GLIMPSES

OF AN

IMPROVED MEDICAL PHILOSOPHY.

BY EDWARD KING,

SURGEON, &c.

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Dedicated respectfully to the Governor and Regents of the Smithsonian Institute, at the City of Washington, in the District of Columbia; because they, the said Governor and Regents, to promote the glorious intentions of the noble-minded founder of that splendid Institution, are required, by honor and duty, to foster efforts like these "GLIMPSES OF AN IMPROVED MEDICAL PHILOSOPHY,"

By their very obedient and humble servant,

EDWARD KING.

Betaville, Prince William Co., Va.

GLIMPSES OF AN IMPROVED MEDICAL PHILOSOPHY.

GLIMPSE THE FIRST—BY WAY OF PREFACE.

1. The following work, GLIMPSES OF AN IMPROVED MEDICAL PHILOSOPHY, is not published under an impression that it will meet with much favor from either the literary, philosophical, or medical world: it is more likely to meet just a contrary reception. I am well aware that the rules of inductive philosophy are most unmercifully violated; and that received doctrines, sanctioned by the very highest authority, are very strangely disregarded: but the case requires all this. To unlearn is more difficult, in many instances, than to learn; and in proportion as error is supported by high authority, the less willing will be those who have labored zealously to acquire those erroneous notions, to canvass the plausibility of contrary opinions.

2. The expectations of the author are, first, that some stray copy will be found on the book-shelf of some bibliopolist, fifty or a hundred years hence; secondly, that by that time the discoveries of experimentalists will so far have demonstrated most of the positions herein advocated, that this essay will be read with as much satisfaction then, as now it will be likely to be condemned; and thirdly, that its publication now, will induce the reflective few, even in the present day, to ask themselves the question—*does or does not frigoric exist as the antagonist of caloric*, and exercise an universal co-agency in the governance of physical, physiological and vital phenomena?

3. Modern philosophy only reluctantly tolerates the existence of caloric; and when its existence is allowed, endows it with an atomic character that requires a still more subtil elementary ether to occupy its interstitial spaces; and bestows upon it, (as well as upon light, magnetic, electric, &c. fluids,) such self-repulsion as would, if it actually existed, burst an adamant bound universe. Philosophy has probably been driven into this unfavorable position from over-looking the co-existence and co-agency of frigoric.

4. I take caloric and frigoric as my Pegasus and Rosinante, and the nuclei of a brace of interchained calorific and frigorific moleculæ as my phæton, and yoke them altogether by initial and molecular attractions, upheld by sense, and scamper through nature, physical, physiological and vital. When I regard prismatic colors as a result of impulses, of variable intensity, propagated simultaneously through interstitial caloric and frigoric, and remember at the same time that the fixed stars are some of them of different colors, the inference arises that some knowledge of the constitution of their atmospheres may be attained some day, which may show, that, although in the atmosphere of the sun and his planets, caloric predominates, and bestows specific characteristics upon terrestrial phenomena; yet, nevertheless, in the atmospheres of some of the fixed stars, frigoric may predominate, and be the instrument of fusion, fluidity, vaporization, &c., as caloric is here. In this matter, my brace of fiery steeds evince a disposition to plunge, and dart out of the solar system; they would feign clatter among the fixed stars, spatter through the lactiferous mud of the milky way, and kick up a dust among the most remote telescopic nebulosities; but I shall curb "my bits o' blood," and keep them within the solar system, and chiefly upon mother earth, among physical, physiological and vital phenomena, giving them occasionally a gallop up and down the nervous fibrillæ of some fat Alderman or fever patient.

5. When I speak so unhesitatingly as I deem it expedient to do of the changes which take place in the atmospheres of compound calorific and frigorific moleculæ, to account for magnetic, electric, galvanic, and other phenomena, to exhibit the habits of sensitive stimuli, and the motions of the arterial and neural aura in phenomena of vitality, and the results of initial attraction of elementary nuclei too minute to be recognized by the most powerful microscope that was ever manufactured, I desire it to be distinctly understood, that I rely upon no microscope but a mental one—the identical instrument with which, of yore, St. Anthony detected nine hundred and ninety-nine thousand devils, at their frolics and gambols, upon the point of a needle.

