry of these reflections. In this connection it is also important that my dream language always uses "radioactive" as a synonym for "numinous" or "synchronistic"; at any rate, it is something that is *becoming more widespread* (in evidence of which I can point to earlier letters). The *numinosum* of the archetype is also the cause of the fear of ego consciousness, which is in fact a fear about its own integrity.

The question of "how deep or how broad does one have to go to achieve full symmetry" ultimately seems to lead back to the problem—in your terminology—of the separation of the self from the ego

This is as far as I have reached. As you were the one who raised the question of these reflection problems, I felt justified in presenting both objective physical data and my own subjective material. Your interest shows that you

also suspect that there is a connection between physical and psychological-reflection questions. I am thus impatient to hear your reaction, and I have no doubt that the placing side by side of the points of view of a physicist and a psychologist will also prove to be a form of reflection.

Many thanks in advance, with greetings and best wishes,

Yours sincerely, W. PAULI

^a Chen Ning Yang, (b. 1922), Nobel Prize for Physics 1957, with Tsung Dao Lee (b. 1926).

^b Harold M. Schmeck, Jr., "Basic Concept in Physics Is Reported Upset in Tests," *The New York Times*, January 16, 1957, pp. 1, 24; "The Text of the Columbia Report on Physics Experiments," p. 24; see Appendix 10.

^c Leon Max Ledermann (b. 1922), Nobel Prize 1988 with J. Steinberger and M. Schwartz.

^d Chien Shiung Wu, (b. 1912).

^e Cornelius Jacobus Gorter (1907-1980).

^f Pauli, "Die Verletzung von Spiegelungs-Symmetrien in den Gesetzen der Atomphysik"; tr., "The Violation of Reflection Symmetries in the Laws of Atomic Physics," in Pauli, *Writings on Physics and Philosophy*, pp. 183-92.

^g Gerhard-Claus Friedrich Lüders (1920-#), Planck Medal 1966.

^h Markus Fierz (from Zürich), born 20 June 1912. From autumn 1936 till spring 1940 he was Pauli's assistant at the ETH. From June 1940 he was Extraordinarius Professor of experimental physics at the Physics Institute of Basel University, where in February 1945 he became Ordinarius Professor of Theoretical Physics.

Summer 1958 he was offered the post of Director of Theory at CERN. After one year at CERN, he became a professor at the ETH. From 1945 to 1964, he was editor of the *Helvet. Phys. Acta*.

ⁱ Max Delbrück (1906-1981), a physicist who in later life devoted himself to biology. Nobel Prize in Medicine and Physiology in 1969 with S. B. Luria and A. D. Hershey.

^j Karl Kerényi (1897-1973) studied classical philology, esp. Greek and Roman mythology. Closely connected with Jung's thoughts, he held many lectures and seminars in Zürich.

^k Karl Kerényi, "Perseus, Aus der Heroenmythologie der Griechen."

77J

Dear Mr. Pauli,

[Küsnacht-Zürich] August 1957

[Typewritten carbon copy]

Your letter is terribly important and interesting. For several years now, I have been preoccupied with a problem that might strike some people as crazy; namely, UFOs (Unidentified Flying Objects) = flying saucers. I have read most of the relevant literature and have come to the conclusion that the UFO myth represents the projected—that is, concretized—symbolism of the individuation process. This spring, I embarked on a paper on the subject, and I have just completed it.

Today, as a consequence of the general prevailing disorientation, the political division in the world, and the ensuing individual separation of the conscious and the unconscious, the *Self* is generally constellated in *arche-*

typal form (i.e., in the unconscious), something I had come across repeatedly in my patients. Now as I know from experience that a constellated—i.e., activated—archetype may not be the cause but is certainly a condition of synchronistic phenomena, I have come to the conclusion that nowadays occurrences might be expected that correspond to the archetype as a sort of mirror image. I then went on to investigate UFOs (reports, rumors, dreams, pictures, etc.). This produced a clear result that might be satisfactorily explained by causality if the UFOs were not unfortunately real (simultaneous visual and radar sightings!). As yet there is no reliable evidence that they are actually machines. They could just as easily be animals. The sightings seem rather to indicate something of dubious substantiality.

I have therefore asked myself whether it would be possible that archetypal imaginings had their correspondence not only in an independent material causal chain, as in the synchronistic phenomenon, but also in something akin to bogus occurrences or illusions, which, despite their subjective nature, were identical with a similar physical arrangement. In other words, the archetype forms an image that is both psychological and physical. This, of course, is the formula for synchronicity, albeit with the difference that in the case of the latter, the psychological causal chain is accompanied by a physical chain of events with a similar meaning. The UFOs, however, seem to be occurrences that appear and disappear for no apparent reason, the only legitimation for their existence being their relationship in meaning to the psychic process. So I would be happy, and it would be a load off my mind, if I could convincingly deny their objective existence. But for various reasons, I find that impossible. There is more to this than just an interesting and conventionally explicable myth.

It seems to me that the physical problem of symmetry or asymmetry, which coincides so oddly with my own preoccupation, is something analogous or parallel. Apart from the mirror image aspect of the phenomenon, the statements from the unconscious (represented by UFO legends, dreams, and images) point to a "slight left-handedness in God," in other words, to a statistical predominance of the *left*—i.e., to a *prevalence of the unconscious*, expressed through "God's eyes," "creatures of superior intelligence," intentions of deliverance or redemption on the part of "higher worlds" and the like. These symbols represent the unconscious and demonstrate its superiority. This corresponds to a state of affairs in which actual consciousness finds itself for the moment in an unsolvable dilemma, and thus the stronger position falls to the unconscious insofar as—potentially at least—it possesses the redeeming Third. The Third is an *archetype* that could unite or reconcile the opposites. The UFO legend shows clearly that the latent symbol is attempting to elevate the collective unconscious above the level of the conflict of opposites into an as-yet-unknown sphere, into a sort of world wholeness and development of the Self (individuation). This

should mean that the mirror-image effects, which dazzle us, would be removed, and the opposites of the two Being aspects would be shorn of their power; this would be done by an "asymmetrical" Third, which prefers *one* direction; namely—according to legend—the direction toward greater differentiation of consciousness, as opposed to the balance of conscious-unconscious. The μ meson would thus correspond to the archetype that is responsible for this psychic operation. The *parity operation* corresponds to the psychological opposition ("right" and "left" in the political sense, conscious and unconscious in the psychological sense, etc.)

e_+ and e_- corresponds to the energy forces of the opposites.

T, time reversal, corresponds to the future direction of the conscious and the past direction of the unconscious.

The fact that it is precisely the *weak* interactions that exhibit asymmetry forms an almost comic parallel to the fact that it is precisely the infinitesimal, psychological factors, overlooked by all, that shake the foundations of our world. The "Chinese revolution" comes from the Antipodes, so to speak—that is, from the unconscious, a symbolic esprit d'escalier of world history! Your dream about the "Chinese woman" seems to have anticipated this; i.e., your anima already had scent of asymmetry.

In your dream of 27. IX [XI]. 1954 [Letter 76], you anticipate the loss of power of the mirror image—i.e., of the opposites. You now know something that is a secret to everyone else—namely, that in the unconscious the Third is preparing itself and is already starting to neutralize the tension energy that comes from the opposites. What this means is the fading of the illusion that the opposites are really objects, and hence the axiomatic theory of symmetry. This process is typically "eastern," for the teachings of Mukti (liberation) and the Tao signify the reconciling of objective opposites (Samsara) and insight into the illusion (Maya) of the world.

The associations you make with regard to the *psychophysical problem* are on the right track, as a further example of opposites (psyche and body) that are suspended or invalidated in favor of a Third.

The coincidence of "Phycomyces" and "Perseus" is unmistakably synchronistic and points to the secret cooperation of the hero (consciousness) who is fighting against the monster of darkness (unconscious)—that is, to the archetype. When I was working on the UFOs, some striking examples of synchronicity also emerged, which drew my attention to the archetypal nature of the phenomenon.

Dream 12 [15]. III. 1957 [Letter 76]: The man with the manuscript is certainly the shadow, but he has a *halo*, making him the unacknowledged hero. Hence the idea of "Krishna" in the following dream. "Spiegler" [Reflector] is a dominant archetype, the producer of the mirror image, the point

through which two sides are inverted, a minimal dimension. This is where the psychologist comes into the dream as a (symmetrical) representative of the psychic side; in other words, the unconscious here is pointing out a psychic aspect of the smallest dimension, probably the Self, which in the psychic sphere represents the largest dimension.

In the world of μ mesons—i.e., that of the smallest dimension of all—the concept of reflection seems to be coming to an end, for now one is dealing with the “Spiegler” [Reflector] himself—namely, with the psychoid archetype, where “psychic” and “material” are no longer viable as attributes, or where the category of opposites becomes obsolete and every occurrence can only be asymmetrical; the reason for this is that an occurrence can only be the one or the other when it proceeds from an indistinguishable One. The μ meson is, of course, just an approximation of the smallest One.

The UFO legend comes to the conclusion that the “Self” is the “Reflector.” The symbolism depicts it on the one hand as a mathematical point and unit and on the other hand, through the circle, as universality (i.e. infinite plurality), personified as Anthropos, God and mankind (Hiranyagarbha = conglomerate soul), eternal and transient, being and nonbeing, disappearing and rising again, etc.

I am sincerely grateful to you for your letter. It has shed new light on many issues for me, and I am deeply impressed by the “conformity” of physical and psychological thought processes, which can only be regarded as synchronistic. The same archetype seems to be involved in both the “Chinese revolution” and in my fascination with UFOs, and yet there are two causal chains here, which are completely separate but which coincide in meaning, although the world of physics is the one of visibility, depth, and breadth and is open to the world; by way of contrast, the inconspicuous and hidden point belongs to the world of psychology, in which physics is reflected. This lack of visibility in psychology, however, gives it the prerogative to appear in the very heavens of the whole earth (which is enough to make one tear one’s hair out). There is absolutely no doubt that it is the individuation symbolism that is at the psychological base of the UFO phenomenon. The difficulty only begins when one takes into account the possibility that UFOs might be real. They always seem to have been there (historical accounts!), but it is only today that they have become a myth. (More frequent appearances?) Has physics any suggestions to make in this respect?

With heartiest thanks

Yours sincerely, C.G.J.

78

A. Jaffé to Pauli

[Küsnacht-Zürich] 19 November 1957

Dear Mr. Pauli,

[Typewritten carbon copy]

Prof. Jung has asked me to thank you very much for being so kind as to send him your work "Phänomen und Physikalische Realität" [Phenomenon and Physical Reality].^a Unfortunately, Prof. Jung is very tired at the moment and has a lot of his own activities to deal with, so he asks you to forgive him if he cannot find time to read it just yet.

With best wishes

Yours, [A. Jaffé]

^a In *Dialectica* 11:2 (1957), pp. 36–48; tr., "Phenomenon and Physical Reality" in Pauli, *Writings on Physics and Philosophy*, pp. 127–36.

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A. Jaffé to Pauli

[Küsnacht-Zürich] 29 December 1957

Dear Mr. Pauli,

[Typewritten carbon copy]

Quite a while ago, Prof. Jung asked me to thank you for kindly sending him the letter from Knoll^a as well as your essay. I did not get around to it because I was kept indoors with a cold. At the beginning of next week, I am going to Locarno for 8 days to rest and—I hope—to get above the fog. Prof. Jung was most interested in Knoll's letter. But that did not stop him from saying, in a tone of resignation: People think I am more stupid than I am! He took your essay along to Bollingen as it seemed to interest him, and he would like to read it at leisure. I should like to take this opportunity to send you my best wishes for 1958—many long journeys, both internal and external. I saw your Chinese colleagues recently on the news. To me they all looked the same. Odd that I should be so incapable of differentiating!

With heartiest greetings and best wishes

Yours, Aniela Jaffé

^a See Appendix 5.

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A. Jaffé to Pauli

[Küsnacht-Zürich] 7 October 1958

Dear Mr. Pauli,

[Typewritten carbon copy]

I asked Prof. Jung about the meaning of the two political figures in the dream in question, and he said that it indicated that probably (of course, one would really need to know the dreamer and his associations) the inner significance of the problems was not being acknowledged, that the psychology of the dreamer was being strongly influenced by the collective. The problem was probably being strongly externalized. Anyone who knew about his own inner contradictions would—in all probability—not dream about such symbolic figures. This more or less covers the content of our discussion. But, as I have said, without knowing the dreamer, such comments are always very risky.

With best wishes

Yours, Aniela Jaffé

* Pauli died in Zürich on 15 December 1958.

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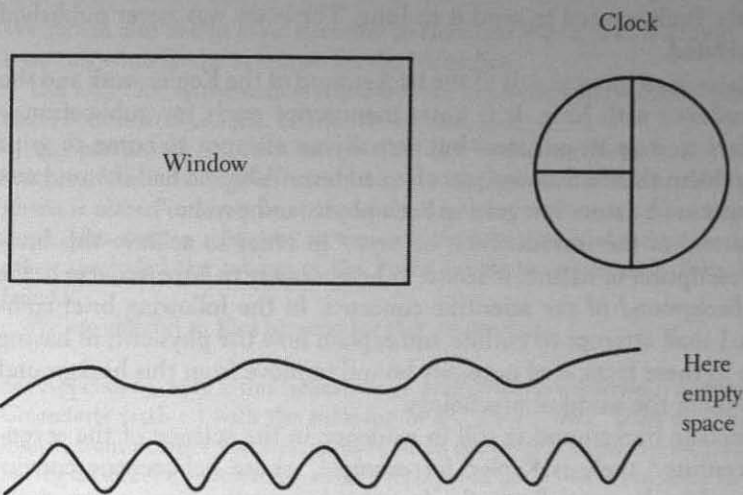
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Appendix



Pauli, Dream of 23 January 1938

At the top there is a window, to the right of it a clock. In the dream I draw an oscillation process beneath the window—actually two oscillations, one beneath the other (see figure below). By turning to the right from the



curves, I try to see the time on the clock. But the clock is too high, so that doesn't work.

Then the dream continues. The "dark unknown woman" appears. She is crying because she wants to write a book but cannot find a publisher for it. In this book there is apparently a great deal of material on time symbolism—e.g., how a period of time is constituted when certain symbols appear in it. And at the end of one page of the book there are the following words, read aloud by the "voice":

"The definite hours have to be paid for with the definite life, the indefinite hours have to be paid for with the indefinite life."

Comments on Appendix 3

BY MARKUS FIERZ

A typewritten copy of the following essay by Pauli—"Modern Examples of 'Background Physics'"—was found among the correspondence with Jung; apparently, Pauli wanted to send it to Jung. The essay was never published and is undated.

This essay is an integral part of the background of the Kepler work and the correspondence with Jung. It is not a manuscript ready for publication—Pauli refers to it as an outline—but actually an attempt to come to grips with a problem that had always preoccupied him. What he had in mind was "a description of nature integrating both physis and psyche."

At the end of the introduction, he says: "In order to achieve this integrated description of nature, it seems to be necessary *to have recourse to the archaic background* of the scientific concepts. In the following brief commentary, I shall attempt to outline and explain how the physicist, in having recourse to these facts, is of necessity bound to move from this background and end up in the world of psychology."

