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CHAPTER 14

The Chevy Chase Record

I have been striving for another kind of success-to make discoveries and know reality. —ELMER GATES

Were the Chevy Chase laboratories worth the great struggle and effort?

Psychurgy was tested by practical laboratory work in the fourteen years at Germantown and Chevy Chase. Ordinarily it is understood that "original investigation" is carried on for discovering something new and that more data (facts, laws, principles) will thereby be added to science and more technique to art; that these data are then taken by the "original" thinkers and systematized and generalized and interpreted, and that the creative "imagination" recombines them and erects a new superstructure. But it required much psychologic knowledge and much laboratory and subjective experimentation for Gates to unravel these processes and find out what they meant; to analyze them into their states and processes of states and then learn how to do them scientifically and according to rational and consciously known and intended principles.

In his "Synopsis of the Past Ten Years' Work," circulated in 1904 among those interested, he reported that much time had been devoted to determining the taxonomic kinds and classes of

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mental data and the particular mental technique most applicable to each of the arts and sciences, and producing the greatest number of new and true ideas. The practicality of the methods was determined by the number of discoveries and inventions. His associates often assured him that he could think out more new and true ideas about a subject in a shorter time than anyone about whom they had ever heard—not random ideas, but ideas that formed a system of knowledge data upon a subject, the most difficult kind of thinking.

In the order of progress the mind first discovers a new idea, then proceeds inventively to apply it. This application is not easy, requiring an order of mind almost as advanced as to discover the idea; therefore, inventive experiment goes hand in hand with scientific research. Only through the application of knowledge to human use does man materially profit by science; and this nearly always involves invention as well as business handling and commercial perfection. Accordingly in Gates' laboratories a series

of costly studies was made of methods by which the mind naturally carries a new idea through these successive stages.

It was at Chevy Chase that the arts of discovering and inventing were reduced to a systematically formulated and scientifically validated technique, and thoroughly tested by practicing them. Some of the special lines of scientific research thus opened up or extended were listed in his Synopsis as follows:

A psychological study of discoverers and of the mental activities or processes of making discoveries, including all kinds of originative and creative work, with special reference to genius and methods of scientific investigation—chiefly by making discoveries under experimentally varied conditions of body, mind, and environment.

A psychological study of inventors and the mental processes of inventing, including all kinds of designing and constructing, with special reference to talent and methods of inventional experimentation—chiefly by inventing under experimentally varied conditions.

A psychological study under experimentally varied conditions

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of students and the mental process of learning, including all kinds of prodigies; of teachers and the mental process of teaching, including all kinds of lecturing, explaining, conversing, expounding, and such with special reference to science—chiefly by teaching and expounding orally or in writing; of moral, ethical, and religious persons and their mental conditions and processes, to discover the conditions of normality and the training for it; of scientists and the sciences and the mental states or taxonomic integrants constituting knowledge, their classification or psychotaxis, their two stages of verification, and the sciences as subdivisions of psychology; of artisans, artists, professional persons, skilled workmen, and the arts, and the mental processes involved in learning and practicing the arts, and the arts as subdivisions of the one art of psychurgy; of merchants, buyers, and sellers and the mental processes, individual and sociologic, of industry and commerce.

A psychologic study of philosophers and the mental processes of philosophy.

A systematic study of individual psychology and experimental introspection.

An experimental study of comparative psychology; of mind-embodiment and brain-building; of sociology, group mentation, sociurgy; of subconscious functionings, mental spontaneities, improvisations; of volition and conation, auturgy, teleotaxis; of intellective, esthetic, and conative mentation; of effects of

conditions on mentative dominancies; of functional periodicities and prognosis; of heredity and eugenics; of physiologic rest and psychologic quiescence and social harmony.

A psychologic study of some just-dawning mental powers, and of ordinary powers extended by special training; of suggestibility and hypnotism.

Systematic application of psychurgy to making discoveries in the six groups of sciences and to making them synthetically: a synthetic science-psychology. Psychurgy applied to itself: a synthetic art-psychurgy.

Also listed in the 1904 Synopsis were these thirty-five selected

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lines of inventive research in which results had been attained:

Acoustics and music: an electromagnetic method of producing fundamental tones without their harmonics, and by which the number and harmonic relation of overtones can be regulated in a note, so that tonal qualities can be made sad or gay; musical instruments and acoustical apparatus; acoustically regulated automatic devices; synthetic music, counterpoint of overtones; methods of training.

Aerodynamics: device for dynamometrically measuring effectiveness of aerial propellers; an aerial propeller; a method of aerial propulsion.

Alloys: method of making and testing.

Architecture: construction of sanitary and sanatory houses, building materials, segmental houses.

Chemistry: monochromatic chemistry, cellular synthetic chemistry; qualitative analysis.

Electricity: measuring instruments; sunshine into electricity; gas storage battery; Foucault-current telephone dynamo; electric typewriter; vacuum enclosed dynamo, motor, and static machine.

Fire protective devices: fire extinguisher, a new method (the basic fire-foam patent)

Food improvement: selective propagation and cell stimulation and method of analyzing minute qualities to augment any desirable constituent and eliminate undesirable ones; radiothermic cooking.

Gems: artificially making all oxide gems; enameling; fluoroscopic separation of gems from gravels.

Grinding, pulverizing: cryothermic method.