6. My excuse or apology for issuing such a publication as this must necessarily be, in its present state, is as follows:—Ever since 1811, now nearly forty years, when I published in the old Monthly Magazine, my first ideas on the nature of cold, I have been nestling this subject, and waiting with the hope that the rapid progress of scientific discovery by experimentalists, would soon enable me to bring forward my favorite views more in accordance with the rules of inductive philosophy; but old age and death seem likely to do their work upon me before I shall be able to gratify my expectations. I venture, therefore, to throw together these *Glimpses of an Improved Medical Philosophy*, trusting that some more competent mind may catch up the same ideas, and do better justice to this truly important subject. Some younger Æsculapius, with a Faraday-like mind, would, or might thus do more to advance medical philosophy, which has long been so nearly at a stand-still, that it seems to lag behind other sciences in these days of progress, than has ever been done since the days of Hippocrates. Such a mind pursuing this subject, like a thorough bred hound, when he has once got scent of the game, might run it through whole thickets of physical and physiological phenomena, and through every lane of life; for even I, who account myself but a mongrel among the pack of thorough bred philosophers, can plainly recognize a right glorious and most splendid prospect into regions of science which have never yet been rightly penetrated by the mind of man.

7. In the next Glimpse, which I intend by way of introduction, I shall give an epitomized view of many of the novel assumptions admitted throughout this essay; and therefore the reader will say that they ought to have formed the recapitulation rather than the introduction. But the reason for thus placing the carriage before the horses, is the following, which may or may not be esteemed valid, according to the bias of the reader. Every part of nature has a certain harmonious relation to every other part—for all nature is but one whole system—or every part must be in keeping with the rest; and therefore in speaking of matters which will be noticed in some of the earliest paragraphs, references which are too original to be readily appreciated, will necessarily lie against those opinions which will have to be taken up further towards the end. But those views which can be broached near the beginning, and those near the end, are so alien to the doctrines of the present day, that without this introduction, the reader would not easily discover their relations to each other; and thus each novel view would require a long bit-by-bit introduction, to the great waste of ink, paper and time; therefore, to supersede these inconveniences, this introduction is requisite to afford him such prior glimpses of the views generally, as may enable him to recognize the relations of one to another, when each comes again under notice.

GLIMPSE THE SECOND—BY WAY OF INTRODUCTION.

8. *Time, space and sense*, are three immaterials; they are co-existent, co-infinite, form a triune, and are attributes of deity.

9. *Sense infinite*, existing exteriorly to man, bestows *Initial attraction* upon the nuclei of moleculæ; and it is thus the parent and governor of all force. It perceives, very variously, every impulse from physical and vital forces acting against, or in opposition to, initial attraction.—Scriptural theology dovetails with medical philosophy at this point.

10. *Caloric, frigoric and the nuclei of moleculæ*, are the physical elements of matter: they need not necessarily be the chemical elements of matter.

11. Caloric and frigoric are alike fluent and continuous; and in virtue of their continuity, each is absolutely incompressible. When compressed by attraction they mutually displace each other from any point of space. They are alike perfectly passive: they neither attract nor repel each other; but each moves, with a facility that surpasses all other motion, as it is moved by the other, and by the nuclei of moleculæ, when under compression. They permeate all matter; and, in conjunction with the nuclei of moleculæ, fill space universal. There exists no subtile ether so perfectly elementary as caloric and frigoric. They are alike imponderable and without buoyancy; nevertheless, when they are moved together in the same direction by any impulse, caloric tends centrifugally, frigoric centripetally—caloric is refracted to the perpendicular less freely than frigoric on passing from a rarer to a denser medium, *et vice versa*, throughout this planet. They each act upon sense, but dissimilarly, so as to create sensations, when impressed by force or conveying an impulse.—The laws of temperature as the stimulus of feeling, and of light as the stimulus of seeing, dovetail with medical philosophy at this point.