The archaic background is still in evidence in the science of the seventeenth century;¹ there is Kepler, for example, whose heliocentric convictions were based essentially on the fact that he saw the Copernican world system as a symbol of the Trinity.

Nowadays, ideas of this nature have been pushed into the background by scientific criticism, although their existence can occasionally be surmised in more speculative remarks. But in dreams and fantasies, scientific concepts and ideas crop up even today as symbols, recalling, as Pauli observes, ideas from the seventeenth century.¹


Pauli saw this himself, which is why his examples of modern background physics are taken from his own experiences. He seeks to understand them, making use of methods and approaches that Jung found helpful in his inter-

¹ In addition to Pauli's Kepler work, I should also like to mention: Markus Fierz, "Über den Ursprung und die Bedeutung der Lehre Isaac Newtons vom absoluten Raum"; Max Jammer, *Concepts of Space*; as well as Ernst Cassirer, *Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit*, vol. 1.

pretation of spiritual manifestations. Although Pauli's experiences are of a personal nature, he ascribes to them, with good reasons, an interpretation that extends beyond the personal.

This is why—as well as for biographical reasons—we have decided to publish this essay in the present volume.

NOTES

See Appendix 3, note 3, *I Ching*, hexagram 51,  Chên, causing excitement, upheaval, thunder.

See Appendix 3, second paragraph from end, for Riemann's surfaces.²

We should also like to draw attention to *Hermann Weyl's* Eranos lecture, "Wissenschaft als symbolische Konstruktion des Menschen."

The idea that mathematical structures are "symbolic constructions" goes back to *Henri Poincaré* (1854–1912), *Science et Méthode*, 1908.

Also particularly relevant here is the book by *Jacques Hadamard*, a student of Poincaré, *The Psychology of Invention in the Mathematical Field*, in which great emphasis is placed on the role of the unconscious for mathematical invention. Hadamard, who died in 1989, was an eminent mathematician whose successes, among others, included the solving of the Fuchs functions, where even Felix Klein had failed.

We are grateful to Karl Meyenn for this information.

See Appendix 3, note 3: multiplication \rightarrow , *multiplicatio specierum* is a term in *Robert Grosseteste* (13th c.) with the meaning of an "effect" that "flows out" to all sides lineally from a center, and thus spreads out in the form of a sphere—i.e., "multiples," having an effect on everything around it. *Light* in particular is one such species, and on the basis of this concept, Robert Grosseteste draws up a light cosmogony. This may be interpreted as a "physicalization" of the *divisio naturae* of *Scotus Eriugena*, which is almost logical.

With Roger Bacon the *multiplicatio specierum* becomes a general natural philosophy–philosophical concept and is still in operation with Witelo, Kepler, and up to Descartes.

See *Etienne Gilson*³ under *Robert Grosseteste*, *Roger Bacon*, and *Johannes Scotus Eriugena*.

Also see *A. C. Crombie*, *From Augustine to Galileo*, 1953, which is where I came across the term.

According to *Matthaeus Paris*, Robert Grosseteste, Bishop of Lincoln, died at his country seat in Buckden, near Peterborough, on 9 September 1252.

² Cf. *Hermann Weyl*, *Die Idee der Riemann'schen Fläche*.

³ *La philosophie au moyen age* [Philosophy in the Middle Ages], Paris: Payot, 1944.

It is striking that Crombie's book came out in 1953, the time when Pauli and Jung were working together.

Should one choose to extend archaeological research back as far as the Middle Ages, Crombie is essential reading.

August 1990

MARKUS FIERZ

Unpublished Essay by Pauli

June 1948 [Typewritten carbon copy]

MODERN EXAMPLES OF "BACKGROUND PHYSICS"

I. PHYSICAL TERMS AS ARCHETYPAL SYMBOLS

What I understand by "background physics" is the appearance of quantitative terms and concepts from physics in spontaneous fantasies in a qualitative and figurative—i.e., symbolic—sense. I have been familiar with the existence of this phenomenon for about 12 to 13 years from my own personal dreams, which are totally uninfluenced by other people. As examples of physical terms that can appear as symbols, I should like to list the following, without any claim to completeness:

wave, electrical dipole, thermoelectricity, magnetism, atom, electron shells, atomic nucleus, radioactivity.

As befits my rational, scientific approach, these dreams seemed to me initially offensive—in fact, an *abuse* of scientific terminology. What is more, I regarded the appearance of this symbolism in my dreams as a personal idiosyncrasy, typical of a physicist, and never even remotely hoped that I would be able to communicate the special experience that manifests itself in dreams of this nature to any psychologists of my acquaintance, for they are certainly not physicists.

Later, however, I came to recognize the objective nature of these dreams or fantasies—i.e., the fact that they are largely independent of the actual person. What first struck me was the similarity of the mood that obtains both in my dreams and in the physical treatises of the 17th century, especially in Kepler, where scientific terms and concepts were still relatively undeveloped, and physical considerations and ideas were interspersed with symbolic concepts. Second, I could see certain correspondences between the contents of my dreams and the graphic concepts of scientific laymen, especially those with a poor education and weak critical faculties, who are not hampered by inhibitions on the part of consciousness that might other-

wise affect the naïveté of the fantasies. Thus it was that I gradually came to acknowledge that such fantasies or dreams are neither meaningless nor purely arbitrary but rather convey a sort of "second meaning" of the terms applied. This seems to me today ample proof of the fact that the kind of imagination I call "background physics" is of an archetypal nature. But any attempt to open it up to a psychological interpretation, based on the idea of the collective unconscious, must not fall into the trap of assuming that the products of background physics are directly comparable with a well-formulated doctrine of scientific truths. From the point of view of contemporary science, the form of imagination under discussion is definitely to be seen as a relapse into an archaic stage. Furthermore, my feeling is that *the purely psychological interpretation only apprehends half of the matter. The other half is the revealing of the archetypal basis of the terms actually applied in modern physics.* What the final method of observation must see in the production of "background physics" through the unconscious of modern man is a directing of objective toward a future description of nature that uniformly comprises physis and psyche, a form of description that at the moment we are experiencing only in a prescientific phase. To achieve such a uniform description of nature, it appears to be essential to have *recourse to the archetypal background of the scientific terms and concepts.*

In the following outline, I shall attempt to explain how a physicist, as a consequence of this approach, inevitably shifts from this background into the field of psychology. As I regard physics and psychology as complementary types of examination, I am certain that there is an equally valid way that must lead the psychologist "from behind" (namely, through investigating the archetypes) into the world of physics.

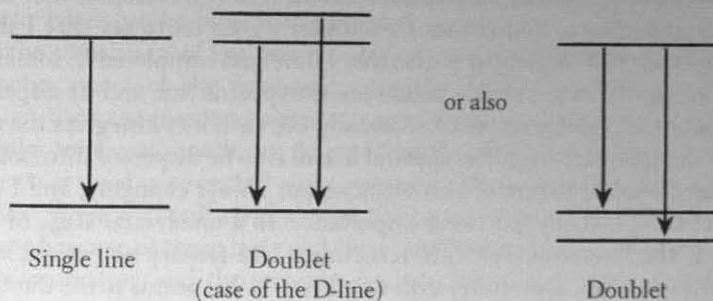
2. THE SPLITTING OF A SPECTRAL LINE INTO TWO COMPONENTS AND THE SEPARATION OF A CHEMICAL ELEMENT INTO TWO ISOTOPES AS DREAM MOTIFS.

As an example of background physics, I shall discuss a motif that occurs regularly in my dreams—namely, fine structure, in particular *doublet structure of spectral lines* and the *separation of a chemical element into two isotopes.*

Let me begin with some explanations for nonphysicists of the terms used here. The frequencies of spectral lines are characteristic of and specific to the various chemical elements, which can thus be identified by the spectral lines emitted by them—i.e., by the precise values of the frequencies of the light emitted by the atoms of the relevant element. What also happens in spectroscopy is that under coarse observation—i.e., with poor resolution—a spectral line appears singly, whereas in apparatuses with greater powers of resolution it appears as separated, i.e., resolved into two or more compo-

nents with only slight variation in the number of oscillations. In the last century, spectroscopists introduced the term "fine structure," naming the separated structures "doublet," "triplet," etc., according to the number of components. A well-known example of such a doublet is the yellow "D-line" of the sodium atom, which always appears in the rock-salt flame.

According to modern ideas (which are crucial to what now follows), the emission of spectral lines comes about in the transition of the atom from one state to another. Each of these states is also an energy level, and it is a universal law of nature that the frequency of the light emitted is always exactly proportional to the difference of the energy values of the initial and final states of the atom—a fact that cannot be explained in the framework of the older, classical physics. *The energy levels are the characteristic states of the atom*, and every spectral frequency is assigned both to the energy of a light corpuscle or photon and to the corresponding difference in energy values of a pair of energy levels. The doublets of the spectral lines correspond to the case where one of the two levels assigned to it is single and the other one is double (see figure below). The doublet fine structure of a spectral line thus also makes visible the splitting of an energetically defined state into two neighboring states.



In an interesting connection to the universal quantitative assignment of light frequencies to energy levels and their differences, there now exists the situation that in addition to the doublet structure of the spectral lines, isotope separation also appears as a related dream motif. The word "isotope" derives from the two Greek words *ίσος* = same, and *τόπος* = place, and it denotes elements that occupy the "same place" in the periodic system of the elements and thus share the same chemical properties. According to the modern concepts of atomic structure, they have the same electric charge of the atomic nucleus and thus have the same distribution of external electrons. Generally they differ physically through their *mass* (here I can leave aside the possibility of differentiating by means of radioactive properties such as lifetime, since the differentiation through the masses of the atomic nuclei—i.e., the atomic weights, is the usual procedure). This limits their

separability to finer physical means, of which the varying deflection of electrically charged atoms by external electrical or magnetic fields is the simplest and by far the most well known. The separation of isotopes by this method is brought about by an apparatus known as the *mass spectrograph*, because the atoms are photographed as lines that look like spectral lines, although of course they have nothing to do with light emission. Isotope separation corresponds here—also externally—to the resolving of a line into two or more neighboring components that correspond to the various values of the mass of the atoms. *As mass and energy are equivalent, instead of various atomic weights, one can speak of various energy levels of nuclear matter* (the structure of which I need not go into at this point). Isotope separation is a relatively difficult procedure (known only since about 1920), and the resolution of the spectral doublets calls for a relatively advanced development of experimental technique.

Now that the way has been prepared with regard to the physical aspects, let me turn to the typical features of the group of dreams to be discussed. In my dreams there usually appears some figure of authority (also regarded subjectively as such by me) on the relevant special field of physics to explain to me that the dispersion of a spectral line into a doublet or—in other cases—the dispersion of a chemical element into two isotopes, is of fundamental importance. Sometimes the authority goes on to say that I should proceed with this dispersion or else that I have just completed it; sometimes in the dream I can see clearly before me the spectral line and its dispersion, as if through a spectroscope. Occasionally, the authority also gives the name of the element that emits the spectral line or is to be dispersed into isotopes; but the chemical nature of this element was always changing, and I never found that it had any particular importance. In a much later stage of these dreams, the chemical elements sometimes had fantasy names (based on countries or cities, sometimes with numbers). What seems to me important is that generally the two dispersed components are of roughly equal strength; in special cases, one is twice as intense as the other, but it never happens that one dominates and the other is a mere remnant.

To find the “second meaning” of this group of dreams, what they have to say—their statement—must first be translated into a *neutral* language, in view of the distinction between the physical and the psychological. A translation of this nature always contains hypothetical elements, and the physical statements should not be regarded as all that important. We shall see how it works with the following “lexicon.”

“Frequency” defines a specific energy state on the one hand, and on the other hand—viewed in time—it is a regular repetition.

A “chemical element” is an object that is also recognizable by its specific reactions but also has the aspect of mass, which makes possible a further

separation. Thus, the statement of the dream could be understood as follows: "Of fundamental importance is the separation of a specific energy state or an object with specific reactions into *two* states or *two* objects with similar but different reactions. This separation comes about not just by watching ('with the naked eye') but through a more delicate form of observation conducted with the aid of a deliberately conscious method." So is the "state" a physical state, the building block of matter, or is it a psychic state, and is the object that is recognized by the specific reactions a material object or is it something psychic—what the psychologists call "contents"?

Does the systematic accomplishment of observation come about through technical construction of apparatuses or by means of a methodically guided imagination (*imaginatio vera non phantastica*)? It seems to be a characteristic of these manifestations of the unconscious that it leaves open the answers to these questions. *For the "standpoint of the unconscious," both are one and the same.*

A certain point of reference can be taken from the fact that the dreams select first one and then the other chemical element. Whereas an atom of a specific type—e.g., a hydrogen atom—is a representative of a species of exactly identical objects, this exact likeness does not seem to be present with the psychic objects (contents) alluded to; it is much rather the case that the latter can be regarded as unique.

In the translation of the dreams' statements into a neutral language, the energetic aspect of the frequency concept, which has come to the fore through the new quantum physics, is used more than its original aspect of a regular temporal repetition. As mentioned earlier, the linking of the two concepts is most unexpected—nay, even irrational—from the standpoint of classical physics. (I still vividly recall the tremendous shock I received as a student because of these facts and their implications. Most of the physicists of my generation and the previous one reacted in the same way.) It took science no less than 27 years to set up a system of concepts appropriate to these paradoxical facts and yet logically free of contradiction. It has emerged that the source of the contradictions arising from the *linking of energy and frequency* with unlimited application of the illustrative images lies in the premise that the energy at any definite moment in time has a quite specific value. It seems pointless to talk about the value of a temporal period in relation to a length of time that is shorter than the period itself. The greater the length of time available to define a period, the more sharply is its value defined. A perfectly sharply defined period corresponds to the limiting case of observation during an infinitely long time. The new thing that modern quantum physics has taught us is that *something exactly analogous applies to energy*. Energy can be measured all the more precisely, the longer the duration of time that is available for that measurement; a perfectly sharp

definition of energy would actually, as a limiting case, require an infinitely long duration of measurement. It is pointless to talk about an energy value at a specific point in time. How is that compatible with the conservation—i.e., the indestructibility—of energy?

Now physical energy is, without exception, indestructible; it does *not* change into hidden, nonphysical forms of energy (such as “psychic energy,” for example). However, in physics we never deal with the universe as a whole but rather with subsystems that are observed from outside. When these systems are inspected by observation, then they are subjected to the action of the observer or the means of observation itself. What this means is: The more precisely the observation method allows inspection of the temporal processes in the system, the more difficult it will be to detect and determine the exchange of energy between the observer and the system being observed. The laws of nature themselves make it impossible to get away from what the physicists call the *complementarity of energy and time*. It is true that the energy remains indestructible, but with a measuring setup that makes it possible to determine the temporal progress of a process, one does not know how much of it has entered the observed system from outside or has left the system. The law of conservation of energy applies to closed systems, whereas systems with a definite temporal evolution are never “closed.” *The two limiting cases of a precisely known energy value with completely unknown time evolution on the one hand and a precisely known time evolution on the other* are in practice never wholly realized, but rather we are always dealing with inexact energy values and with imprecisely known temporal processes. Depending on the choice of experiment, one can find oneself closer to one or the other of the above-mentioned limiting cases.