Higher temperatures: a method of obtaining; non-contaminative heating, metal working and shaping.

Invisible optics.

Lighting: hygienic illumination by shielding from eyes, screening out invisible rays.

Linguistics: word groups for special trades, professions.

Looms and mining: (as previously noted).

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Metallurgy: reduction of titaniferous ores; higher temperatures applied to reduction; agglomerating ores.

Meteorology, electric: experiments and devices showing relation of electricity to weather.

Microscopy and telescopic: the double microscope; reflection microscope; cumulative photomicrography; invisible-ray photomicrography; oxygen lens.

Non-electrolytic device: plumbing, vessels and pipes.

Painting and pictorial representation: comparative visibility of pigments in relation to distance and color perspective; augmentation of luminosity by reflected colors.

Pedagogics: improved and new educative apparatus; psychurgic instruments; psychotaxic museum groups; educative toys; prismatic photometer; electric sonometer; reflection color wheel.

Photography: sensitive plates in relation to temperature of greatest sensitivity; photographic values of pigments under different reflected visible and invisible colors.

Physical training: psychophysically regulated training devices; sports and games for special and general training; mechano-therapy.

Publication: devices for printing any number of copies simultaneously; terromagnetic transmission of news.

Radiothermics: focalization of solar and other rays and their applications to non-contaminative fusions, recrystallizations in vacuo, and enameling.

Refrigeration: thermostatic regulation of rate; automatic cooling of air in houses, regulation of moisture; non-conductive vacuum plates.

Submarine: devices for industrial operations and exploration.

Toys: dumbbell wrestlers, bow-gun top; bat and return ball; cryophorus toy; kaleidoscope marble; cushion hobbyhorse; top and stick; paper and spool shoot-the-chute; parallel-line illusion on transparent paper.

Various devices: linear-lens ruler; suction sweeper;

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anatomical transparencies; clay furniture; electrosonic drilling and graving; airjet motor; Axminster static machine; method of delinting cottonseed; bathing bag for army or camp; suction bath sponge; hollow-wick candle; draw-cut scissors; vacuum clock; water lens; collapsible and hollow-handle toothpaste brush; *multum in parvo* computer; hourglass self-closing ink bottle.

War: armor plate, of greater resistance, that will float; rapid-fire gun; others.

X-Rays: electromagnetic augmentation; plateholder.

At Chevy Chase, Gates applied his improved art of discovery to opening up a number of new and fruitful lines of research in several sciences and arts by discovering for each a new experimental method and technique, showing by results that it was worthy of further pursuit and that practical applications could be expected to pay the costs. He called these methods, when collected and systematized, a department of Research. A few of the twenty-six proposed departments of Research were briefly described in his "Confidential Report of 1909."

One of the most appealing was a department relating to the Diagnosis and Cure of Disease. During a mentative period of seven months Gates discovered "psychophysical diagnosis": when any one of the psychophysical measurements of a person is found to fall away from his previously established standards, it indicates the approach of some disease, long before the patient feels the first symptoms, or other modes of diagnosis can detect it. Then is the opportune time to begin treatment. This method can also be used by the psychurgic teacher to follow the gain or loss of some mental capacity under training. Measurements were made in the isolation chamber under uniform and standard conditions, some sixty-eight or less being made under selected conditions. He discovered "photometrical diagnosis": when different wave lengths of visible and invisible light are thrown upon an animal body, some find certain tissues transparent and others opaque; the relative degrees of transparency of each tissue to each group of wave lengths may be measured, and when any varies from its standard it indicates disease.

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He discovered "phototherapy": although a given tissue is transparent to certain groups of wave lengths, pathological germs in these tissues are not similarly or equally so and are opaque to some. When the wave length to which the germ is opaque, but to which the surrounding tissue is transparent, is augmented in intensity and especially made rapidly intermittent, it quickly destroys the germ, which absorbs the rays and is heated and photo chemically acted upon and killed. (In connection with other lines of research, special light sources and optical equipment were invented and used.)

At another mentative period Gates worked out a method of artificial phagocytotherapy by which the phagocytes of an animal that is naturally immune to a given pathogenic germ are taken, (or even artificially bred) and injected into the veins of the patient in

much larger quantities than naturally supplied. When Gates first wrote and talked about this experimentation, nothing had been done in this line; but since then, he noted in 1913, two of those to whom he talked had written about it. But the right kind of research remained to be done.

He also discovered ganglionic therapy by electrocataphoretically carrying into the ganglionic center of an organ or system a very small quantity of medicine, instead of administering it in the usual larger doses. He carried much further the application of his earlier methods of dirigation for the cure of certain diseases, and the methods of brain-building to cure others, as in the development of imperfect organs. When systematic sensory and motor excitation of any bodily part was accompanied by an intentional discrimination of the least-noticeable-difference between all degrees of sensory and motor feelings, the augmented enregistration (brain-building) in the connected brain area produced a greater development in that part of the body.

One interesting case (reported in the *New York Medical Times*, December 1897, in the article by Gates cited later) was of a patient, 68, whose left arm had not grown in size since he was 14 months old, owing to sequelae of scarlet fever, during

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which time he had not moved any portion of his arm. A few months of this psychophysical training in discriminating touch, pressure, distance between touches, temperature, and muscular feeling (using a platinum probe for electrical stimulation) caused the arm to grow to three times its former size, and the patient was able to move each finger and bend the arm at the elbow. After his death a few years later, examination of his brain showed in the right-cortex arm areas an enormous number of young and well-formed cells.