12. *The nuclei of moleculæ* are infinitely small, hard, sphericle particles: they may vary in magnitude, or they may be all of the same magnitude; they may differ, *per se*, in quality, as the chemical elements of matter seem to indicate, or they may be of one quality only, so far as physical and vital phenomena are implicated.—They have gravity; but only in virtue of the initial attraction with which each nucleus is endowed.—Physical science, broad as is its abutment against medical philosophy, hangs to it by this small hinge.

13. By sense the nuclei of moleculæ are endowed with attraction: those having atmospheres of caloric attract one another; and those having atmospheres of frigoric attract one another. This attraction is the elementary force of nature, and it is therefore herein called *Initial attraction*. *Molecular* attraction is an aggregation of many initial attractions: that of the central nucleus of a compound molecule added to those of other nuclei retained in its atmosphere. Every variety of physical force throughout the universe is derived from initial attraction: there exists *no* repulsion, except as a secondary force, derivative from initial attraction.—Mechanics, as a science, dovetails with medical philosophy at this point.

14. *A simple calorific molecule* consists of a nucleus and an atmosphere of pure caloric. These simple moleculæ dwell chiefly latent in the atmospheres of compound calorific moleculæ, being held to their central nuclei by initial attraction, as in oxygen. In blood globules they constitute the arterial aura, confined in arterial tubes. Free or active, that is, not being fixed deep in the atmospheres of interchained compound moleculæ, but only more or less loosely retained at and about the circumference of those atmospheres, they constitute the positive or vitreous electric, magnetic, galvanic, &c. fluids.

15. *A simple frigorific molecule* consists of a nucleus and an atmosphere of pure frigoric. Simple frigorific moleculæ dwell chiefly latent in the atmospheres of compound frigorific moleculæ, being held to their central nuclei by initial attraction, as in hydrogen. Confined in tubes, as in tubular neurine, they constitute the neural aura or nervous fluid. Free or active they constitute the negative or resinous electric, magnetic, galvanic, &c. fluid.—It is almost superfluous to state that, as branches of medical philosophy, galvanism, electricity, magnetism, and the circulation of the neural aura and arterial aura, diverge at this point from the main stem; but their twigs intertwine continually.

16. *A compound molecule*, whether it be calorific or frigorific, has a central nucleus and an atmosphere of caloric or frigoric respectively, in which are fixed or rendered latent by initial attraction, many other moleculæ; each atmospherical molecule being *always of the same family* as its central nucleus respectively. A calorific molecule cannot enter a frigorific atmosphere; nor a frigorific molecule a calorific atmosphere. Caloric and frigoric are always pure; and when two moleculæ unite, the interstitial caloric or frigoric, as the case may be, of their atmospheres, blends and becomes one and the same. The nucleus of a simple molecule being within the sphere of attraction of a compound molecule of the same family, or situated any where within the circumference of its atmosphere, will be elicited by initial attraction, and will fall or gravitate towards the central nucleus of the compound molecule. Thus, if it be elicited towards the centre with a force equal to two, and towards the circumference with a force equal to one, it will tend towards the centre with an energy equal to one; and it will move towards the central nucleus as deeply as it can find admission between other atmospherical nuclei. Solution, absorption and saturation, in chemical science, are instances in point. If the nucleus of a simple molecule be situated at the circumference of the atmosphere of a compound molecule of the same family, and cannot find admission, it will still be loosely retained at the circumference by its initial attraction acting generally upon the atmospherical nuclei and central nucleus of the compound molecule; but it will be in a condition in which it constitutes an electrical atmosphere; and it will be ready to be extruded, just as swift as lightning, by the attractions of the interchained moleculæ which surround the spot, if it can find a point for exit, as between two surfaces of atmospheric air and a metallic conductor. When two compound moleculæ of the same family come within the sphere of each other's attraction, if they be hindered from running together into one another, blending and becoming one, as is their case in their interchained condition as they constitute water and other matter, the density of attracting points will increase in *two* directions—from the circumference of their atmospheres at their point of junction towards the central nucleus of each; and the energy of the resulting force will be as the density of attracting points increases in the *two* directions. This is the variety of molecular attraction of which chemistry and natural philosophy take cognizance. When vast lots of compound moleculæ, of both families, are congregated, so that their attractions of this kind are aggregated into one force, it becomes the force called gravity in physical astronomy.