The findings of new physics have accordingly led to a fundamental change in the attitude of modern man toward the archetypal ideas that are at the basis of matter and energy. Since time immemorial, the idea of matter had been closely linked with the Mother archetype. In alchemy, there was an elevating of the status of this idea in that the *prima materia* was actually assigned the attribute of the *Increatum*, which orthodox Christianity had assigned exclusively to God, as the masculine spiritual principle. It was C. G. Jung who drew attention to this,¹ and interestingly enough, he saw in this the psychological basis for the materialism of modern time. When new physics, with its radiation and pair production processes, demonstrated that what had earlier been known as “material substance” was in fact ephemeral, this materialism was deprived of its very foundation. This “substance” has been replaced by the law of conservation of energy by means of which mass and energy are recognized as *proportional and hence equivalent* (inertia of energy).

¹ *Psychologie und Alchemie*, 1944, esp. p. 437ff. [CW 12, pars. 430–32].

Corresponding to the transition from static to dynamic laws of nature, the attribute of indestructibility (*Increatum*) was now linked with a concept that had come originally from the archaic view of "mana," which was totally different from the idea of matter.

In this connection, it seems significant that according to quantum physics the indestructibility of energy on the one hand—which expresses its timeless existence—and the *appearance of energy in space and time* on the other hand *correspond to two contradictory (complementary) aspects of reality*. In fact, both are always present, but in individual cases the one or the other can be more pronounced. The "nonillustrative" *mathematical functions* used by modern physics take on the role of *symbols that unite opposites*. (Such symbols are always of an abstract nature in psychology, too, whereas "illustrative" in old physics would be analogous to "concretistic" in psychology. Incidentally, for me the term "illustrative" is largely a relative one and is simply a question of habit.) The opposition that emerges here is no longer that between matter ('*mater*') and dynamics ('*mana*'), but rather that between *indestructibility (energy) and time*. The former seems to belong to a timeless form of existence that is contrasted with time as a feminine principle, similar to the way in which, at an archaic level, material substance and the physis stand in contrast to the spirit and the psyche. *The ancient idea of polar opposites, such as the Chinese Yang and Yin, is thus replaced in modern thinking by the idea of the complementary (mutually exclusive) aspects of phenomena. Because of the analogy of microphysics, I feel that one of the most important tasks for the Western mind is to translate the ancient idea into the new form in psychology as well.* We shall return frequently to this viewpoint.

Complementarity in physics, as I have indicated elsewhere, has a very close analogy with the terms "conscious" and "unconscious" in psychology, in that any "observation" of unconscious contents entails fundamentally indefinable repercussions of the conscious on these very contents. *An "ego with total consciousness" (claimed by Eastern philosophy—and probably with justification—to be possible only in death) or, on the other hand, an objective-psychic one, not observed by any subjective consciousness (and hence influenced), corresponds to two limiting cases that in reality can never be achieved.* The universality of the objective-psychic and the uniqueness of contemporary consciousness are both ever present. The symbolic images uniting this opposition are known to manifest themselves in myths. With this pair of opposites, the "objective-psychic" (known in Eastern philosophy as "consciousness" but in Western psychology as "the collective unconscious") acquires—as a result of being so widespread—a sort of timeless reality, whereas the "individual ego" ("consciousness" in our Western terms) and the usual way of looking at time are essentially linked together.

By bringing in this general analogy of the epistemological situation in physics and in psychology, an attempt will be made to acquire further

reference points for the (hitherto somewhat vague and ill-defined) "second sense" in the group of dreams discussed. Note should be taken of my immediate associations with the dreams (context), as well as material from other sources as a basis of comparison.

3. FREQUENCY SYMBOLISM AND LEVEL OF CONSCIOUSNESS

Even with the very first dreams, the ones dealing with a *separation into two components* (be they spectral lines or chemical elements), the following type of idea immediately and ingenuously occurred to me. A birth is a division of a body into two parts; as it is a form of separation that can only be perceived by subtle methods, it could mean a "psychic birth." The child or embryo plays an important role in yogin meditation; when the "child" rises above the head of the yogin in a later stage of meditation,² this "detachment from the spirit body into an independent existence" could justifiably be described as a "doublet splitting" of the psyche of the yogin; meditation as a conscious activity would be analogous to the manufacture and application of the spectrograph in physics. In this case, the "child" is a graphic representation of the previously mentioned "spirit body" or "adamantine body" or the *corpus subtile*—a concept that has been very familiar in the West since late antiquity (especially to the Gnostics). This is linked to the idea of a "superior personality part," which is more constant than the ego, can outlive it, and is said to express itself by appearing as a specter or ghost. In accordance with the Gnostic idea of the light sphere (pleroma), in which the psyche—before and after birth—has an existence free of the dark physis, this *corpus subtile* would be closer to the light sphere than the ordinary ego trapped in the body. But this *corpus subtile*, as its name suggests, would have not only a psychic existence assigned to it but also a physical one (the latter, it seems to me, in a way that would be very unclear to us).

What also occurred to me in this division into two was the neutralizing of an unconscious identity of two people who are connected emotionally. All these associations to my dreams were related to a *raising or multiplying of consciousness*.

Now the doubling of a psychic content as it develops consciousness is a motif that is well-known in psychology. It can be explained by the fact that the new consciousness content indicates a different mirror image in the unconscious. This motif is equally common in mythology as the saga of two brothers, one of whom is immortal (spiritual), while the other is mortal (material) and bound to life on earth.

² Cf. *Das Geheimnis der goldenen Blüte, Eine chinesisches Lebensbuch*, p. 139f.; [Baynes tr., 1931 pp. 51–53], esp. the figures [p. 139; Baynes, p. 51].

In connection with this, I also recalled the existing symbol consisting of alternating light and dark stripes, which was very familiar to me at the time, a symbol that arises from the image of the "doubled content" by means of *multiplicatio*.³ This symbol often appears linked to what is known in psychology as "anima"⁴ and is also found in Indian temples. It seems to represent a series of complementary-opposite situations, one of which is presented as spiritual-timeless (aion), the other as material-temporal (chronos). The question remains open as to whether the "series" is thought of in temporal terms or as a simultaneous juxtaposition. In the former case, it seemed to me to express that archetypal concept which is at the base of the doctrine of the transmigration of souls;⁵ according to this doctrine, the timeless reality of the life the psyche is repeatedly being interrupted by a temporal sequence of material earth lives.

In the second version of the simultaneous juxtaposition of the "series," the stripes could also be related to the "multiple luminosity" of the unconscious psyche,⁶ a luminosity represented by separate sparks of light.

³ What is meant by *multiplicatio* is the tendency of a psychic situation to be repeated or become more widespread, which *can occur at a moment* when the opposites of a pair are equally balanced. Today I know that this phenomenon is mentioned frequently in western alchemy. I first came across it in the text of the *goldenen Blüte* [Golden Flower] translated by Wilhelm (1st edn. [1929], p. 142): "The Book of Successful Contemplation (*Ying Kuan Ching*) says: The sun sinks in the Great Water and magical pictures of trees in rows arise. The setting of the sun means that in Chaos . . . a foundation is laid: That is the condition free of polar opposites (*wu chi*) [Baynes tr., p. 55]. There is also a reference here to the *I Ching* hexagram [#51] of upheaval (or thunder = Chên). The commentaries to this hexagram are of great significance for the frequency symbolism under discussion here. The *multiplicatio* is circumscribed in the Commentary: "The upheaval alarms everyone for one hundred miles around."

⁴ See the novel *The Beast in the Jungle* by Henry James [1843-1916], where there is a comparison between the "unknown woman" and the tiger roaming the jungle. The tiger is striped.

⁵ This claim may call for an explanation: When objects with such stripes appear in dreams, they cause alarm. What is feared is the "splitting" into a pair of opposites, in extreme cases *fear of death*. In such cases death appears as disintegration into a pair of opposites. But what is actually feared is not the "polar opposites" as such but just a too strong "intensity of oscillation." Cf. the "fear" in the above-quoted commentaries to the *I Ching* symbols "Chên" (thunder) [see Wilhelm, vol. 1, hexagram 51].

⁶ C. G. Jung, "Der Geist der Psychologie" [The Spirit of Psychology], *Eranos Jahrbuch* 1947 [1946], esp. chap. 6, [pp. 428-40; tr., rev., CW 8, pars. 388-96]. Jung interprets the multiple luminosity as "small consciousness phenomena" linked to the archetypes. To me it seems to fit the second version of the stripes—namely, that the "anima" can appear as the inferior function contaminated with the collective unconscious and also as the secret bearer of this "multiple luminosity." (Personal experience from dreams: The "anima" appears as a Chinese woman. Furthermore, there is mention of "owls" in the dreams, as sacred birds that can see in the dark, or a "Grottenolm" appeared.)

Chronologically, I should like to point out that the second version of the stripes is a later version in the essay quoted by C. G. Jung, whereas I have been familiar with the first one for a long time.

The ideas that struck me with regard to the group of dreams under discussion were both immediate and vivid, but at first my dreams were not in any way influenced by them, and they carried on producing their spectral doublets and isotope separations. Today I understand why. At the time, I was firmly of the opinion that the dreams were a "misuse" of physical concepts; for that reason, I searched frantically for purely psychological interpretations and explanations just so that I could get the physics out of the way; I did my utmost to cling to my conviction that this was all "just" psychology. But as dreams are compensatory to the conscious attitude, they insisted that the physical terminology should be taken for what it was. This forced me to accept it as an essential part of what was being represented.

I could not draw any further conclusions from this alone, but later I had the opportunity to establish further proof of the "frequency-degree of consciousness" connection. First, I came across the book by C. H. Hsieh *Quantum Physics and I Ching* (Shanghai, 1937). The author is Chinese, a private scholar with a somewhat inadequate background in mathematics and physics. (There is no translation of this book from the Chinese; it was Chinese colleagues in the U.S.A.: who made it accessible to me.) What is of interest to us is that the author makes a direct link between the physical emission of light and the previously mentioned psychological phenomenon of the *multiplicatio*, with the physical concept of the light wave being derived from the Taoist symbol of the Tsi-Gi. Once again I was struck by the similarity between the tone and mood of this book and that of my "physical dreams," as well as that of the writings of Kepler. This was the first time that it had occurred to me that this might be *an archetypal background for the physical concepts*.

Moreover, in the essay of Jung's quoted earlier, "Der Geist der Psychologie" [The Spirit of Psychology], there is a parallel between spectral frequency and degree of spiritualization, in that the "psychic" drive processes are compared with the ultrared part of the *spectrum*, and the archetypal images of the drive consciousness, which belong to the spiritual sphere, are compared with the ultraviolet part.⁷ At first one might think that this is a rationally constructed analogy, but I feel that Jung's specific arguments about the colors red, blue, and violet indicate an *already existing symbolism*. It is probably not possible to deduce anything more definite from the actual text of the essay.

My knowledge of "background physics" in general and "frequency symbolism" in particular was, however, developed in a quite unexpected and fundamental way by S. E. White's unusual book, *The Unobstructed Universe*. The author seems to have only a superficial knowledge of physics, has no great critical faculties, nor is he particularly well educated; his mentality

⁷ *Ibid.*, p. 457 [GW/CW 8, par. 414].

is very much that of an engineer, clinging to practical matters and not given to the formulation of general concepts. Compensating for this conscious attitude is his "anima," which has the utmost difficulty in getting him to think in abstract terms. The spiritualistic side of the book is of no interest to us and for our purposes can be regarded as *an engineer's dream*. The "anima" dictates to the author ideas that purport to be those of natural philosophy, and characteristically the anima is accepted by the author as an authority in this field, with its ideas being viewed as scientific truths!

What it is in actual fact is a spontaneous manifestation of the archetypal background of physical concepts, whose objective tendencies—especially that of aiming for a uniform description of nature—emerge very clearly. *The conditions for the materialization of what I call "background physics" were in this case absolutely ideal.*

Particularly relevant for our purposes is the chapter on "frequency" (pp. 144-46). Here the author says that frequency measures the "degree of consciousness," the "potentiality of life or evolution," hinting at a continual progression; he goes on to say that this is also what produces this life and that the "quality of what is produced is contained therein"; frequency is "the unity of consciousness in motion," and every consciousness finds itself in motion. What seems to me important here is the author's remark that in English the adjective "frequent" (in contrast to the noun "frequency") also has the meaning of "habitual" and "persistent." For him, he says, frequency has the naïve-illustrative meaning of a series of "go-stop" actions. On the other hand, "constancy" for him does not have the meaning of unchangeability but is rather a continuous—i.e., uninterrupted—extension; in other words, "constant" means an unending continuum as a whole. For this author, too, the image of "frequency" does not psychologically presuppose the concept of time. Ordinary physical time is much rather just a representation of real (orthic) time in the higher level of "consciousness" and, just like space and motion, establishes the connection between real ("orthic") time and what he calls the "obstructed" aspect of "consciousness." But there is just one single universe, and it has these two aspects: the obstructed and the unobstructed.

What can be clearly recognized here is an analogy between these ideas and the associations that occurred to me in connection with the dreams about doublet splitting and with the archetypal periodic symbol consisting of alternating light and dark stripes. Here, too, frequency is a characteristic of a stable state and its "degree of consciousness"; and here, too, a distinction is made between two aspects of the one universe, an unobstructed "higher," spiritual, timeless one and an obstructed one, rooted in the physical world and ordinary time.

Obviously, there is a lot of criticism that can be leveled at the way in which S. E. White uses these concepts. The term "consciousness" in partic-

ular is used in a way that is hardly acceptable to the Western scientific mind. An essential part of the definition of this concept for us is that a perceiving subject is confronted with an object that is different from him and is that which is perceived. That is why it strikes us as pointless to apply the term "consciousness" to the whole cosmos. And that is also why the term "degree of consciousness" is rather unclear; I would prefer to replace it with "degree of spiritualization or desubstantialization." Subjective ego consciousness, by way of contrast, seems to me to be standing on the side of matter and ordinary time, with the timeless, objective psyche standing on the other (complementary) side.

Furthermore, although I have no objection to accepting the existence of relatively constant psychic contents that survive the personal ego, it must always be borne in mind that we have no way of knowing what these contents are actually like "as such." All we can observe is their effect on other living people, whose spiritual level and whose personal unconscious crucially influence the way these contents actually manifest themselves.⁸ The author's critical admiration for the manifestation and the utterances of his "anima" may well be the reason why he gets bogged down with the triads and never makes it as far as the quaternity.