Two interesting examples of brain-building were also given. Mrs. M had been suffering for nine years from dyspepsia, not so much from gastric inability as from improper assimilation. Gates gave her a systematic series of training in pleasurable odors and perfumes and tastes, and in remembrances of pleasurable gustatory and other hunger feelings at the same hour daily for two months. The result was complete restoration of her assimilative powers and a gain of 20 percent in weight (she was much emaciated) and of more than 30 percent in strength. The additional brain-cells, he considered, that were thus placed in the cerebral areas of the gastrointestinal tract (or the development of incipient cells) caused the brain to send more and better stimuli to the digestive organs.

Mr. L was unable to distinguish as small a color difference with the left eye as with the right. By producing upon the eyeball

and its supplementary integuments a series of systematic sense-impressions of the different kinds, and of many thousand tints, shades, and hues of color, there was produced in seven weeks a greater power of discrimination in the left eye.

Another application was the cure of criminal and immoral dispositions by systematically remaking the moral nature anatomically, physiologically, and psychologically. He found at least as many moral diseases as physical ones. Another application was curing diseases of the intellect, including many kinds of mental aberration, of which monomanias and nervous prostration are types. Gates found that when through worry or overwork any one set of structures in the brain becomes permanently hyperemic

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so that the mind cannot stop working, by putting new sensory and "imaginative" and ideative structures in some other part of the brain and keeping them constantly active, the vasomotor blood dominancy will soon draw the congestion of blood and attention away and cure the patient. Diseases of emotion may also be cured by the enregistration of normal emotions and of scientific ideas about the things (sentiments) that give rise to abnormal emotions, and then re-functioning them. These methods combined with special conative enregistrations and trainings can also be applied to the cure of diseases of the will, such as aboulia, hyperboulia, and the parabolias. Gates found that the volitions and the will could be strengthened and trained by a systematic introspection of the mental process of willing, beginning with the simpler conations and extending gradually to the more difficult and complex processes, and more especially by means of inhibitive and dirigative methods.

These methods of systematic mind-embodiment and brain-building should find their highest utility in the attainment of a higher degree of health and normality.

Another method of cure by selective libero-motor dirigation was found: by dirigation the libero-motor impulses going from the brain to any part of the body may be augmented, more blood thus sent to that part, its metabolism increased, its growth and functioning augmented, and some of its diseases cured.

A new method of cure was eunesthesiaury. The esthesias are the feelings, appetites, desires, emotions, sentiments; the good ones are eunesthesia. A volitional excitement of them is esthesiurgy. Eunesthesiaury is the systematic re-functioning of the desirable or good or happy esthesias. All growth and cure are due to metabolism, and so is disease; to augment anabolism is at once to augment health, while to cause catabolism is to produce disease. Healing is accomplished by anabolism under the guidance of the

nerves, by the so-called curative powers of nature, and anabolism creates the superabundant energy needed for such growth and cure. A patient can be taught to functionate the good emotions more often in a day than he had previously

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done in a year, and to avoid the evil emotions and slowly get rid of them. By this means the tide of life will be raised and the energy of mentation increased.

Gates' experiments indicated that one method of therapy will consist in a medicinal and chemical modification of the *psychologic* activities of the cells. He demonstrated that cells are alive because they feel stimuli and can adapt acts to ends; since only mind can feel and adapt, it follows that cells have simple and elemental minds, and are alive for that reason. The functioning of an organ consists in the combined functionings of its cells, and the cells function mentally. To change the functioning of an organ it is therefore necessary to modify the mentation of the cells. Gates found that medicines are capable of modifying the psychologic characteristics and functionings of cells and that in all cases where medicines act curatively (germicides, deobstruents, protectives, and anesthetics not considered), they do so only to the extent that they influence the psychologic activities of the cells of that organ, or nourish it as a food. Therefore, he believed that a study should be made of the effect of all known medicines, chemicals, forces, and foods upon the psychologic activities of unicellular organisms; and when this is understood, an intelligent study can be made of multicellular creatures and human diseases. Out of this a scientific therapy should arise and achieve a successful adjunctive therapeutic treatment for all diseases.

In the *American Therapist* of December 1895, Gates published the article "Methods of Research in, and the Importance of, Cellular Psychology"; and in the same number appeared an appreciative editorial by the editor, Dr. John Aulde ("Gates has spent many years studying cell metabolism and his experiments upon dogs, rabbits, and guinea pigs run into the thousands; and the results bid fair to open a new era in scientific medicine . . ."). In the *Medical Times* for December 1897, appeared a more widely noticed article by Gates on "Experimental Researches into the Cause and Cure of Disease by New Methods and along New Lines." In the *New York Herald* on August 21, 1899,

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there appeared a still more widely noticed article on "Forecasting Disease." As a result of these and other articles and lectures,

overtures were made to him to organize a department of Research, but the necessary backing evidently was not obtained.

A new study of food values and their curative use, of the improvement of foods to nourish the body and *mind* in health and disease, has an importance that is difficult to estimate. By selective propagation and regulation of the psychologic cell activities of plants Gates found that any desirable chemical constituent of a cereal, vegetable, or fruit could be augmented and undesirable ones eliminated at the rate of one or more percent a generation, up to a certain limit.