17. Compound moleculæ, both calorific and frigorific, are *binary, ternary, quaternary, quinary*, &c., to an extent at present unknown. The atmosphere of a compound molecule may be occupied at the same time by simple or binary or ternary, &c. moleculæ: but these *planetary* nuclei, as well as their *satellitic* nuclei, must always have atmospheres of the *same family kind*, whether it be calorific or frigorific, as the *solar or central* nucleus. The solar system is suitably referred to, not because the atmosphe-

rical nuclei of a compound molecule are presumed to revolve around the central nucleus and one another, as planetary bodies revolve around the sun, and their satellites around them; but because the solar system is a true type of a compound molecule of the very highest order, within the scope of human intellect. It is a complex, as well as a compound, molecule; having in its atmosphere masses of aggregated compound calorific and frigorific moleculæ. Although it is an exceedingly sublime complex compound molecule, consisting of aggragated masses, having their own regulated motions, so as to present to human understanding the very highest order of contrivance for molecular existence, yet in reference to the whole universe, it may constitute only one of many, interchained by attraction, to constitute a molecule including all the fixed stars—and even this may be a gradation to many higher orders—to occupy the plenum of the universe.—But Peg. and Rosa. may not bolt beyond telescopic range.

18 The nuclei of two compound moleculæ of the same family, when their atmospheres meet and blend, attract one another; and they would run into one another, blend their atmospheres, and become one molecule of greater magnitude, but, as they exist in matter, they are hindered from so doing by compound moleculæ of the other family, of which the atmospheres meet *interveniently*. The two pairs are thus *interlocked* or *interchained*, in such manner that as the nuclei of the pair of compound calorific moleculæ approximate, those of the pair of interchained compound frigorific moleculæ must necessarily recede, *et vice versa*. *By this interchainment* of the constituent moleculæ of matter, the calorific and frigorific *become antagonistical* the one to the other; and in proportion as either is better or worse supported, or propped up, by the caloric or frigoric intruded into its atmosphere by the surrounding media, it predominates over, or yields to, its antagonist. If the atmospheres of either pair, or both pairs, receive an accession of atmospherical moleculæ, by solution and absorption, the energy of the attractions between either or both pairs will be modified; and the character of the matter which they constitute, will undergo mutation, generally such as cannot be anticipated, *a priori*. Innumerable physical and chemical, as well as many vital phenomena, result from this arrangement of the constituent moleculæ of matter. Some of them have been regarded as repulsion, as in the distribution of caloric, magnetic, electric, galvanic, &c., repulsion, the radiation of light, &c. The last is the squittation of an impulse, resulting from the incompressibility and extreme mobility of interstitial caloric and frigoric, acted upon by the indescribably beautiful elastic spring maintained by the two attractions in antagonism.

19. Each compound molecule, of either family, as it exists in homogeneous matter—we will say in water that has been distilled and boiled, and at the temperature of 42 deg. F., under ordinary pressure, has six points of communication and attraction with others of its own family immediately circumjacent. Four of these points form a first series, in, we may assume, a horizontal plane; and two will form a second series exactly vertical. The lines of direction of the several points of communication, in both series, will radiate from the central nucleus equidistant, and they will continue equidistant within the atmosphere of their own nucleus, so far as that atmosphere retains its spheroidal character—that is before the atmosphere becomes elongated and rendered oblique, (as it will be liable to be by internal molecular motion within the elongations) at the points of communication with its neighbors.