Regardless of any justified criticism, however, we can once again ascertain from the spontaneous manifestation of this author's unconscious that the concept of "frequency" can be psychologically brought into association with the pair of opposites conscious-unconscious, although the ordinary concept of time will not automatically be taken for granted. Of course, rationally it is difficult to understand why frequencies or masses should have any connection with level of consciousness. And there is certainly no direct connection between the physical data of frequency or mass and consciousness: A rapid physical process runs without consciousness just as a slow one does, and a heavy atom has just as little consciousness as a light one. But these associations of ideas between level of consciousness and frequency, between doublet splitting of spectral lines or isotope separation and doubling of a psychic content with developing consciousness, all appeared directly and spontaneously; this is similar to the way in which the connection between frequency and energy level in physics, which could not be understood rationally *a priori*, was simply found to be existing in nature.

It is difficult to form any further definitive conclusions from the material given. Yet everything seems to point to a deeper archetypal correspondence of the complementary pairs of opposites.

⁸ In his novel *Time Must Have a Stop*, A. Huxley [1894-1963] describes an interesting thought experiment with a spirit of death. In a spiritualist meeting, this spirit makes the most unpleasant experience that the mediums misunderstand everything and distort what he actually wants to say.

	Physics	Psychology
Object	indestructible energy and momentum	timeless objective-psychic
Subject	definite space-time process	ego consciousness-time

From the psychological point of view, physical laws seem to be a "projection" of archetypal associations of ideas, whereas seen from outside, even the microphysical occurrence could be interpreted as archetypal, albeit with its "reflection" in the psychic being a necessary condition for the possibility of perception.

In summary, we can interpret the material given as follows: The unconscious spontaneously executes a projection of the one complementary pair of opposites onto the other, with the energy level or the mass number on the one side symbolically corresponding to the level of consciousness on the other.

What is it that lies at the essence of the situation described by the term *complementarity* that makes one have to limit oneself to perceiving the compatibility of the two aspects of reality that initially seem contradictory, without any consideration of things or processes in space and time, which are objective—i.e., independent of the method in which they are observed?⁹ This is possible only through unifying symbols, the role of which in physics is played by abstract mathematical functions.

⁹ This situation applies not only to the compatibility of the application of concrete concepts such as "wave" and "particle" in physics, which are arrived at through the understanding of the basic limitations of their testability by measurements, but also the compatibility of psychological concepts such as life and soul with the acceptance of the permanent validity of physical laws wherever physical measurements can be carried out. As in physics, the deterministic approach has been abandoned, and there is no longer any reason whatsoever to maintain a vitalistic approach, according to which the soul could or would have to "violate" physical laws. Much rather it seems to be an essential part of "world harmony" that physical laws leave just enough latitude for the possibility of a different approach and method of observation (biology and psychology) that the soul can attain all its "objectives" without violating physical laws.

This basic attitude, according to which the deterministic (mechanistic) and the vitalistic approach can be interpreted as complementary errors, is totally incompatible with the idea expressed by C.G. Jung (*Der Geist der Psychologie* [The Spirit of Psychology], *Eranos Jahrbuch* 1947 [1946], p. 415 [CW/CW 8, par. 375]) that the soul might violate the law of entropy in physics. The law of entropy presents no problems for the approach put forward only because thermodynamics expressly permits and promotes the possibility of a transition from disordered to ordered states in a partial system, if a compensatory increase in entropy (i.e., increase in disorder) occurs at the same time outside the system.

In all life processes, the well-known physiological metabolic processes of the burning up of food are more than adequate to guarantee the compatibility of the total entropy balance with the increase in the overall entropy required by the 2d law of thermodynamics.

4. THE ACTIVE CONTRIBUTION OF CONSCIOUSNESS AND THE APPEARANCE OF QUATERNITY SYMBOLISM.

According to the point of view presented here, the quaternity would not be effective in physics, but a quaternity would certainly be assigned to the wholeness made up of physics and psychology insofar as the complementary pair of opposites of physics reappears reflected in the psychic sphere. It would be conceivable, and in fact seems to me plausible, that there might be phenomena in which the *whole quaternity* plays a crucial role, and not just the physical and psychic pair of opposites. With *such* phenomena, it would not be possible to give a meaningful definition to conceptual distinctions such as that between "physical" and "psychic" (as is also the case with atomic phenomena, where the distinction between "physical" and "chemical" frequently loses its meaning).

I am not yet in a position to say anything that could be adequately substantiated, but nevertheless, both by way of summing up and looking ahead, I would like to give two dreams that belong together, in which the quaternity features prominently. The dreams occurred within an interval of four days in the middle of March¹⁰ this year, when my work on Kepler had more or less come to an end. I shall now describe these dreams in detail:

Dream 1.

My first physics teacher appears and says: "The change in the splitting of the ground state of the H-atom is a fundamental one. Brass tones are engraved on a metal plate." Then I go to Göttingen.

Dream 2.

(Seven pictures in a row. No words are spoken until right at the end and I am the one speaking.)

Picture 1. A woman comes with a bird, which lays a large egg.

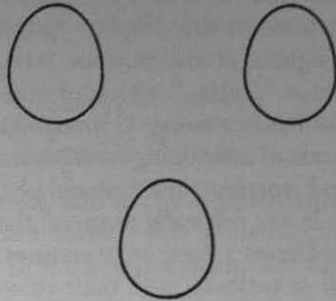


Picture 2. This egg divides itself into two:

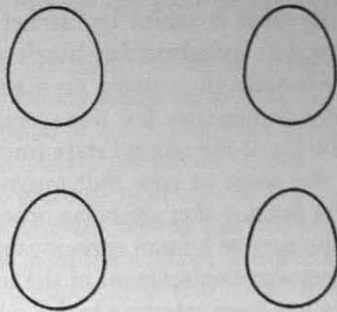
¹⁰ In my experience, dreams in which quaternity symbolism and especially the birth of something new plays a crucial role usually occur at the time of the equinoxes, i.e., end of March or end of September. These two dreams are typical "equinox dreams. With me the two equinoxes are times of relative psychic instability, which can manifest itself both negatively and positively (creatively).



Picture 3. I go closer and notice that I have in my hand another egg, with a blue shell.



Picture 4. I divide this last egg into two. Miraculously, they remain whole, and I now have two eggs with blue shells.



Picture 5. The four eggs change into the following mathematical expressions

$$\begin{array}{cc} \cos \delta/2 & \sin \delta/2 \\ \cos \delta/2 & \sin \delta/2 \end{array}$$

Picture 6. This gives the formula

$$\frac{\cos \delta/2 + i \sin \delta/2}{\cos \delta/2 - i \sin \delta/2}$$

Picture 7. I say, "The whole thing gives $e^{i\delta}$, and that is the circle." The formula vanishes, and a circle appears.

With regard to Dream 1, it evidently belongs to that group of dreams dealing with a splitting of a spectral line or an energy level into a doublet. But it has certain features that were not present in other dreams of this kind. First of all, there is a change in the splitting, which in physics is possible only by means of existing electromagnetic fields of force. What this corresponds to in the psychic sphere is an intervention of consciousness (which Dream 2 confirms). The H-atom is the simplest one of all, since the positively charged atomic nucleus is only encircled by one single negative electron. Thus it also represents the simplest "polar opposite." Moreover, the "proton," being the lightest atomic nucleus, is the building block for all other heavy nuclei. Hence "proton," which of course means "the first," points cosmogonically to the beginning. Cosmogonical pictures are always connected with the process of developing consciousness. The metal plate is not in itself a symbol and represents the material physical world (physis) in a relatively stable form. It was originally assumed that there were 7 metals (as well as 7 planets); in Dream 2 there are 7 pictures. The tones, by way of contrast, serve very well as symbols; with their connection to music, they represent feeling—the very thing that physics cannot express. With their connection to the music of the spheres (I was very involved with Kepler at the time), they have a cosmic character. As an acoustic phenomenon, they also belong to physis, so they are a symbol uniting physis and psyche. To me they appear to be exactly what is meant by "archetypes." If we interpret "brass" as *aere perennius*, i.e., indestructible-timeless, the dream is saying that the archetypes also imprint their stamp on matter, so that physis and psyche form an indivisible connection. But this seems to be a consequence of the change in the splitting of the ground state (initial state). An attempt will be made to assert the point of view *that psychic contents, and hence archetypes, too, only alter because they are being observed*, i.e., as the result of an intervention on the part of human consciousness. In relation to the archetypes, this is the "secular displacement of the unconscious world picture," which C. G. Jung has been referring to for a long time.¹¹ (Cf. here what is said at the end of section 2 about the alteration of the concept of energy.) To add to this a *spontaneous* alteration of the archetypes seems to me neither very satisfactory nor essential. The objective (independent of the personal) statement of Dream 1 seems to indicate, therefore, that the development of human consciousness, particularly through the convergence of microphysics towards other archetypal concepts, has led to a situation in which physis and psyche are indivisibly linked "archetypally." So I go to Göttingen, a place where not just physics but a lot of important work in mathematics is being done.

¹¹ Cf. *Psychologie und Alchemie* [1944], p. 181 [GW/CW 12, par. 166].

The close link between Dream 1 and Dream 2 is obvious, in that Picture 2, with the spontaneously produced two eggs¹² can be interpreted as the "ground state" on which a "fundamental" change is brought about through the intervention of the "ego" in Pictures 3 and 4. This change consists in the appearance of the quaternity, which comes about through the reflection of the duality. With this outcome, Dream 2 goes beyond Dream 1. In fact, Dream 2 corresponds fully to the "Axiom of Maria Prophetissa":¹³ One becomes two, two becomes three, and out of the third comes the One as the fourth. The last mentioned typically comes about for me through mathematics. The formula

$$\frac{\cos \delta/2 + i \sin \delta/2}{\cos \delta/2 - i \sin \delta/2} = e^{i\delta}$$

is mathematically correct, and in the representation of complex numbers through distances $e^{i\delta}$ is a number that always lies on the "unit circle" (the circle with the radius 1); if δ is taken as any size desired, $e^{i\delta}$ actually represents a circle.

The imaginary unit $i = \sqrt{-1}$ is a typical symbol since it is not contained under the ordinary numbers; the introduction of this symbol gives many mathematical theorems a simple and distinct form. In this dream it has the irrational function of uniting the pairs of opposites and thus producing wholeness.

Without going into mathematical detail, I should nevertheless like to stress here that I cannot acknowledge an antithesis between a mathematical and a symbolic description of nature, since for me the mathematical representation is a symbolic description par excellence.¹⁴

Far be it from me to presume to be able to give an "interpretation" of the two dreams; in fact, I have the feeling that any such interpretation would call for further progress in *all* the sciences. The decisive role played by mathematical signs in the production of the "One" in Dream 2 also seems to suggest that the unifying power of mathematical symbolism is far from being exhausted; in fact, I would venture to say that it goes further than physics does in this respect.

According to its own definition, physics has to represent regularity in nature in conceptual terms and thus has to focus its attention on that which can be reproduced and quantitatively measured. As a consequence of this limitation that is at the very essence of physics, anything that is feeling-

¹² On eggs, *ibid.*, pp. 277-78 [pars. 304-6].

¹³ Cf. *ibid.*, p. 41 [par. 26].

¹⁴ I believe in the accuracy of the following psychological definition: Anyone for whom mathematical signs have symbolic power has a gift for mathematics.

toned, judgmental, and emotional lies on the opposite side—the psychological one—and what is more, from this root there springs the *statistical nature* of its statements, a nature which, especially with atomic processes, must basically dispense with any consideration of individual cases (apart from special ones). This is not a question of any shortcomings of the quantum theory within physics¹⁵ but a shortcoming of physics within life as a whole.

Mathematics, on the other hand, has not only a quantitative side but also a qualitative one, which comes to the fore, for example, in the theory of numbers and in topology. Concepts created by mathematics, such as Riemann's surfaces, lend themselves very well to a symbolic representation of the relativization of the concept of time that is linked to the developing consciousness of the new focal point described as the "ego." It is, however, beyond the scope of this essay to delve into the problems involved in the symbolic union of the *unique* with the general.

From the standpoint of the tendency to unify our world picture, it seems pleasing that connections are starting to be formed in a sphere that has already become so broad that it includes the Dioscuri myth on the one hand and doublet splittings of spectral lines and isotope separations on the other.

¹⁵ Some older physicists hold this point of view, but the majority, including myself, do not accept it.

Two Letters from Pauli to H. R. Schwyzer

The next two letters document the seriousness with which Pauli dealt with Plotinus.

[1] *Pauli to Schwyzer*

Zollikon-Zürich, 27. I. 1952

Dear Doctor Schwyzer,

[Handwritten]

I would like to thank you for sending me your article on Plotinus, which has already provided me with much food for thought. I will permit myself to tell you briefly what interests me at the moment, in particular with regard to the history of philosophy, and I have a few further questions for you about Neoplatonism.

I am thinking about the discussions on the *privatio boni*—i.e., the idea or doctrine that evil is a “a nothing,” just an “absence of good” (n.b. I myself reject this idea, as the Gnostics did, but that is *not the point* at the moment; I am just talking about the *historical* aspect of the matter). There was a certain amount of discrepancy about this between myself and my friends, who claimed that this idea was specifically Christian, and they referred to Basileios and Augustine, among others, where this doctrine has been particularly developed; they also pointed to the link between this idea and the early Christian tenet that God is a *summum bonum*; i.e., *only good*. Now I knew Plotinus, whom I had read in Harder’s translation (albeit only in part). I referred to the *privatio boni*¹ especially to II 9 (πρὸς τοὺς γνωστικοὺς), and also to Plotinus’s identification of the εἶν with the ἀγαθὸν. (I was familiar with the designation ὑνεραγαθὸν in P.’s “negative theology” of the “One,” but I regard P. as an intuitive feeling type² rather than a systematic thinker, for he often makes not even the slightest attempt to avoid logical contradictions. For example, P.’s *positive* statements about the “One” contradict his *negative* theology of the “One” in other passages.) With Plotinus, there is certainly a logical connection between the *privatio boni* and his

¹ Could you please give me the Greek word for *privatio*? I did a little Greek in high school.

² Schopenhauer describes P. as a “pulpit orator,” who “flattens” Plato just as modern pulpit orators flatten the Evangelists. But he praises IV as being “excellent.”

identification of the *ἐν* with the *ἀγαθὸν*. (The similar interpretation of "matter" (*ὕλη*) as a simple *privatio* and as being identical with absolute evil has not escaped me; but P. probably views matter very differently from us and maybe even somewhat differently from Aristotle (?).

One of my acquaintances responded to this by speculating that Plotinus might have been influenced by early Christians. I intuitively felt that this was highly unlikely and that the reverse seemed to make more sense (that later on the Christians were influenced by Plotinus). That was as far as I could get, without professional expertise.

Recently I met Prof. Howald, as you know, and in reply to my question he vehemently rejected the idea of any Christian influence in Plotinus. He went on to say that in Plotinus's day there were no Christians whose spiritual ideas could be taken seriously.³ However, he did stress that the Gnostics (in my view justifiably so to some extent) made life very difficult for Plotinus (which in fact I knew). He strongly recommended me to read your writings on Plotinus, and I am very pleased that you have now enabled me to do this.