He considered the first concrete application of these methods to be probably a bureau of Diagnosis to collect facts relating to all methods of cure and their preliminary validation, and thus gather the first complete list of inductive data regarding all known forms of treatment. With these data as a starting point the methods of psychurgic validation could be applied and new and more correct data obtained for use as the conscious states in applying the psychurgic art of discovery to the whole subject.

"No one who has witnessed the experiments in brain-building and dirigation, or practiced the art of mentation, or seen the experiments on cellular mentation, will for a moment doubt that the secret for the cure of disease and attainment of health is to be found in the study of the effects of forces and mental activities upon the minds of cells in the animal body. Hence this paper may be considered a first statement of a scientific and fundamental law of cure—to be hereafter elaborated and rendered more definite by a series of most interesting experimental researches." So Gates enthusiastically closed his article in the *Medical Times*.

A department of research was proposed relating to Foods and Agriculture. At Chevy Chase for the first time foods were studied with reference to their power to sustain nervous and mental activity. During a mentative period of nine months Gates also discovered the method of cell stimulation and selective propagation

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just mentioned. He reported to *Popular Science News* an experiment by which in eleven generations the fat in a meadow mushroom (*Agaricus campestris*) was increased to 2 1/2 percent of its weight. The next result was the photochemical ripening of perfumes and tastes and flavors in fruits; then came the electrostatic perfume extractor. He found that unicellular foods could be produced from propagating protists and other lowest microorganisms, which could be cooked and eaten like other foods. These one-celled organisms cannot be diseased, and contain approximately all the nutrients of the higher animals and

plants. He found that many plants, of which the grapevine was typical, absorb tastes and flavors directly from the soil, which should therefore be guarded from certain manures or chemicals; that certain chemicals used in the soil produce tastes in fruits; and this led to his important discovery of the pedonic fertilizer, a complement of the organically fixed nitrogen fertilizer he discovered at Germantown in 1895. Other improvements were the protective bag, moistureproof and germproof, for foods; a process of non-contaminative fruit drying; an aseptic method of making fruit juices and a non-leakable method of bottling; aseptic fermentation of wine, ciders, and malt liquors; and a heated air cooker with thermostat.

Another mentative period of five months led to agricultural improvements, including a new method of selective propagation by which, for instance, cotton, flax, and wheat could be made to grow with a large yield on land previously producing nothing. It amounted almost to a species of self-fertilizing plants capable of growing with much less moisture than other plants of the same species. Then came the invention of a cheap method of delinting cottonseed in large quantities (patent allowed; basis of present method); and an electric and other means of selecting the best seeds and of extracting oil from seeds.

A department of Meteorology was proposed. At the request of Professor Hazen of the Weather Bureau, Gates applied the art of discovering to this subject of "a few facts and many

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theories" and in a short period attained twenty-six new experimental results, reported at the time, including the following: Water evaporated more rapidly from a pan having a positive electric charge than from one having a negative charge. Moisture was carried from positive to negative areas with a speed greater than the rate of diffusion. Oppositely-charged moisture particles formed mist and rain where they met. A volume of air expanded when charged electrostatically, producing a region of low barometric pressure, while between such regions would be a high-pressure area. The rotation of a body (orange or earth) in a magnetic field (such as the sun's) generated static electricity, thus accounting for atmospheric electricity. This static electricity would be unequally distributed because of differences in temperature, moisture, dust, and other factors.

While at Germantown, Gates had invented means for vertical flight, and had later improved on it. For Professor Hazen he flew a small model vertically high in the sky; 11 miles was recorded, although he stated it as 7 1/2. Hazen wrote exuberantly:

Gates—I am dizzy with joy. That was great—11 miles. Won't the old Weather Bureau crowd be green with envy when they hear!! I have found the Gates to Meteorology. It does my old heart good. Be out tomorrow, fix it up at my expense and bring down some of that eleven-mile air.

Yours, HAZEN.

This model was similar to the self-propelled missile that Gates in one test flew horizontally one mile in 6.5 seconds (553 m.p.h.).

In 1904, Gates considered making a practical flying machine to enter the contest sponsored by the St. Louis Exposition, which announced a prize of \$200,000 for an airplane making the best speed (at least 18 3/4 m.p.h.) over a ten-mile circuit three times around three marking balloons on a right-angled course. These modest requirements seem historically strange now, especially

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the odd speed (reduced from a slightly higher earlier figure). The prize was reduced, then dropped entirely, so Gates never undertook the project.

Gates was interested that his mind also entered the domain of Astronomy during this period, experimentally demonstrating principles that the earth would be made to revolve about its axis around the sun by the greater resistance of the half of the earth nearest the lines of magnetic force from the sun. The earth, being not completely transparent to magnetism, that half opposite the sun would meet with less resistance and thus cause the earth to revolve precisely as it does. It was also shown that the revolution of the sun's magnetic field would give the earth an orbital velocity and in precisely the same direction as it is revolving. This was done in nine weeks.