20. A compound molecule, of either family, can receive into its atmosphere, at any given temperature, only a specific amount of atmospherical nuclei—a glutton can eat only his belly full. And if the surrounding medium force into it more atmospherical nuclei than its normal capacity can receive without change, (whether by elevating or lowering the temperature, by mechanical pressure, by mingling solutions of matter whose constituent moleculæ very readily blend their atmospheres, &c.,) it will undergo change of physical and chemical character. The change may consist, in moleculæ of either family, in an augmentation of volume, or a concentration of the atmospherical nuclei, of their atmospheres; and a corresponding diminution of volume, accompanied by the extrusion of pure caloric or pure frigoric, and occasionally of simple moleculæ of either family, as the case may be, of the interchained antagonistical moleculæ; and the matter which the moleculæ of both families constitute will undergo physical and chemical mutations of character, which only the experimental chemist can know. Chemical phenomena generally, combination in definite proportions, &c., are exemplifications.

21. Inanimate matter, upon which attraction is bestowed, and in which it is upheld, in all its modifications progressively from its initial character, by sense infinite exterior to man, we shall now leave; and proceed to consider *living* matter, in which a modification of molecular attraction in medullary substance or neurine, *a superaddition upheld and modified by finite sense* in the soul, and called the equilibrium of life, will have to be considered.—Pure psychology dovetails with medical philosophy at this point.

22. The soul is a finite portion of the infinite triune constituted of time, space and sense, but during life, insulated from the infinite.

23. The finite is insulated from the infinite, yet each pervades the other, as well as matter, without mutual displacement, in virtue of their immateriality. Thus in the period and place occupied by the soul, there exist two triunes, not a sexune: the whole of a finite triune and a part of the infinite triune.

24. Every thing having life, whether it be man, animal or vegetable, (or even a crystal,) has bestowed upon it exactly the amount of sense which its organisation was designed to wield or educate. In all her works nature shows gradations—sports, as it is sometimes expressed; but in nothing more conspicuously or beautifully than in the gradations of modes of being, including the growth of crystals, plants and animals, up to man; and in every instance every thing leans or depends on, and grows out of, the powers of sense.

25 Infinite sense *bestows and upholds, but it does not modify*, attraction in inanimate matter, and also in animal matter, to maintain its characteristics as matter. Infinite sense could modify attraction, and thereby convert stones into bread, or what not, more readily than the chemist in his laboratory, by modifying the same attraction, effects transmutation; or as readily as the circulating fluids of animals, under established modifications of the same attraction, become bone, tendon, muscle, &c., but it *does not* modify; and if it were to modify attraction in a degree ever so slightly, it would be a divine interposition, and would be regarded as miracle. Finite sense *cannot bestow*—that is done by infinite sense—but *it can uphold and modify* molecular attraction in medullary substance or vesicular neurine; and its power to do so is called *life*.

26 By the exercise of its powers, finite sense can *permit* simple moleculæ, either calorific or frigorific, to become latent in the medullary substance called vesicular neurine. During sleep, simple frigorific moleculæ are permitted to become latent; and simple calorific moleculæ are necessarily developed, and they pass quietly off in venous blood. During volition, simple calorific moleculæ become latent, and simple frigorific moleculæ are developed, and they pass off along the nerves. By another modification of its power, which is called the will, and which I call *the fiat of the soul*, sense can develope or set at

liberty, from their latent state, the simple frigorific moleculæ which have become latent during sleep, at the origin of any nervous fibrillæ which, through the instrumentality of muscular contractions, will affect its designs.

27. For the full integrity of the powers of the soul, it is essential that the constituent moleculæ of vesicular neurine be interchained, and subsist in a somewhat fluid state, as are oxygen and hydrogen in water. Finite sense *presides over this interchainment*, and modifies that amount of attraction which is a superaddition to the attraction which upholds the existence of the same substance as mere matter. The interchained calorific and frigorific moleculæ constituting neurine, are in a state of antagonism, as in other fluid matter; and the fiat of the soul can modify the attraction of those of either family, to give the other a limited predominance. Also the two digestions going on in living beings, give, *physiologically*, a predominance to those of either family to a limited extent: thoracic or pulmonary digestion supports the attraction of those of the calorific family; abdominal or gastric digestion those of the frigorific family. The antagonism of these two attractions in the two kinds of moleculæ, so far as the same is upheld in equilibrio by finite sense is properly enough styled *the equilibrium of life*; and if either of those two attractions predominate beyond a limited extent, the equilibrium of life is destroyed, and the result is death. It should be observed that when a similar equilibrium as it is upheld by infinite sense, in inanimate matter, is modified ever so slightly, (as is often effected in the laboratory of the chemist,) not death nor annihilation, but some new form of matter, is the result.