I was particularly interested in your statement that Basileios and Origenes were directly influenced by P. (Parallels: *νοῦς*—Son of God, *ψυχή* (world soul)—Holy Spirit),⁴ and that P. was known to Augustine. I was also interested in your reference to *Albinus* the didact. (*When did he live?*)

My initial opinion⁵—a purely intuitive one—that the *privatio boni* doctrine and the identification of the (*ἐν*) with the *bonum* (*ἀγαθὸν*) was primarily a heathen-Neoplatonist one and only afterward moved over into Christianity seems to have been well-founded. But I would be most interested to hear from you whether these two theses (which are directly connected) can be found before Plotinus among heathen authors (Neoplatonists and Neopythagoreans) of late antiquity (esp. the first two centuries of the Christian era). (These theses seem to me a sort of standard formulation of the Neoplatonist emotional attitude.)

Without the help of specialists I am unable to answer these questions. Thanking you in advance for your expertise and your trouble,

Yours sincerely, PAULI

³ I once saw *Tatian and Melito of Sardis* (II c.) quoted but do not know whether these writers were Christian. Actually, I assume they were "Neoplatonists or Neopythagoreans."

⁴ The Plotinus "Trinity" *ἐν*, *νοῦς*, *ψυχή* is arranged hierarchically, not with equal-ranking members, as is the case with the Christian Trinity.

⁵ I knew that, if one so wishes, Parmenides' distinction between "being" and "nonbeing" things could be further developed, as could Plato in this respect. What also struck me was that Scotus Eriugena strongly supports the *privatio boni*, too, although he is more Neoplatonist than Christian. His direct source is probably the Acropagites of Dionysios, which, of course, he translated.

[2] *Pauli to Schwyzer*Zollikon-Zürich, 3. II. 1952
[Handwritten]

Dear Doctor Schwyzer,

Many thanks for your lengthy letter, which in fact answered my questions as far as is actually possible. I now have the definite impression that the original model for the *privatio boni* doctrine is the equating of *ἔλη* and *στέρησις*¹ (you mention Aristotle's argument against it). This has nothing to do with ethics or morality as such but rather takes me back to my real field, which is natural philosophy. Hence I am interested in it anyway, independently of the *privatio boni*. The distinction between "being" and "non-being" things (Parmenides) was originally one of natural philosophy and not ethics.

It now seems that at the beginning of the Christian era—but independent of Christianity—it also happened with the heathen (Neoplatonist and Neopythagorean) philosophers that all the pairs of opposites took on an ethical-moral coloring and were somehow related to the one pair of opposites good-evil. And so, as you say, with Moderatos at the latest, the *ἔλη* was at the time identified with the *κακὸν* and probably simultaneously *τὸ ἔν* with the *ἀγαθὸν*. Everything else emerged naturally on its own; naturally, these ideas appeared as *interpretations* of the older philosophers.

Thank you very much once again; I do hope that one day I shall have the opportunity to meet you personally.

With kind regards,

Yours sincerely, W. PAULI

¹ I knew that this equating of the two was to be found with Plotinus, but not the argument of Aristotle.

Letter from Max Knoll to Pauli Concerning UFOs

[1] *M. Knoll* to Pauli*

Technische Hochschule München
Institute for Technological Electronics
[Munich] 9. 12. 57

Dear Mr. Pauli,

[Typewritten carbon copy]

Please excuse our delay in replying, which was due to the start of the new semester and the fact that Ursula had a severe bout of flu. Despite that, we were able to have long discussions about the really interesting—albeit far from simple—problems in your letter.

Your first question about the nature of the radar system is easy to answer. A ground-based radar system for observing aeroplanes consists, for example, of a beamed, rapidly pulsed wave, shaped like a fan which, within one minute of time, scans the whole horizon (360°) in polar coordinates, with the fan beam rising up to 45° above the horizon. The beaming of this fan and its scanning movement occur through a rotating mirror. The electromagnetic-wave impulses reflected by aeroplanes are detected by a nearby receiver and amplified, their arrival time being dependent on the distance of the reflecting aeroplane. They then control the grid of a cathode-ray tube, with the ray moving synchronously in polar coordinates; the sky zone being scanned will be projected concentrically onto the screen of the cathode-ray tubes so that the reflecting aeroplanes will appear as light objects against a black background and the observation point corresponds to the center of the screen. The circuit is so arranged that the objects appearing on the periphery of the screen correspond to the desired maximum distance of observation. Objects closer to the center of the screen correspond to shorter transit times of the wave impulses and correspondingly shorter distances from the observation point.

Similar radar systems are used for observation from an aeroplane, and they usually just scan one quadrant of the sky or less.

* Max Knoll (1897–1969) was a professor at the Technische Hochschule Berlin, Princeton University, and the University of Munich. He collaborated with Ernst Ruskas on the invention of the electron microscope.

You later ask who persuaded Jung to believe in UFOs. I do not know, either; you are probably correct when you assume that his American patients are responsible. Incidentally, in the U.S. Air Force there are not only several pilots but also quite a few senior officers who believe in UFOs. In fact, 3 years ago one of them gave a lecture on the subject in Princeton (which I did not attend).

It is crucial to bear in mind that the observation of radar images in general is no greater guarantee for the objectivity of the "sighting" of UFO than direct visual sighting; in fact, it is less so, since radar images almost always show a series of "virtual" objects as well as the ones being scanned—e.g., unwanted reflections and the level of the electronic noise of the equipment, with the result that it is very easy to project something onto the screen pattern. This means that the interpretation of radar images, in the case of objects lying at the limit of measurability, is often very uncertain and more like a Rorschach test, where the structure of the screen pattern is also a "random" one. Radar images would only be convincing if they were photographed or filmed, so that a number of experts could form an objective opinion as to what are real objects and what are subjective interpretations. But so far this has not happened.

When we visited Jung at the beginning of this year, he also told us about the so-called confirmation by radar of the existence of UFOs. I then proceeded to raise the objections cited above. He listened attentively but then seems to have forgotten what I said. In the course of our visit on 15 June of this year, he brought up the subject of UFOs again, but this time in relation to their psychological significance for the individuation process, and here (like you) I agree with him. He then went on to relate that he had seen UFOs on a Nuremberg engraving from the 16th century: "A cylindrical mother ship is releasing disk-shaped daughter ships from a glass tube, like pills from a pillbox."

In summary, I would like to say that once again Jung must be made to understand that the UFOs seen on radar screens are no more "real" than those sighted directly, and that no definite conclusions can be drawn about their actual existence except by radar photographs or radar films (examined by experts), and no such material has been published. Based on the observations that have been made so far, Jung would actually be in a position "to give a convincing denial of the objective existence of UFOs."

In addition to that, there is no ruling out the possibility—as Ursula points out—that they are American or Russian secret rocket-propelled aircraft.

But even this would not detract from the Jungian concept, since they are clearly defined synchronistic causal chains, probably with psychological processes, perhaps the most remarkable fact being that the disk shape constellated by the unconscious is actually the most favorable one from the

aerodynamic point of view. I have read reports in illustrated magazines about test models with such disk-shaped, rocket-propelled aircraft (in Canada and France, I believe). Of course, they are not UFOs.

On the whole, Jung's basic idea that individuation symbolism is the reason why the UFO myth is so widespread strikes me as quite plausible, although in my opinion, the problem of their "reality without a causal chain" does not exist, since there are no reliable sightings. For the same reason, Jung's comparison of a "reality without a causal chain" with the physical system of symmetry (page 2 of his letter [Letter 77, par. 4]) does not seem to fit, whereas the analogy between the individuation process and the physical problem of symmetry (page 3 [ibid.]) I find good, also because of the way in which the characteristic of "orderedness" emerges more clearly in the "wholeness symbols."

The conclusions you drew from your impressions of the international Physics Congress were very convincing for us; it is a pity that we were not able to talk in November, but we had to postpone our visit to Zürich because of Ursula's long and difficult illness (she sends best wishes to you both).

We hope we shall soon be able to come in the new year.

With kind regards, also to Franka,

Yours, MAX KNOLL

Two Lectures by Pauli at the Psychological Club of Zürich*

THE INFLUENCE OF ARCHETYPAL IDEAS ON THE SCIENTIFIC THEORIES OF KEPLER

(Based on Pauli's Essay of the Same Title)†

Although the subject of this study is a historical one, its purpose is not merely to enumerate facts concerning scientific history or even primarily to present an appraisal of a great scientist but rather to illustrate particular views on the origin and development of concepts and theories of natural science in the light of one historic example.

In contrast to the purely empirical conception according to which natural laws can, with virtual certainty, be derived from the material of experience alone, many physicists have recently emphasized anew the fact that intuition and the direction of attention play a considerable role in the development of the concepts and ideas, generally far transcending mere experience, that are necessary for the erection of a system of natural laws (that is, a scientific theory). From the standpoint of this not purely empirical conception, which we also accept, there arises the question, What is the nature of the bridge between the sense perceptions and the concepts? It seems most satisfactory to introduce at this point the postulate of a cosmic order independent of our choice and distinct from the world of phenomena. Whether one speaks of the "participation of natural things in ideas" or of a "behavior of metaphysical things—those, that is, which are in themselves real," the relation between sense perception and idea remains predicated upon the fact that both the soul of the perceiver and that which is recognized by perception are subject to an order thought to be objective. Every partial recognition of this order in nature leads to the formulation of statements that, on the one hand, concern the world of phenomena and, on the other, transcend it by the "idealized" use of general logical concepts. The process of understanding nature as well as the happiness that man feels in under-

* Delivered 28 February and 6 March 1948 and recorded in the club's 1948 annual report, pp. 37-44.

† This is an early version of Pauli, "Theorien bei Kepler"; tr. Pauli, "Kepler." As the later version is an expansion of the earlier, the text here has been extracted from the translation.

standing—that is, in the conscious realization of new knowledge—seems thus to be based on a correspondence, a “matching” of inner images pre-existent in the human psyche with external objects and their behavior. This interpretation of scientific knowledge, of course, goes back to Plato and is, as we shall see, advocated very clearly by Kepler. He speaks in fact of ideas that are preexistent in the mind of God and were implanted in the soul, the image of God, at the time of creation. These primary images, which the soul can perceive with the aid of an innate “instinct,” are called by Kepler archetypal. Their agreement with the “primordial images” or archetypes introduced into modern psychology by C. G. Jung and functioning as “instincts of imagination” is very extensive. When modern psychology brings proof to show that all understanding is a long-drawn-out process initiated by processes in the unconscious long before the content of consciousness can be rationally formulated, it has directed attention again to the preconscious, archaic level of cognition. On this level, the place of clear concepts is taken by images with strong emotional content, not thought out but beheld, as it were, while being painted. Inasmuch as these images are an “expression of a dimly suspected but still unknown state of affairs,” they can also be termed symbolic, in accordance with the definition of the symbol proposed by C. G. Jung. As ordering operators and image formers in this world of symbolic images, the archetypes thus function as the sought-for bridge between the sense perceptions and the ideas and are, accordingly, a necessary presupposition even for evolving a scientific theory of nature. However, one must guard against transferring this *a priori* of knowledge into the conscious mind and relating it to definite ideas capable of rational formulation.

For the purpose of illustrating the relationship between archetypal ideas and scientific theories of nature, Johannes Kepler (1571–1630) seemed to me especially suitable, since his ideas represent a remarkable intermediary stage between the earlier, magical-symbolical and the modern, quantitative-mathematical descriptions of nature. The chief writings of Kepler (henceforth referred to by the number given) are:

- 1) *Mysterium cosmographicum*, 1st edn., 1596; 2d edn., 1621.
- 2) *Ad vitellionem paralipomena*, 1604.
- 3) *De stella nova in pede serpentarii*, 1606.
- 4) *De motibus stellae Martis*, 1609.
- 5) *Tertius interveniens*, 1610.
- 6) *Dioptrice*, 1611.
- 7) *Harmonices mundi* (5 vols.), 1619.
- 8) *Epitome astronomiae Copernicanae*, 1618–1621.

I should mention briefly at this point that Kepler’s three famous laws of planetary motion, upon which Newton based his theory of gravitation (1687), were not what he was originally seeking. A true spiritual descendant

of the Pythagoreans, he was fascinated by the old idea of the music of the spheres and was always trying to find harmonious proportions, in which for him all beauty lay. He attached the utmost importance to geometry, claiming that its theorems "have been in the spirit of God since eternity." His basic principle was "*Geometria est archetypus pulchritudinis mundi*" (Geometry is the archetype of the beauty of the world).

The essay gives a brief biography of Kepler and goes on to discuss the hierarchical arrangement of his archetypal concepts. The highest place is occupied by the trinitarian Christian Godhead, which is incapable of visualization. For Kepler, the most beautiful image that represents God's own form of being is the three-dimensional sphere. He says already in his early work (1): "The image of the triune God is in the spherical surface, that is to say, the Father is in the center, the Son is in the outer surface, and the Holy Ghost is in the equality of the relation between point and circumference." The movement or emanation passing from the center to the outer surface—an image that frequently recurs with him and is closely connected to the Neoplatonists (especially Plotinus)—is for him the symbol of creation, while the curved outer surface itself is supposed to represent the eternal Being of God. One naturally links the former with extroversion and the latter with introversion. In his later writings (2, 5, 7), Kepler takes us one step farther down in the hierarchical order of his universe, passing, that is, from the ideas in the mind of the Godhead to the corporeal world. Here the heavenly bodies, with the sun as the central point, are for him a realization of the ideal, spherical image of the Trinity, though less perfect than it. The sun in the center, as the source of light and warmth and accordingly of life, seems to him especially suited to represent God the Father. Kepler's view of this correspondence between the sun with its surrounding planets and his abstract spherical picture of the Trinity is regarded as primary. Because he looks at the sun and the planets with this archetypal image in the background, he believes with religious fervor in the heliocentric system. This heliocentric belief impels him to search for the true laws of the proportion of planetary motion as the true expression of the beauty of creation.

In view of Kepler's conflict with Fludd—the representative of traditional alchemy—it is important that Kepler's symbol—of a type designated by Jung as a mandala because of its spherical form—contain no hint of the number four or quaternary. Perhaps this is due to the lack of a symbolism of time in Kepler's spherical picture. Movement in a straight line, directed away from the center, is the only kind contained in Kepler's symbol, and insofar as this movement is caught up by the outer surface of the sphere, the symbol can be termed static. Since the Trinity had never been represented in this way before Kepler, and since he stands at the threshold of the scientific age, one is tempted to assume that Kepler's "mandala" symbolizes a way of thinking or a psychological attitude, far transcending Kepler's person

in significance, produced that natural science which we today call classical. From within an inner center, the psyche seems to move outward, in the sense of an extroversion, into the physical world in which, by definition, everything that occurs is automatic, so that the mind, in itself in a state of rest, embraces this physical world, as it were, with its ideas.