A proposed Department Y had for its purpose an experimental investigation of those mental powers most recently dawning, of those phenomena that are discernible when any mental faculty is trained beyond certain usual limits, and of the so-called psychic phenomena. Dirigation to sensory centers in the brain produces, after a time, "images" of dreamlike vividness, and if continued these become phantasms that are mistaken for realities (as described in Chapter 7). Visual, auditory, tangial and other phantasms may be thus produced, and if the investigator has not experienced and learned to identify them, he cannot safely undertake a subjective investigation of psychic phenomena nor correctly interpret them in others. This is one of many ways that psychurgic training is applicable. In the investigation of "physical

phenomena" of occultism, magianism, and spiritism Gates devised many methods and special instruments that made trickery and fraud practically impossible. In one method the investigator is trained to see in such complete darkness that the medium believes he cannot be seen; electric and photic devices automatically record every movement of the subject. If after removing all kinds of physical deception there were any phenomena remaining, they should belong to the mental realm and could be investigated. One of many devices was the Unknown Objects Room, in which

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an unknown number of unknown objects were put in a closed room. Mediums were invited to allow their controls to describe the contents; psychometrists, clairvoyants, intuitive persons, mystics, and occultists were invited, and for several years their answers were recorded. The room was then opened, and facts were compared with answers. An object wrapped in felt was hermetically sealed in an opaque glass tube and went the rounds of the world and hundreds tried to tell what was inside. A slate and pencil were also enclosed the same way and sent to slate-writing mediums. Although some mediums claimed that "spirits" could write on the slate, it came back blank. Gates wrote to an associate that in his Chevy Chasse darkroom over a thousand mediums and such people had been tested, and he was sure they were glad his results had not been reported. But, he pointed out, besides methods of "psychic research" there were other and much more important methods revealed by psychurgy, from a wholly new standpoint and by wholly new experimental methods of this department, which he later called Cognobiotics. Pearlie Edson was named director and custodian of its records and manuscripts.

A department of Thermodynamics was proposed. Gates made one application of the art of discovering to that branch of physics relating to heat. This resulted in the heated oxygen jet for quickly melting and cutting metals and the superheated hydrogen jet for autogenous welding and non-contaminative casting (in his use, he later noted, five years before patented elsewhere); a melted-metallic-filament electric light; a method of increasing the highest temperatures otherwise producible, giving methods of casting and purifying metals, making glass and baking china or porcelains, reducing ores, and nodulizing fines; the inverted-dome smelter; a fusible slag; reducing titaniferous ores.

Various other departments were proposed, such as Electrical Separation, Mining, Optics and Photography, Cooling and Heating, Ordnance and War, Production and Transmission of Energy; but the one especially dear to Gates' heart was Acoustics and Music.

Since at that time acoustics was the most clearly demarcated

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branch of physics, Gates selected it to study how the mind learned a science, and worked it over many times. A later phase of his work was conducted in the specially constructed Music Hall of his Chevy Chase laboratories. The first notice of his work in this field appeared in the press during the spring of 1899, as in the Boston Evening Transcript for April 22: "Marvels of Science; Wonder Work Turned Out by Elmer Gates; New Instruments for Producing Emotional Music—The Psychology of Acoustics," written by the friendly correspondent and frequent visitor to the Gates laboratories, Rene Bache.

Much later, about 1913, Gates wrote in a letter: "Now I do truly believe in these discoveries and inventions as a dawning of a new era in music. I desire that they do not make their first appearance as a mere moneymaking enterprise but under high artistic auspices, clothed in the majesty of their high ideals. I would like the world first to hear the soul-entrancing tones and harmonies and melodies of the new music from the biggest and most expensive and complete exhibition instrument; hear it in a music hall built for the purpose, in a music-loving city whose emotionally-ready people have the artistic instincts to appreciate it, and perhaps also to see its profound religious meanings."

He invented a new way to make musical tones for a keyed instrument without wires, reeds, pipes, strings, or other usual means—one that cannot get out of tune, and in which a great number of instruments can be combined into one. He also invented the important method of making pure tones. He was unable to find in any musical instrument a single note that did not contain at least two overtones that were mutually discordant; and when these overtones were prevented, a tone was produced of extraordinary beauty and inward "grip"— "the tone that will be heard around the world and make all listeners happier." He found the pure tone "ravishing; it subdues and thrills the inner, introspective subconscious nature." It produced a pure tone-feeling (which he called tonesis) that is not experienced if discords are present; likewise a melody of pure tones will produce a

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pure melody-feeling (melodesis), both being different from emotion. The difference between musical feeling (mousikesis, which comprises tonesis, harmonesis, melodesis, rhythmesis and such), and emotion was arrived at by his psychophysical studies. A pure tone cannot be described; it must be heard.

Gates also discovered methods to vary at will the tone-quality of any note or all notes at once, making all sad and mournful for a

sad piece, so that the tonesis and harmonesis and melodesis may accentuate it, or likewise making all notes cheerful and gay, and so on throughout the range of mousikesic experience. (At present, as is well known, the quality of all tones of an instrument, such as the piano, is fixed.) These pure tones, in which each one of the overtones can be varied to change the feeling-quality tonesis, were indescribably beautiful; the "hearing of them will be a revelation," he exclaimed; and when once heard—even a single note, but preferably at least an octave, to thus hear the tonic and subdominant chords—it "will be realized that the Gospel of Music has been revealed."

He also developed an overtone music, a true and complete musical scale, and new methods for the psychophysical measuring and training of professional musicians and singers. Of this overtone music he wrote:

"I remember the first time I heard a musical note; it was an old form of piano called a melodeon. I struck a bunch of keys and the reverberations, as they died away, almost made me swoon with emotion (but the feeling was more than mousikesis). It touched the inner world through introspection more than melody and rhythm or harmony, and out of it came the invention of my introspective overtone music, the effect of which is, more truly than any other music, to 'call the past out of the grave and the future out of its cradle and make the present one sweet eternity.'