28. Finite sense not only upholds and modifies that amount of attraction in vesicular neurine which constitutes life, and presides over the interchainment of the constituent moleculæ of the same to maintain the equilibrium of life, and permits simple calorific and simple frigorific moleculæ to become latent in the same, and developes, at will, simple frigorific moleculæ to effect its designs through the instrumentality of muscular contractions, but also *sense feels or perceives*, and feels very variously, elementary force acting against or in opposition to the attraction which it upholds; and the feelings or perceptions thus excited are all called *sensations*. In every instance of sensation, elementary force or impulse, variously modified by the organs of sense, and always acting against the two attractions upheld by finite sense, is the true stimulus. Sense infinite bestows and upholds elementary force; and when that force is propagated to or against sense finite, the latter feels or perceives.

29. Finite sense exercises yet two other powers: cogitation or thinking, out of which grows reason; and pathos or emotion, out of which grow love and hate, joy and grief, &c &c.

30. The phenomena which we have heretofore noticed depend very much upon the constitution of matter. We have now to notice some that depend more upon the constitution of the soul itself. The soul consists of a finite amount of time, space and sense, inseparably united into a finite triune. The primary metaphysical faculties of the soul are, first, *temporability*, having for its base the finite amount of time insulated in the soul, and for its stimulus infinite time existing exteriorly to the soul. Secondly, *mensurability*, having for its base the finite amount of space insulated in the soul, and for its stimulus infinite space existing exteriorly to the soul. And, thirdly, *sensibility*, having for its base the finite amount of sense insulated in the soul, and for its stimulus elementary force, an endowment by infinite sense upon matter.

31. Sensibility has been recognized for ages; but mensurability and temporability have been totally overlooked. By sensibility we recognise the sensitive qualities of things and occurrences: those dependent on sensation, as hardness and softness, roughness and smoothness, &c.; temperature, as hot and cold, &c.; color, as red and blue, &c.; sound, odor, flavor, &c. By mensurability we recognize the relations of the same to space, as shapes, sizes, relative situations, &c. By temporability we recognize the relations of the same to time, as period, now, yesterday and to-morrow, long since, far ahead, before and after, &c.

32 All things and all occurrences occupy portions of infinite time, and of infinite space, and have specific relations, through elementary force, to infinite sense. Infinite time, space and force being the stimuli of soul, (not much unlike as light is the stimulus of vision,) we recognize things and occurrences according to the portions of these which the said things and occurrences occupy, and precisely as they do occupy them, conjointly. Things and occurrences are appropriate only to the *place, period and mode*, according to truth. When, where and how they transpired are, *indelibly* stamped upon these three immaterials, without any possibility of their being changed, to be unavoidably cognizable to the soul after death, for ever and throughout all space. It is an error to suppose that they are stamped upon our soul, or mind, or brain: they are stamped only upon these three immaterials exterior to our souls, yet through the agency of the soul; and the soul can re-recognize the same, when, where and how, only according to their truth. When things and occurrences are re-perceived by memory, we do not find them, nor if we imperfectly remember do we seek them, in any part of the brain, or mind or soul; we find them, and we seek them if needed, at the period, at the place, and conjoined with all collateral sensitive qualities, when, where and how they originally existed and transpired.