The next step in Kepler's hierarchical arrangement of the cosmos involves the individual souls. What he understands by individual souls are not just human souls but, employing Paracelsus's concept of the "Archaeus," the souls of the planets as well. The earth having lost its special position for the Copernicans, Kepler feels bound to assign a soul to it, the *anima terrae*. This *anima terrae* is also a formative power (*facultas formatrix*) in the earth's interior and in Kepler's view is responsible for meteoric phenomena. For Kepler, the individual soul, as an image of God, is partly a point and partly a circle: *anima est punctum qualitativum*. In the original essay, which functions of the soul are attributed to the central point and which to the peripheral circle is explained in quotations from *Harmonices mundi*. Connected to this conception of the soul as both point and circle are Kepler's special views on astrology (cf. esp. 5). According to him, the justification for astrology lies in the ability of the individual soul to react—with the help of the *instinctus*—to certain harmonious proportions that correspond to specific rational divisions of the circle. As with the perception of euphony in music, the soul is said to have a similar specific ability to react to the harmonious proportions of the angles that the rays of starlight, striking the earth, form with each other. Kepler seeks to link astrology to optical resonance effects, along the lines of scientific causal thinking. This resonance is based on the fact that, according to him, the soul knows about the harmonious proportions because, by virtue of its circular form, it is an image of God (1, 5, 7). In Kepler's view, astrological effects are caused not by the celestial bodies but rather by the individual souls with their specifically selective ability to react to certain proportions. Since this power of reacting, on the one hand, receives influences from the corporeal world and, on the other hand, is based on the image relation to God, these individual souls (the *anima terrae* and the *anima hominis*) become for Kepler essential exponents of cosmic harmony (*harmonia mundi*).

Kepler's views on cosmic harmony were incompatible with the point of view of the respected physician and Rosicrucian Robert Fludd of Oxford, who, as the representative of traditional alchemical philosophy, published a vehement polemic against Kepler's *Harmonia mundi*.¹ The intellectual "counterworld" with which Kepler here clashed is an archaistic-magical

¹ The relevant writings by Fludd, *Discursus analyticus* and *Replicatio*, which was his reply to Kepler's *Apologia*, were unfortunately not available to the author in the original. But the publisher of Kepler's collected works added to his *Apologia* several quotations by Fludd.

description of nature culminating in a mystery of transmutation [*Wandlungsmysterium*]. Fludd² starts off from two polar fundamental principles: form, as the light principle, coming from above, and matter, as the dark principle, dwelling in the earth. In accordance with exact symmetry, from above and below the world is the reflection of the invisible trinitarian God, who reveals himself in it. A constant struggle goes on between these polar opposites: From below, the material pyramid grows upward from the earth like a tree, the matter becoming finer toward the top; at the same time, the formal pyramid grows downward with its apex on the earth, exactly mirroring the material pyramid. In the middle, the sphere of the sun, where these opposing principles just counterbalance each other, there is engendered in the mystery of the chymical wedding the *infans solaris*, which is at the same time the liberated world soul. In agreement with old Pythagorean ideas, Fludd evolves from the proportions of the parts of these pyramids the cosmic music, in which the following simple musical intervals play the chief part:

<i>Disdiapason</i>	=	Double octave	<i>Proportio quadrupla</i>	4:1
<i>Diapason</i>	=	Octave	<i>Proportio dupla</i>	2:1
<i>Diapente</i>	=	Fifth	<i>Proportio sesquialtera</i>	3:2
<i>Diatessarion</i>	=	Fourth	<i>Proportio sesquitercia</i>	4:3

This is illustrated by several figures.

Fludd seems to have attacked Kepler so fiercely because he felt that despite their common starting point of similar archetypal concepts, Kepler was the child of a spirit that represented a serious threat to Fludd's own archaisitic mystery world. Whereas for Kepler only that which is capable of quantitative, mathematical proof belongs to objective science, for Fludd nothing can have objective meaning unless it is directly connected to alchemical or Rosicrucian mysteries. This is why he dismisses as "sedimentary substance" the quantities represented in Kepler's geometrical diagrams and acknowledges only his own hieroglyphic figures (*picturae, aenigmata*) as the true symbolical expressions of the "inner nature" of cosmic harmony. He also criticizes Kepler for having shifted cosmic harmony too much into the subject, thus taking it out of the physical world instead of leaving it in the *anima mundi*, dormant in the matter. Kepler, by way of contrast, represents the modern point of view that the soul is a part of nature.

Generally, one has the impression that Fludd was always in the wrong when he let himself be drawn into a discussion concerning astronomy or physics. Yet the polemic between Fludd and Kepler is still of significance to

² *Cosmi Maioris scilicet et Minoris Metaphysica, Physica atque Technica Historica*, 1st edn., Oppenheim, 1621.

modern man. An important pointer is to be found in Fludd's criticism of Kepler that "you force me to defend the dignity of the quaternary" (*cogis me ad defendam dignitatem quaternarii*). For modern man, this is a symbol of a completeness of experience, which is not possible within the scientific method of observation and which the archaic point of view, which also strives to express the emotions and feeling-toned values of the soul with its symbolic images, has over the scientific point of view.

At the end of the essay, an attempt is made to bring this seventeenth-century problem into association with the generally felt wish today for a greater unification of our worldview. There is an initial proposal to recognize the significance of the scientific stage of knowledge for the development of scientific ideas by supplementing the investigation of this scientific knowledge [*Erkenntnis nach aussen*] with an investigation directed inward [*Erkenntnis nach innen*]. The former process is devoted to adapting our knowledge to external objects; the latter should bring to light the archetypal images used in the creation of our scientific concepts. Only by combining both these directions of research may complete understanding be obtained.

It is then pointed out that though we now have natural sciences, we no longer have a scientific picture of the world [*Weltbild*]. This very circumstance, however, should make it easier to move toward a unified concept of the entire cosmos [*Gesamtweltbild*], of which the natural sciences are only a part. Modern quantum physics has come closer to the quaternary point of view, which was so violently opposed to the natural science that was germinating in the 17th century, to the extent that it takes into greater consideration the role of the observer in physics than is the case in classical physics. Unlike the "released observer" of the latter, the former postulates an uncontrollable interaction between the observer or the means of observation and the system observed with every process of measurement, and invalidates the deterministic conception of the phenomena assumed in classical physics; the series of events taking place according to predetermined rules is interrupted by the selective observation, which—as an essentially nonautomatic occurrence, according to the point of view of modern physics—may be compared to a creation in the microcosm or even to a transmutation [*Wandlung*], albeit with unpredictable results.

Not only alchemy but also the heliocentric idea furnishes instructive examples of the problem as to how the process of knowing is connected with the religious experience of transmutation undergone by him who acquires knowledge [*Wandlungserlebnis des Erkennenden*]; it transcends natural science and can be comprehended only through symbols, which both express the emotional, feeling aspect of the experience and stand in vital relationship to the sum total of contemporary knowledge and the actual process of cognition. Precisely because in our times the possibility of such symbolism has become an alien idea, it may be considered especially interesting

to examine another age to which the concepts of what is now called classical scientific mechanics were foreign, but which permits us to prove the existence of symbols that had simultaneously a religious and a scientific function.

Pauli's Observations on Cosmic Rays

[Handwritten note from Pauli, undated]

OBSERVATIONS ON "COSMIC RAYS" AS DREAM SYMBOL.

I have long been familiar (12–15 years) with dreams in which other physicists (usually experts in the field of cosmic rays) conduct experiments with these rays (reflection, dispersion of rays, and similar things). Frequently, the rays are described as "dangerous," in that they can all cause "burn wounds" (like radioactive rays). As a protection against this, the physicists in the dreams indicate "asbestos sheets" (to insulate the body) or a "spin factor" (spin meaning "rotating on its own axis"; "spin factor" here being similar in meaning to "*circum-ambulatio*").

The "cosmic rays" in the dreams are not the real cosmic rays of physics. They are actually suprapersonal (archetypal) contents but not yet made more specific. The dreams under consideration seem to correspond to a relatively early stage of the confrontation of consciousness with other—as yet unknown—contents of this kind.

Let me give one example. It contains a very *favorable* indication—namely, the "fine structure" of the second line. What this does is to indicate the beginning of an assimilation of an unconscious content into consciousness.

Example: Dream 7 October 1949

"The physicist H. is present and says that his father is conducting experiments with cosmic rays. They will be made visible by having objects put in their way as obstacles. My wife and I are looking on. Lines appear on a photographic plate, more or less like this:

| || • | |

My wife says that she finds it very interesting."

Comment (made at the time): It is as if "contents" had been sent to me but ricochet off me (scattering), possibly to reappear elsewhere.

Note by Jung on Synchronicity*

Synchronicity is a necessary consequence of the concept of the relativity of time: The modern concept of "complementarity of energy and time" formulates a reciprocal dependence like the "complementarity of the unconscious and consciousness." What that means in general terms is that the One replaces the Other, with both the One and the Other acquiring a ("transcendental") Being. Events are never independent of time, and time is never independent of events, as a consequence of which not only is the time determined by the event, but the latter is also determined by the former. A "precisely known energy value" is paired with "a completely unknown temporal progress" and vice versa. (Letter from Prof. W. Pauli.) In the one case, an amount of energy is precisely determined at the expense of the time measurement; in the other case, the time at the expense of the energy measurement. Energy and time are aspects and hence factors of an observed event; in other words, both are *principia explicandi*, although neither one can be replaced by the other, and both have quantity. Every physical event can be observed from the standpoint of energy on the one hand, and from that of time on the other. What is most fruitful for the observation of psychic processes is the physical field theory, "within which every change at every point involves a change at all the others." These changes are released by "field forces" working a distance (K. W. Bash: *Gestaltgesetze der Jung'schen Typologie und Funktionslehre* [Gestalt Laws in Jungian Typology and Functions Teachings]. Lecture, Univ. Amsterdam, 1947).[†]

* Handwritten and previously unpublished.

† Kenover W. Bash (1913-1986), Extraordinarius Professor of Psychiatry, University of Bern. Lecture published in *Schweizerische Zeitschrift für Psychologie* under the title "Gestalt, Symbol und Archetypus."

Correspondence between Pauli and the C. G. Jung Institute

[The following three letters record Pauli's persistent demand for a more academic approach to psychology.]

[1] *Prof. Dr. W. Pauli*

Zollikon-Zürich, 22 July 1956 Bergstrasse 35
[Typewritten carbon copy]

To the President of the C. G. Jung Institute,
for the attention of the Curatorium

Dear Mr. President,

In recent years, I have noted with grave concern that the scientific approach is becoming increasingly neglected in matters relating to the C. G. Jung Institute and the activities of its members. As the scientific patron of the Institute, I thus regard it as my duty to draw attention to the standpoint of the sciences, and I must therefore officially request certain information from you as President. It is clear to me that in addition to the scientific aspect of psychology, there is also a humanistic one, but I do not see it as my duty to defend that. In this connection, I should like to point out that psychology always used to be counted as one of the humanistic sciences, but it was precisely C. G. Jung himself who emphasized the scientific nature of his ideas, and it was through his works that the way was paved for an integration of the psychology of the unconscious into the natural sciences. It is my opinion that the progress that has been made in this respect is being seriously jeopardized by the administration of the C. G. Jung Institute.

There is, for example, the question of the way the success of the academic teaching of the President is evaluated. To my amazement, I noted that here the formal-arithmetical criterion of the number of students is a serious factor, regardless of the demands made on the students by the teaching staff. Such an absurd notion should be rectified immediately—no matter who does it. For every natural scientist or mathematician, it goes without saying that the only meaningful criterion for judging the success of a teaching assignment

is the number and *quality* of the students who experience it. I should therefore like to have information about *which of your own students you can quote who, independently, can empirically or theoretically apply the psychology learned with you.* (I am not talking about analysts here, since they are not trained in your lecture course at the ETH.) It would be of particular interest to know whether there are any whom you can recommend for scientific work that you do not have time to carry out yourself.

Another question refers to the general intellectual level of the psychotherapeutic practice. This is where there is the greatest danger that the practice might degenerate into a completely unscientific conveyor-belt system, dominated by the *formal-arithmetic* principle (with pecuniary factors involved), using the time available to deal with or "get through" as large a number of patients as possible with as little thought input as possible. It used to be necessary for the therapist to have to put on his thinking cap if he was making only slow progress with patients. Today, that is hardly necessary, since with the modern assembly-line system the doctor can well afford to dispose of patients at short notice if they threaten to make him think too much. As a result of the fact that doctors are in such great demand, the individual personality of the doctor is being replaced more and more by a sort of collective *group consciousness among therapists*. In my experience (insofar as such a thing is possible with therapists outside the consulting room), this is an egocentric attitude of the doctor to "his"—or "our"—relationship to the patient and to his (the doctor's) *complete alienation with regard to the normal natural products of the unconscious* (dreams, fantasies, etc.) that do not occur in "his" relationship. But it is precisely the scientific investigation of such matters that should form the basis for the perception of disturbances in the normal process of these phenomena in neuroses and other pathological cases.

By completely neglecting this normal sphere in modern people (I am not talking now about fairy tales, myths, history of religion, etc.) the C. G. Jung Institute is fostering the gradual total elimination of the scientific character of the psychological ideas of C. G. Jung in the actual psychotherapeutic practice, thus giving it the unscientific character of an assembly-line industry. I therefore ask the question—with a request for information—as to *what measures the C. G. Jung Institute is thinking of taking in order—at least with its members—to combat the general abuses and deplorable state of affairs of analytical practice at the moment.*

And this leads me on to another specific question. In his writings, C. G. Jung repeatedly stipulated that *the doctor himself had to undergo analysis*. So I am also requesting information as to *what measures the C. G. Jung Institute is thinking of taking to ensure that its members (including the President) comply with this stipulation* when Prof. Jung is enjoying a well-earned retirement and *can no longer take over these functions.*

In this connection, I should like to propose that the reason for what has become the stereotype response of analysts, "Nothing comes to mind," should be sought with the analyst himself, in accordance with the diagnostic methods of C. G. Jung's Association Experiment. This would lead to surprising discoveries about the analysts and their psychic state and would also mean that this convenient response would be made less often and less promptly by the ladies and gentlemen in question.

I would be perfectly capable of turning all this into a lengthy treatise, but I assume that nobody would find time to read it.

Mr. President, I demand that you bring this note to the attention of all the members of the Curatorium as a *vote of no-confidence from the scientific patron against the administration of the C. G. Jung Institute*, and I expect an official reply from them at the beginning of the winter semester.

Yours respectfully, [signed] W. PAULI

[2] W. Pauli

Physics Institute of the ETH Zürich,
Zürich, 7/6, 6 Aug. 1956.
[Typewritten carbon copy]

For the attention of the Curatorium of the C. G. Jung Institute

Dear Frau Dr. Frey-Rohn,*

I am pleased that your letter has triggered a discussion, although it remains to be seen what the outcome will be. I cannot draw up a detailed memorandum, but I would like to take this opportunity to add a few explanations and further comments to what I wrote in my last letter. I propose that you then think the whole matter over and that on my return from Italy—not before the middle of September—we pursue the discussion in person, if possible in the presence of Dr. Meier (and others, if you so wish).

1. I made no reference to *facts* because I am not interested in making myself the center of attention. And I also regard my *proposals* (analysis of the analysts themselves) and my *inquiries* as more important than my ideas about psychotherapists, which must, of necessity, be based on the observation of a small number of people; unfortunately, I do not have at my disposal statistical observation material regarding the mental state and the conduct of a *large number* of analysts.