"Music is something more than an esthetic and esthetic art," he wrote elsewhere, "something more than an individual predilection or social tool: it is fundamentally also a mode of *religious expression*. It stands apart from all evanescent beliefs and

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theories like a beacon in the upper clear-air purity of its own eternal Heights. It normalizes all the feelings and emotions and aspirations while its divine Light illuminates, shining straight into the heart of mankind. . . . The words of a song may utter falsehood and cruelty, but the tone and melody will instill truth and kindness. Music speaks a universal language. Its inward meanings cannot be side-tracked and perverted by any use made of it; it assumes a deep religious mood towards that which is eternally The Highest and not merely towards the particular God-belief of any age. It excites transports of religious exaltations that are independent of any of the transitory theologies with whose rituals it may at any time be yoked. But the musical feelings have been simply growing dearer and deeper and not changing like the myths and teachings, for the joy that music gives comes from the Depths and the Heights of the eternal nature of Consciousness.

"These musical discoveries have given me great joy—and they will bring nothing but joy and beauty to the world. They open a new era in the history of music. It will enter upon a new and greater career; its beauty will be augmented and its influence be more profoundly felt in the deeps of human nature; its social power will be increased, and its message to the world made more important and far-reaching."

He considered his main contribution to the science and art of music, as to all departments, the application of the arts of discovery, validation, invention, and doing creative work, which comprise what he named heurotechny. He had great hopes for this department of Acoustics and Music. Its main mentative assets were kept secret, its inventions not included in the mortgaged list; but before leaving Chevy Chase, he realized with regret that he probably would not have time for its further development.

As late as 1920, Vladimir Karapetoff, consulting engineer in acoustics and electrical engineering and professor of electrical engineering at Cornell University, heard of Gates' work in certain problems of acoustics and music, and after meeting him in New York,

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wrote: "I cannot tell you how much I appreciated meeting you, and having the privilege of listening to your description of your various inventions, and your observations upon the workings of the human mind. The influence of such a meeting is always far reaching for me, in that it adds courage and inspiration to work on bigger things, and let smaller things in life go."

It was at Chevy Chase that many psychologic discoveries were made or further developed, as in volitional training, the volitional factor of conation and the conscious factor of volition, as well as in teleotaxis, which is the grouping into one unit—one mental integrant—of all the mental states and acts that are made in carrying out a given purpose. In judgment-training Gates discovered principles and methods to test and train pupils in the sanity and skill of judgment in practical affairs; it was not so much lack of ability as of training under conditions when the judgment could be verified. He proved by experiment that when a person has the opportunity to verify his judgments accurately, he soon learns to judge accurately. If he is shown a hundred successive persons known to the teacher to be perverts, thieves, liars, tubercular, truthful, so that his judgments may be verified immediately, he soon learns to make almost no mistakes. But if he never learns the differences, his judgment remains faulty. That such a training exceeded in practical value all others, Gates stood ready to demonstrate. Also he found judgment of values to be

rarely sane, being generally based on some wholly fictitious and useless ends, especially social judgments. Then again, a judgment is rarely based on weighing all evidence, but usually on prejudgment and prejudice, or on some temporary and unimportant emotion, mood, or caprice. That a habit can be formed by a course of mind-training to remedy this situation, he was also prepared to demonstrate.

It was at Chevy Chase that the principles and methods of auturgy were further developed, auturgic validation discovered, and sociurgy outlined. Three of the new methods of introspection were discovered and their states and processes formulated, and the method of introspective validation was developed and

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tested—so new that it would be understood only by students who learned it.

Gates made investigations relating to Ontogeny and Auturgy. All his life he kept a careful diary, but from 1894 to 1908 he gave it much more attention, keeping the "Introspective Diary" in order to have a full record of both inner and outer series of events so that he might study his life as a whole—as one individual among a society of individuals, one of the creatures of the Cosmos. He thus hoped to learn to what extent his *ontogeny passively repeated phylogeny* and to what extent it could be modified by his initiative. His daily record was turned into a new line of psychologic research.

This study of successive periods and phases of development in light of ontogeny and auturgy, and of events he could control and could not, enabled him to reach important convictions of a practical character regarding Fate and Free Will, expressed in some of his writings.

This "Introspective Diary" was voluminous; for that reason he would summarize and generalize it every so often to keep it within bounds. In it he saw himself as a third person, beholding the stream of his inner life mingling with that of the outer series of events; and by studying successes and failures long after their practical excitations had passed he could see opportunities lost and dangers that might have been avoided. He profited thereby; but not conspicuously, he noted, in what the world calls material or social success. He was striving for another kind: to make discoveries and know reality. His whole life was planned accordingly, and its ups and downs were studied with reference to that aim.