My letter is the outcome of a lengthy period of reflection and was not a

* Liliane Frey-Rohn was an early member of Jung's circle and an analytical psychologist in Zurich; she was the author of *Von Freud zu Jung* (1969) (trans. *From Freud to Jung* [1974]) and *Friedrich Nietzsche: A Psychological Approach to His Life and Work* (1988).

sudden decision. What I referred to as "group consciousness of the psychotherapists" is an expression of their *monopoly position* in the study of unconscious processes and the enormous demand for them in patients. Connected with that is the rivalry among analysts, which does not stop at the gates of your own institute but usually extends to all your colleagues on the small planet. The analysts (be they male or female) naturally hold the view that this attitude is neither capable of nor in need of being analyzed. (You can, of course, deny all this, but that will make not the slightest impression upon me.) It looks to me like the consequence of mental incest, which in turn is the price to be paid for this monopoly position.

Products of the unconscious, such as dreams, etc., are examined by analysts only in the cases of people who are undergoing analysis.¹ But this presupposes what the physicist describes as a "systematic error." Dr. Meier's *repeated* assertion that the examination of dreams of people who are neither analysts nor in analysis is fundamentally impossible for nonmedical purposes—not only at the C. G. Jung Institute but anywhere in the world in the 20th century—has naturally shocked me. For, as a scientist, I am very interested in learning what people dream about, what archetypes crop up and so on when the analyzing ladies and gentlemen do not intervene. They should have nondoctors trained for this! It has been my experience that the analyst, if asked any question about such an uninfluenced product, will say in a minute or even less, "Nothing comes to mind," and not bother to give it any more thought. There is no way I can check whether they react to patients in the same way, but I assume that is the case with all those who are anxious not to overwork their thinking apparatus.

This trivial reason or any other form of intellectual unacceptability is by no means necessarily the only or the most effective reason. In such a case, my suspicion, speaking as a scientist, is that with the analyst (who may well see himself as a major or minor avenging god) there is a *resistance to the question* (which he or she will, of course, vehemently deny, has "never seen," etc., etc.) For this reason, I have proposed the Jungian Association Experiment—with diagnostic evaluation—as a means of analyzing the analyst *and must absolutely insist on this proposal*. My impression is that the ladies and gentlemen conducting analysis have got completely out of control. Or perhaps you can tell me who controls them?

I should like to refer once again to the necessity of training *students* who are in a position to conduct independent, scientific investigations (for nonmedical purposes) by applying the psychology of the unconscious. Analytical

¹ I am well aware that there are examinations of dreams by medicine men and so on. But this certainly does not render the knowledge of dreams of modern nonanalyzing and nonanalyzed people superfluous.

psychology must first produce evidence that it *can be taught* not just as a healing art but also as a theoretical science, *independent of the existence of individual, possibly unique geniuses such as C. G. Jung.*

I am fully aware of the fact that there are several ways of being successful in life,² but as regards academic teaching success, I simply do not know of any criterion other than that of producing *students* who can work independently. This criterion is by no means directed at the person of Dr. Meier but in my opinion applies to *everybody*.

One method of being successful without any personal scientific achievement, and taking care not to overwork one's thinking apparatus, is also the business and organizational activity of the President of the C. G. Jung Institute in Egypt. As regards the question of the importance of the Codex found there, I freely admit my total incompetence but am happy to accept the judgment of the experts on language and religious history, and I am pleased if Dr. Meier has proved to be of use to them.

But what we are talking about here is an institute for *psychology*, and therefore I should like to propose that for one of the nonmedical investigations that I have indicated as desirable, a student of Dr. Meier should produce a work *on the application of Jungian psychology to the interpretation of the text of the new "Evangelium veritatis"*. What I have in mind is something on the level of a doctoral thesis, seeing that Prof. Jung *has already published a great deal on Gnosis in general*. This would at least alleviate the effect of the way the administration at the C. G. Jung Institute gives priority to the humanities over natural sciences, in that the *psychological* approach to a historical text would also bring it closer to the natural scientist. It is time there was evidence that *Prof. Jung himself is not the only one* capable of writing such psychological commentaries, particularly since he has carried out the necessary preliminary work in this field.

Or will the psychologists and analysts of the C. G. Jung Institute also react to the Codex found in Egypt by saying that "nothing comes to mind"? I shall be leaving shortly and unfortunately will not be able to spend any more time on this matter before I go, but I hope there will be an opportunity to talk this situation over in September or October. Anyone out to do so can of course come up with a hundred reasons as to why my proposals are not feasible, but the *punctum saliens* is that where there is a will, there is also a way!

With best wishes, also to Dr. Meier,

[W. PAULI]

² I also know that there are first-class research scholars who are not interested in *teaching*.

[3] W. Pauli

Zollikon-Zürich Bergstrasse 35 June 1, 1957

Dear Mr. C. A. Meier,

[Handwritten]

I am pleased to have heard from you once again, and I assure you that the contents of your letter will be read with "due consideration". . . .

However, some time around the end of April, Mrs. Jacobi informed me in the course of a telephone conversation that this question of the Zwecker material was a private matter between you and myself¹ and the Curatorium "knows nothing about it"—despite that meeting! It is quite clear that the C. G. Jung Institute *still fails to support* my scientific endeavors. I cannot say that I am surprised by this! (My impression is that I am simply being used.) Ever since that telephone conversation, I have had no further contact with the Curatorium. Nor have I heard whether anything will come of my idea of a lecture at the C.G.J. Institute by van der Waerden on the history of astrology (you will recall that that was something else I brought up at that meeting). . . .

I can fully appreciate the fact that your resignation as member of the Curatorium will in no way affect "your connection with Analytical Psychology" (since in mathematical terms Analyt. Psychology \neq C.G.J. Inst.). May your hope that you will be able to do more for J.'s psychology be realized. That will also depend on whether there is any change in my rather critical attitude toward your psychological skills (of which you are not unaware).

Thank you for informing me (by means of a copy of your letter to Dr. Riklin) about the changes made by the Curatorium in the *editing* of the "Studies from the C.G.J. Inst." As long as I am a patron of the Institute I shall not fail to keep a *critical* eye on the publications brought out under the new editorship.

Yours faithfully,

With best wishes, W. PAULI

¹ This is the exact opposite of what I wanted!

Articles on Parity Violation from
The New York Times, January 16, 1957*

"BASIC CONCEPT IN PHYSICS IS REPORTED UPSET IN TESTS"

CONSERVATION OF PARITY LAW IN NUCLEAR THEORY CHALLENGED BY
SCIENTISTS AT COLUMBIA AND PRINCETON INSTITUTE

By Harold M. Schmeck, Jr.

Experiments shattering a fundamental concept of nuclear physics were reported yesterday by Columbia University.

The concept, called the "principle of conservation of parity," has been accepted for thirty years. It must now be discarded, according to the Columbia scientists.

The principle of parity states that two sets of phenomena, one of which is an exact mirror of the other, behave in an identical fashion except for the mirror image effect.

The principle might be explained in this way:

Assume that one motion picture camera is photographing a given set of actions and that another camera simultaneously is photographing the same set of actions as reflected in the mirror.

If the two films are later screened, a viewer would have no way, according to the principle of parity, of telling which of the two was the mirror image. The recently completed experiments indicate that there is a way of determining which of the two images is the mirror image.

In communicating with people in an intelligent civilization on another world, the Columbia Report explained, it would be impossible, with the principle of parity in effect, to tell whether or not they and we meant the same thing by right-handed and left-handed. This could be true and still the basic physical laws in both worlds would behave exactly alike. The recent experiments indicate that this is not the case for weak interactions of sub-atomic particles.

* *The New York Times*, vol. 106, no. 36,152, pp. 1, 24.

The idea that destroyed this principle originated with two theoretical physicists, Dr. Tsung Dao Lee of Columbia and Dr. Chen Ning Yang of the Institute for Advanced Study at Princeton, N.J. They suggested certain definitive experiments in papers on the subject: "Is Parity Conserved in Weak Interactions?"

The generally accepted belief, which had been a part of nuclear physics since 1925, was that parity should be conserved.

Two sets of experiments suggested by the two theorists showed that this parity was not conserved. A team of four Columbia physicists in collaboration with a member of the Institute for Advanced Study and a team at the National Bureau of Standards carried out the work.

The meeting that released the results of the experiments was held at 2 P.M. yesterday in Columbia's Pupin Physics Laboratory at 119th Street and Broadway. The chairman of the meeting was Dr. I. I. Rabi, Columbia's Nobel Prize-winning physicist.

"In a certain sense," Dr. Rabi commented on the development, "a rather complete theoretical structure has been shattered at the base and we are not sure how the pieces will be put back together."

Physicists present at the meeting indicated that it might take a long time to evolve a new concept on the basis of the recently achieved results. One scientist said that the nuclear physics, in a sense had been battering for years at a closed door only to find that it is not a door at all but a likeness of a door painted on the wall. Now science is at least in a position to hunt for the true door again, he observed.

K Mesons Led to Doubts

The Columbia theorists were led to doubt the principle of parity because, during the last few years, phenomena had been described in high energy physics that could not be explained by existing theories. This was particularly true of the patterns by which certain sub-atomic particles called K mesons decayed. Nobody was able to formulate a theory to account for both of the two methods of decay that followed.

Dr. Lee and Dr. Yang suggested that perhaps it would be necessary to give up the principle of parity to gain an explanation of the sub-atomic interactions. They found that certain experiments dealing with particles better known than the K mesons could resolve the puzzle.

One set of experiments, done in a low temperature physics laboratory of the Bureau of Standards, showed that disintegrating nuclei of radioactive Cobalt 60 exhibited a specific "handedness," or spin in a given direction.

The other set of experiments dealt with the decay patterns of pi mesons. These are sub-atomic particles that are better understood than the K

mesons. The pi mesons are believed to be largely responsible for the force that holds atomic nuclei together.

The disintegration pattern of the pi mesons also showed a definite "handedness."

Scientists contributing to the work in addition to Dr. Lee and Dr. Yang are listed by Columbia as Dr. Ernest Ambler, Bureau of Standards; Dr. Richard L. Garwin of Columbia's Watson Scientific Laboratory; D. D. Hoppes, physicist of the Bureau of Standards; Associate Prof. Leon M. Lederman of Columbia and Associate Prof. Chien Shiung Wu of Columbia.

"TEXT OF THE COLUMBIA REPORT ON PHYSICS EXPERIMENTS"

Following Is the Text of the Columbia Report on Physics Research Released Yesterday:

I. INTRODUCTION

The Department of Physics of Columbia University announces a development of very profound importance uncovered in very recent experiments in the subject of the physics of elementary particles. These experiments are:

- (1) The beta-decay of oriented nuclei—Prof. C. S. Wu of Columbia University in collaboration with Ernest Ambler, R. W. Hayward, D. D. Hoppes and R. P. Hudson of the National Bureau of Standards.
- (2) The angular asymmetry in electron decay of mu mesons—Dr. Richard I. Garwin, Prof. Leon M. Lederman and Mr. Marcel Weinrich of Columbia University. (Note: Dr. Garwin is also a senior staff member of the I.B.M. [International Business Machines] Watson Scientific Laboratory of Columbia.)

II. SIGNIFICANCE

Both of the above experiments (described in more detail below) were suggested by two theoretical physicists, Prof. T. D. Lee of Columbia University and Prof. C. N. Yang of the Institute of Advanced Study, Princeton, N.J. The first of a series of three papers on the subject was entitled "Is Parity Conserved in Weak Interactions?" The experiments designed to answer the question give a decisive answer—parity is not conserved—thus destroying one of the basic laws built into all physical theories of the past thirty years.

Parity

The concept of parity, although actually significant only in the realm of microscopic (atoms and particles) physics, has a well defined every-day definition. One way of describing this is as follows:

Suppose we are in communication with an intelligent civilization on another world and wish to determine whether their clocks run in the same sense as ours do—or again whether they mean the same thing by left-handed and right-handed as we do. We have always believed that communications of this idea, in the spirit of analogy, is impossible. There was no absolute, universal sense to “Handedness.” However, the stranger’s laws of physics are perfectly good—even if his definition is opposite to ours for, say, a left-hand screw and right-hand screw.

The statement that the two worlds, one based upon a left-handed system and one based upon a right-handed system, have the same laws in physics is known as an “invariance principle,” i.e., the laws of physics are said to be invariant and unchanged, if the right-hand and the left-hand convention are interchanged. The interchange is a reflection in the sense that a mirror image is a reflection in the plane of a mirror. Physicists refer to this reflection as a “parity operation.” The Principle of Invariance to Reflection or to Parity Operation has been built into physical theories since 1925 and serves as a severe restriction on the types of laws predicted by those theories. It is this principle which has been destroyed by the recent Columbia experiments.

The main reason for this is that it has been discovered that elementary particles—neutrinos and mesons—possess a “handedness” as an intrinsic property. One must now speak of a left or right-handed neutrino, for example. More precisely, these particles must now be considered to possess, in addition to charge, mass, spin, etc.—properties analogues to a screw—that is, a favored rotation (spin) and an advance along the axis of rotation, either in the right-handed or the left-handed manner. Another way of describing the situation is to compare an elementary (spinning) particle with a spinning bullet. If the shape of the bullet were a perfect cylinder, there would be no screw defined, or no “handedness,” since the two ends of the bullet are identical.

The new concept of particles is now in analogy with a normal bullet (pointed nose) which differentiates one end of the spin from the other. Particles which “point” in one direction relative to the sense of rotation are called right-handed, etc. The fact that such particles exist on this world and on the other world now permits an absolute identification of right and left hand between the two worlds, in violent disagreement with previous concepts. No theory which has included the parity idea would have been

successful. These experiments brilliantly proposed by Lee and Yang, now at least open the way to a correct and unifying theory of elementary particles. Lee and Yang also point out that the over-all symmetry of the universe may still be preserved by assuming that if our galaxy is essentially right-handed, some distant galaxy may be in turn left-handed. It may be that this assumed distant galaxy is identical to the hypothetical anti-matter, now a subject of intense speculation. This would represent an enormous simplification in our theoretical attack on the structure of the universe.

III. THEORETICAL BACKGROUND

The proposal that the parity law may not be true was made by Lee and Yang last summer. This was in an attempt to reconcile data obtained with the super-atom smashers, the Brookhaven Cosmotron and the Berkeley Brevatron. The data consisted of the study of the properties of unstable K mesons, particles which were only recently discovered (1952-53). One aspect of K meson disintegration seemed to violate the parity law. So deeply rooted was this law, that the entire world of physics was completely baffled by the K meson puzzle, the general feeling being that the K mesons, being newly discovered, were just not well enough understood. Lee and Yang boldly made the break and, in their historic paper, they re-examine the consequences of removing the parity law for radioactive disintegration of nuclei and particles. They found, to their surprise, that none of the existing data would be in contradiction and that certain crucial experiments, dealing with more well-known particles, would give decisive answers.

IV. THE EXPERIMENT ORIENTED NUCLEI

To detect the "handedness" of particles, the radioactive nucleus Cobalt 60 was cooled to a temperature of 0.01° above absolute zero [-273.1 Centigrade]. At this temperature, all thermal motions are reduced to extremely small values. The application of a magnetic field will cause most of the cobalt nuclei, which are known to be spinning[,] to align themselves, like small magnets, parallel to the applied magnetic field. The radioactive cobalt nuclei disintegrate, giving off electrons. The crucial point is the comparison of the number of electrons emitted along the direction of spin to the number going in the opposite direction. The very fact that these numbers are different indicates the favoring of a direction associated with the spin, that is, a "handedness" in the sense of a screw. Moreover, the magnitude of the difference was sufficiently large to indicate a violation of charge conjugation invariance.

The technical aspects were quite difficult. At the request of and in collab-

oration with Professor Wu, the National Bureau of Standards Low Temperature Physics Group undertook experiments to verify the theoretical considerations. This group assisted by National Bureau of Standards specialists in radioactive measurements provided the techniques and experience for completing the project successfully. Scintillation counters had to be installed within the complex vacuum and cooling system and extreme care had to be taken to eliminate spurious effects. This work was partially supported by the Atomic Energy Commission.

Meson Decays

In this experiment two parity violations were detected as well as the violation of "charge-conjugation-invariance." It was discovered that when the familiar pi meson (well known since 1947 and now known to be principally responsible for the force that holds nuclei together) disintegrates into a mu meson and a neutrino the mu meson always spins in the direction of its motion. Here again, the mu advances as if it were a screw and demonstrates the parity-violating "handedness." The alignment of mu spins was detected by counting the end products of the radioactive mu meson decay, and electrons which were found to favor one direction of spin of the parent mu meson over the other, in their direction of emission.

As a by-product of this experiment, the strength of the small "magnet" carried by the mu meson (called a magnetic moment) was measured to a precision of 5 per cent. Magnetic moments of electrons are known to precisions of 0.005 per cent (P. Kusch, Nobel prize) but the number of particles available is 10^{14} , whereas in this experiment less than 50,000 particles were counted. Oriented mu mesons are extremely sensitive to weak magnetic fields and this technique will prove a powerful tool in probing the magnetic fields inside nuclei and atoms between atoms.

The latter experiment was carried out at Columbia's Nevis Cyclotron Laboratories in Irvington-on-Hudson, N.Y., operated under the joint program of the Office of Naval Research and the Atomic Energy Commission.

Personae

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D. D. Hoopes, assistant, National Bureau of Standards, Washington.

R. P. Hudson, section chief, National Bureau of Standards, Washington.

Leon M. Lederman, Associate Professor of Physics, Columbia University.

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Basic Concept in Physics Is Reported Upset in Tests

Conservation of Parity Law in Nuclear Theory Challenged by Scientists at Columbia and Princeton Institute

By HAROLD M. SCHMECK 2c.

Experiments shattering a fundamental concept of nuclear physics were reported yesterday by Columbia University.

The concept, called the "principle of conservation of parity," the test of Columbia report will be found on Page 24.

has been accepted for thirty years. It must now be discarded, according to the Columbia scientists.

The principle of parity states that in a set of phenomena, one of which is an exact mirror of the other, behave in an identical fashion except for the mirror image effect.

The principle might be explained this way:

Assume that one motion picture camera is photographing a given set of actions and that another camera simultaneously

is photographing the same set of actions as reflected in a mirror.

If the two films are later screened, a viewer would have no way, according to the principle of parity, of telling which of the two was the mirror image. The recently completed experiments indicate that there is a way of determining which of the two images is the mirror image.

In communicating with people in an intelligent civilization on another world, the Columbia report explained, it would be impossible, with the principle of parity in effect, to tell whether or not they and we meant the same thing by right-handed or left-handed. This could be true and still the basic physical laws in both worlds would behave en-

Continued on Page 24, Column 2

3.1° Sets 2-Year City Low; Snowfall Imperils Traffic

MACMILLAN GETS EISENHOWER WISH FOR ALL SUCCESS

Briton Responds With Equal Warmth to Greetings on His Appointment

By DREW MIDDLETON

Special to The New York Times.

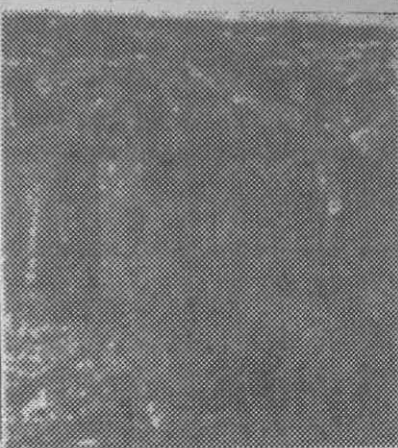
LONDON, Jan. 15.—President Eisenhower has warmly congratulated Harold Macmillan on his appointment as Prime Minister, wishing him "every success" in his new post.

Mr. Macmillan, in his reply, has pledged his cooperation with the President in furthering friendship between the United States and Britain.

The exchange of letters was made public today by the Prime Minister's office. Mr. Macmillan also received similar messages of congratulations from Secretary of State Dulles and Secretary of the Treasury George M. Humphrey.

Regarded as Rebellious

Conservative leaders regarded the letters as the beginning of the end of a policy dispute between the two nations arising over British intervention in Egypt last autumn. The President's letter is regarded not only as a generous personal gesture



DELAYING ACTION IN EGYPT: Israeli soldiers setting up a road between El Arish and Beira during their withdrawal in the Sinai Peninsula. Members of the United Nations Emergency Force entered the El Arish area of

DULLES SEES PLAN TO MIG-17 Jet Craft Reported Delivered To Syria by Soviet ISRAELIS KEY BA
AVERTING A WAR

THE MEANING OF PARITY

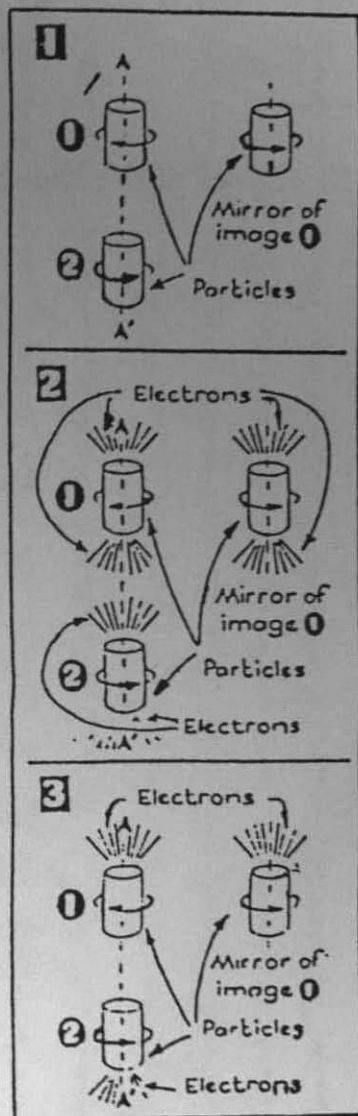
(MIRROR SYMMETRY)

The parity law of physics states that for any atomic or nuclear system no new physical consequence or law should result from the construction of a new system, differing from the original by being a mirror twin.

Consider Particle 1, spinning about a direction AA'. Now construct or find Particle 2, which is chosen to be identical to the mirror image of 1. The parity law says that there should be no observable difference between the two particles, 1 and 2, which may be detected by measurements made along direction AA'. This law permits one to make predictions: suppose 1 is radioactive, disintegrating into electrons. The parity law predicts that equal num-

bers will be emitted towards A, and A', as in Figure 2. Why? Consider the alternative. If 1 emits more electrons towards A, 2 must emit more towards A' since 1 becomes identical to 2 simply by turning it upside down. But, now 2 is no longer the same as the mirror image of 1. The physicist observing 2 would make one decision about the relation between the direction of favored electron emission and the spin sense; the physicist in the mirror world would obtain a different answer. Parity law would have been violated.

For the past thirty years, the special conditions predicted by the philosophically pleasing idea of mirror symmetry have borne fruit, consistently making successful predictions about atomic and nuclear processes. However, a general theory of the structure of matter eluded us. Then, in the new subject of "strange particles," the K-mesons studied at Brookhaven and Berkeley, the first parity puzzle appeared. This led to the Lee-Yang proposal. The preferential emission of electrons towards one direction of its spin is the observation that disproved the parity law.



Facsimiles of the Handwriting of Pauli and Jung



On opposite page: 1. Unpublished handwritten note by Jung on synchronicity.

On page 228: 2. Extract from a letter from Pauli to his friend C. A. Meier.

1. Die Synchronizität
2. Die Begriffe der Relativität der Zeit; Das
3. Complementarität von Energie und Zeit² formulierte
4. Zeitgleichheit, wie die Complementarität von Wellenlängen
5. Ganz allgemein bedeutet dies, dass das Eine des Anderen,
6. und des Anderen ein ("transcendentales") Sein gehört.
7. Abhängig von Zeit, und Zeit ist nie unabhängig von Ereignis
8. Form nicht nur die Zeit nach der Ereignissen, sondern
9. erstere bestimmt ist. Ein "exact bekannter Energie
10. ist einem völlig unbekannter zeitlichen Ablauf³ und
11. die Wellenlänge von Prof. W. Pauli⁴). Im diesem Fall wird ein Ereignis
12. auf K. r. Ten der Zeitmessung, in andere die Zeit auf Kosten der
13. rge und Zeit sind Aspekte und daher Faktoren eines Beobach

The Letters Listed in Chronological Order

[1]	Jung to Pauli	Küsnacht	4 November 1932
[2]	Jung to Pauli	Küsnacht	5 May 1933
[3]	Jung to Pauli	Küsnacht	19 October 1933
[4]	Jung to Pauli	Küsnacht	2 November 1933
[5]	Jung to Pauli	Küsnacht	28 April 1934
[29]	Pauli to Jung	Zürich	28 April 1934
[6]	Jung to Pauli	Küsnacht-Zürich	22 May 1934
[30]	Pauli to Jung	Zürich	24 May 1934
[7]	Pauli to Jung	Zürich	26 October 1934
[8]	Jung to Pauli	Küsnacht	29 October 1934
[9]	Pauli to Jung	Zollikon-Zürich	22 June 1935
[10]	Jung to Pauli	Küsnacht	24 June 1935
[11]	Pauli to Jung	Zollikon-Zürich	4 July 1935
[12]	Jung to Pauli	[Missing]	21 September 1935
[13]	Pauli to Jung	Princeton	2 October 1935
	[Enclosure to 13]		
[14]	Jung to Pauli	Küsnacht	14 October 1935
[15]	Jung to Pauli	Küsnacht	14 February 1936
[16]	Pauli to Jung	Princeton	28 February 1936
[17]	Jung to Pauli	Küsnacht	19 May 1936
[18]	Pauli to Jung	Zürich	16 June 1936
[19]	Jung to Pauli	Küsnacht	6 March 1937
[20]	Pauli to Jung	Zürich	3 May 1937
[21]	Jung to Pauli	Küsnacht	4 May 1937
[22]	Pauli to Jung	Zürich	24 May 1937
[23]	Pauli to Jung	Zürich	15 October 1938
[24]	Jung to Pauli	[Missing]	
[25]	Pauli to Jung	Zollikon-Zürich	30 October 1938
[26]	Jung to Pauli	Küsnacht	3 November 1938

[27]	Pauli to Jung	Zürich	8 November 1938
[28]	Pauli to Jung	Zürich	11 January 1939
[31]	Pauli to Jung	Zollikon-Zürich	3 June 1940
[32]	Pauli to Jung	Zollikon-Zürich	25 and 28 October 1946
[33]	Pauli to Jung	Zollikon-Zürich	23 December 1947
[34]	Pauli to Jung	Zollikon-Zürich	16 June 1948
[35]	Pauli to Jung	Zollikon-Zürich	7 November 1948
[36]	Jung to Pauli	Küsnacht	22 June 1949
[37]	Pauli to Jung	Zollikon-Zürich	28 June 1949
[38]	Pauli to Jung	Zollikon-Zürich	4 June 1950
[39]	Jung to Pauli	Küsnacht	20 June 1950
[40]	Pauli to Jung	Zollikon-Zürich	23 June 1950
[41]	Jung to Pauli	Küsnacht-Zürich	26 June 1950
[42]	Pauli to Emma Jung	Zollikon-Zürich	11 October 1950
[43]	Jung to Pauli	Küsnacht	8 November 1950
[44]	Pauli to Emma Jung	Zollikon-Zürich	16 November 1950
[45]	Pauli to Jung	Zollikon-Zürich	24 November 1950
[46]	Jung to Pauli	Bollingen	30 November 1950
[47]	Pauli to Jung	Zollikon-Zürich	12 December 1950
[48]	Jung to Pauli	Küsnacht	18 December 1950
[49]	Jung to Pauli	Bollingen	13 January 1951
[50]	Pauli to Jung	Zollikon-Zürich	2 February 1951
[51]	A. Jaffé to Pauli	Küsnacht	14 March 1951
[52]	Jung to Pauli	Küsnacht	27 March 1951
[53]	Pauli to Jung	Zürich	17 April 1951
[54]	Pauli to A. Jaffé	Zürich	3 December 1951
[55]	Pauli to Jung	Zollikon	27 February 1952
[56]	Pauli to Jung	Zollikon	17 May 1952
[57]	Jung to Pauli	Küsnacht-Zürich	20 May 1952
[58]	Pauli to Jung	Zürich	27 February 1953
[59]	Jung to Pauli	Küsnacht	7 March 1953
[60]	Pauli to Jung	Zürich	31 March 1953
[61]	Jung to Pauli	Zürich	4 May 1953
[62]	Pauli to Jung	Zürich	27 May 1953
[63]	Jung to Pauli	Küsnacht	23 June 1953
[64]	Jung to Pauli	Küsnacht-Zürich	24 October 1953
[65]	Jung to Pauli	Küsnacht-Zürich	5 December 1953

CHRONOLOGY OF LETTERS

[66]	Pauli to Jung	Zürich	23 December 1953
[67]	Jung to Pauli	Küsnacht-Zürich	10 October 1955
[68]	A. Jaffé to Pauli	Küsnacht-Zürich	27 August 1956
[69]	Pauli to Jung	Zürich	23 October 1956
[70]	A. Jaffé to Pauli	Küsnacht-Zürich	15 December 1956
[71]	Jung to Pauli	Küsnacht-Zürich	December 1956
[72]	Pauli to Jung	Zürich	22 March 1957
[73]	A. Jaffé to Pauli	Küsnacht-Zürich	29 May 1957
[74]	Pauli to Jung	Zürich	June 1957
[75]	Jung to Pauli	Küsnacht-Zürich	15 June 1957
[76]	Pauli to Jung	Zürich	5 August 1957
[77]	Jung to Pauli	Küsnacht-Zürich	August 1957
[78]	A. Jaffé to Pauli	Küsnacht-Zürich	19 November 1957
[79]	A. Jaffé to Pauli	Küsnacht-Zürich	29 December 1957
[80]	A. Jaffé to Pauli	Küsnacht-Zürich	7 October 1958

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