In this "Introspective Diary," he emphasized, were truthfully recorded his secret moods and motives; all judgments regarding opportunities and plans and dangers; all those indefinite intuitions,

promptings of the feelings, urgings of the emotions, premonitions, and such, so that he might judge their value in the light of after-related events. He also practiced utterly random improvisation, proving that much of the richest fruitage of his

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mind would have been lost without this freedom of expression through all the mind's faculties and upon all subjects under all emotive dominancies. While he found direct evidence that his emotions, conations, and subconscious processes, like his cognitions, were causatively related to the Cosmic Reality, there was also evidence that this series of motions and processes could be directed through the initiative of a new idea being born into the world, thus setting up a different series of conations and physical motions than otherwise. If the new ideas were true, the trains of consequences thus started would be desirable, while if they were untrue, results of conduct based on them would be bad. Hence to know the truth, and all of it possible, became a duty. Truth is consonant with reality. He could voluntarily decide upon mentation upon any subject and thus bring into the world a new initiative according to which conduct could be willed. This telic and alethic auturgy represents the highest ideal of conduct. Through it man becomes emancipated from Fate and largely makes his own history, he optimistically concluded.

In this diary Gates recorded not only outer events beyond his control but events resulting from his plans. He also recorded all changes in his tastes, abilities, beliefs, moral and ethical and philosophical convictions, joys and sorrows, and especially all promptings of that cumulative desire for a closer contact with the non-individual and cosmic factors in his life and mind. He recorded the exact dates and places and conditions under which he attained hundreds of new and true ideas. He made a number of important discoveries about the nature and tendencies of his own character, abilities, and limitations, some being of general application. This record by which the spontaneous development of inherited social tendencies was controlled with events due to his initiative was a unique study of a life, here and now, in its personal, social, and cosmic relations.

Perhaps the fundamental idea was the study of those factors that were outside and underneath all his plans, so that he could catch, if possible, a glimpse of their trend. Humanity is part of a greater Cosmic Process in whose current it passively drifts.

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And so with the individual: only a small part of its course is the outcome of voluntarily planned effort. This greater life of the

Cosmos, this Tao, expresses itself in its own way, not only in the outer series of events of the environment but also in the subconscious and conscious inner life, Gates pointed out in his "Synopsis of 1900." His diary was an attempt to gather data indicative of the trend and character of that non-individual and cosmic process in him and outside him; and to discover what practical relations he might have to *it*. He noted interesting progress; he had satisfied himself that his life had its destiny pretty well marked out by conditions and processes outside his control; but within that orbit there was ample room for voluntary and initiative effort. "Whether it be a reversion to phylogenetic instincts or a growth towards something to which the human race is just attaining, I know not; but this I know, that this practice tends to strengthen my religious nature," he wrote.

But one of the best results of his researches was the discovery and formulation of the science of Consciousness, which he called cognostics, a science more fundamental than the psychology that had been known, dealing with the nature, laws, and activities of the very Consciousness that forms the basis of conscious states and out of which they arise. This consciousness of Consciousness, called cognition, underlies the mental states and operations as the stream underlies the bubbles and waves on its surface. Cognition is more fundamental than sensory perception or inductive and deductive reasoning, and out of it has arisen a wholly new science whose data have been derived by a more direct and immediate kind of knowing. Its data are known absolutely and not relatively and therefore are a *criterion of truth* that is infallible in those domains to which it applies and thereby establishes data that are applicable to all domains. The art of discovery applied to epistemology led to this standard of knowledge, a fundamental basis of truth; and out of it, in connection with other principles of psychurgy, Gates evolved at Chevy Chase the scientific art of *validating knowledge*, the most important of the various arts comprising psychurgy. He considered cognostics and

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the art of validation the crowning achievements of psychurgy!

In working out an exposition of cognostics and validation he had to invent a systematic terminology for psychology, a special system of nomenclature for psychurgy, and symbols, signs, and formulas for both. He found, according to his report, the terminology of psychology "in a chaos and utterly inadequate"; not only were terms insufficient but those given in dictionaries and textbooks were vaguely defined. For psychurgy, and especially for cognostics, he devised an entirely new set of terms. He began by giving a separate name and symbol to each distinct kind of

conscious state and each process of states (some several hundred), and to each kind of mental operation he gave a sign. In this way he could indicate, somewhat as in an algebraic formula, the relation, interactions, mutual modifications, and products of the states, processes, and operations. The truth of any formula, having once been established by cognostics and validation, made it possible to derive corollaries that might otherwise remain unknown. And these formulas could then be used as instruments of investigation. In many respects this could be considered the application of mathematics to psychology—"an algebra of the conscious processes." Without these symbols, signs, and formulas cognostics would be obscure, and the psycho-technical methods of mind training and discovering and validating would be almost impractical. "To the student who masters these subjects it will some day be of historical interest that they were discovered and worked out at Chevy Chase."

It was at Chevy Chase, the report continued, that Gates applied the art of discovering to philosophy and was led to discover and formulate the psychurgic method of philosophy. He then applied this method to ontology, and he was led to identify and classify and define fully the various *kinds* of Being, "thus lighting up the jungle of ontological conceptions and definitions in which philosophy has been hopelessly lost."

It was at Chevy Chase that he applied these methods and the psychurgic method of science to the problem of cosmic causality and energy, and thereby identified a new *kind* of energy

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that is the basis of the causal connection between Consciousness and physics.

One aspect of his philosophical point of view is expressed in a letter to his friend, the Reverend Oliver H. P. Smith, written February 18, 1902, some of the first part of which follows:

"My liking for and leaning towards philosophy has always been so strong that it delights me to meet a man who can induce me to occasionally break away from the rigid barriers of inductive research and give free play to hypotheses regarding Matter, Motion, and Mind—their noumenal cause, origin, destiny. My training, and especially my psychurgic work, has rendered me suspicious of all metaphysical aphorisms and epistemological dicta, and I studiously avoid all influence of theory while engaged in mentation for discovery and invention. But when the serious work of the day or week has temporarily ended, I delight to commune with the Idealists, occultists, mystics, and philosophers, for I always find that, whilst their premises and conclusions are

often wrong, their *insight* is nearly always *upward* and in the right direction.

"Research requires that I deal with only unquestionable facts, and therefore, when my investigations have ended for a time, I all the more delight to play truant to the rules of a posteriori empiricism and meditatively brood upon a priori principles and necessary truths, that *seem* to constitute the character and destiny of phenomena. But, my friend and brother, I am not attacking philosophy in general or metaphysics in particular, for I have ventured to hope that my forthcoming books will reveal a new and practical basis for *experimental* (!) metaphysics—shall I say it?—an *inductive* basis! I think I have demonstrated it inductively and convincingly but do not mean I have proved all or any considerable part of the statements of metaphysicians to be true. I cannot describe in a letter what requires a book but I can hint at a few phases as follows:

"Psychology is the science of the mind and its experiences. A synthesis of its six kinds of experiences constitutes the only

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true interpretation of the universe possible to us. To the extent that this is not based on the facts of these experiences, to that extent it will be a false philosophy. . . . I am re-observing the phenomena of the sciences according to the psychologic principles of the art of using the mind, so my understanding of the universe, as far as my knowledge goes, will not be corrupted and vitiated by theory and hypothesis.

"Now, where is there room for the a priori and metaphysics? I reply: in auturgic introspection, where the mind may have experience with itself. The investigator will discover that the mind has a certain *nature*; and that each intellective, emotive, and volitional state has its own *natural history*; and he will learn to know himself. Such knowledge is of utmost value—it is all inductive. Such experiences will differ in individuals, according to their mental degree of evolutionary development, skill, and knowledge content. But there is still another line of introspective investigation, based on the demonstrable fact that you may not only introspect your conscious states as they arise, but that you may become AWARE of these introspections; that is, the mind has its own inherent, immanent, cosmic nature of which you may become directly and *immediately* (not mediately) aware, and this IMMANENT and *essential* nature of mind conditions all its experience-content, and in becoming introspectively aware of that *immanent* nature of that Cosmic Process called your mind, you are acquiring in the strictest sense of the word *inductive* data. And what you inductively find to be the essential nature of

Consciousness, and of your Awareness of that Consciousness, constitutes the inductive basis of metaphysics! Do you see it? If you don't, call at Chevy Chase some day. Your mind is as surely a cosmic process as the formation of a planet or the evolution of life. Your mind is the *Universe-hood* in you: it is the Eternal Process at work in you, and in studying it introspectively you are studying it *inductively*. It is as much an inductive experience to become aware of an introspective state as it is to become conscious of the pain from a bee-sting, or the color of a flower. It

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is as truly an inductive datum to become aware of the immanent nature of Consciousness as it is to know how it feels to put your hand in the fire.

"Now, that which is an unchangeable characteristic of the Awareness is that which underlies all knowledges—creates and conditions them—and a collection of such introspective data is a collection of inductive data, and is just as capable of being *experimentally verified, classified, and generalized* as are the data of acoustics or psychophysics; and the result of such study of the Awareness is a metaphysic. I am sorry to be so brief; suffice it to say, there can be no other metaphysics"

Mr. Smith, a Methodist minister connected with the Waseca (Minnesota) Assembly School of Christian Sociology, carried on an extended correspondence with Gates during the years 1895-1902, writing philosophical thought "of a high order." On one of Smith's letters Gates had annotated, "This man is a thinker!" Mr. Smith desired to come to Washington and be the mouthpiece for researches of the Elmer Gates Laboratories, especially in religious applications, but he never came. Later, in 1911, he suffered a nervous breakdown (dying the next year), and Gates wrote to him in appreciation partly as follows:

"I esteem you as a close friend, inwardly granting you the privileges of a close friend although I have never seen you. I am glad such things can be. I have never tried to analyze why you thus affected me from the first; why there was room for you in my inner life, while for so many others who sought it, I could not grant what I gave you without the asking."

For over fourteen years, it required persistent and almost unremitting attention by Elmer Gates to comprehend the broad new subject of cognostics and to expound it so that he might hope to be understood. From the new cognostic standpoint he had to reconsider the whole of psychurgy and the art of validation, reconstruct the system of classification, and retrain his mind according to the new methods.

Cognostics gives conclusive proof that in a somewhat similar way to chemical combination, when one conscious state is simultaneously

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present in consciousness with another conscious state, they will unite, if the proper mental processes are applied, and produce a new mental integrant. These conscious states—each having different properties, qualities, and cognitive values—unite through the influence of the cosmically constituted natures that underlie them and according to conscious, subconscious, and cosmic processes. The resultant mental integrant is a new kind of conscious state, having properties, qualities, and cognitive values that differ from those of the original states. When the right kinds of states are thus allowed to act upon each other in the right way according to the psychurgic art, the result is new knowledge.

Cognostics! That new knowledge of Consciousness was fulfilling the promise of Gates' researches and hopes—was fulfilling his life!

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