33. Emotion the highest power of finite sense in the soul, is nearly independent of the will. The power of beauty, goodness, truth, &c., to kindle love, joy, &c.; and of opposite qualities to kindle hate, grief, &c., the will can only very imperfectly oppose. And moreover man would be unjustifiable if he were to attempt to oppose an influence which it is his duty, as well as his interest, to improve if possible, and at all events to cultivate to the utmost, till earth becomes heaven, and the design of the influence above alluded to be fulfilled.

34. We have taken glimpses of the powers of finite sense in the soul—what may be the powers of infinite sense? The thought is overwhelming! The mortal who can recognize the powers of finite sense, and make a mental transition to the possible powers of infinite sense, and then doubt the superintendence of omniscience as it is revealed in the scriptures, should write himself down—fool and madman.

35. It is not difficult now to understand that the universal triune may and must recognize whatsoever is perceived sensitively, thought intellectually, and felt emotionally, by finite souls. Infinite sense, one of the constituents of the infinite triune, is continuous (one whole) throughout the universe and throughout eternity. *Any moment* of infinite time, another constituent of the same triune, *is as large* as the universe; so that an impression, through the agency of sense, upon any moment, is co-extensive with space in virtue of the unity of the triune. *Any point* of infinite space, another constituent of the same triune, *is as eternal* as time; so that any impression, through the agency of sense, upon any point of space, is eternal in virtue of the perfect unity of the same triune. And in virtue of the motions of planetary bodies, no two impressions upon space can occur upon the same point, any more than they can upon the same moment, so as to interfere each with another; but each impression must remain legibly distinct in every way.

36. A mode of being thus infinite in every way, omniscient to design and omnipotent to execute, has created this universe and all that it inhabit—what for?—ask yourself that question again and again, reader—what for?—Not surely to annoy and torment himself; but in some way to augment his own satisfaction.

"Thou art worthy, O Lord, to receive glory, and honor, and power: for thou hast created all things, and for thy pleasure they are" (subsist) "and were created." Rev. ch. iv, v. 11. Enough, this, for man; here where human powers nearly fail to carry us, revelation begins, and in perfect harmony with human recognition.—To augment the pleasure of Deity, we, and all else, were created and subsist.

37. Man required to be instructed how best to augment the pleasure of Deity; and the commandments, containing perfect principles of human inter-communion, and ending with the eleventh, "to love one another," were divinely promulgated; with further instructions to pray for, and of course to strive for, the conditions (those of angelic nature) upon earth, which appertain in heaven. A hundred scriptural quotations could be given, than which no language could more plainly proclaim that *the duty of of man upon earth is that of bliss-factors*. We are as machines, created for the elimination of pleasures and joys; all of which are to be indelibly inscribed upon the universal triune.

38. Emotion is the highest power of souls; and religion is a code of instructions, given by God, for the cultivation, in a proper way, of emotion, to a climax. Emotional joy is the richest contribution which man can make to the fund of bliss in Deity. It is the express duty of man to elicit, to receive and communicate—to reciprocate—pleasures and joys to a maximum amount—just as we instinctively strive to do for those whom we truly love—to augment the fund of bliss in God; and we shall exult with joy eternally in proportion as we do this, our duty. If, on the contrary, we do evil, that is, decrease, in any way, the fund of bliss in God, our compunction, (when hereafter the stimuli of time, space and sense, acting upon our only faculty akin to memory here below, shall reveal unavoidably to us all our deeds, thoughts, and their tendencies,) will amount to an agony, (called sometimes "the worm that never dies," sometimes "hell fire," sometimes "eternal torment," &c.) which we cannot by any possibility, whatever, evade, mitigate or alter.—And since Christ did all that he did, and died the death that he died, to enable us, (if we would believe and of course obey; for to profess belief, without obeying, is but perpetrating a rank lie to the spirit of truth,) to avoid the above agonies, the consciousness of having desereved all that we may suffer will necessarily and very properly augment our torment—a superaddition of agony, from which the unchristianized portion of mankind will be exempt.

39. Having shown where and how revealed religion and practical Christism dovetail with medical philosophy, we have next to notice *two physiological functions* which are necessary, in one shape or another, to every gradation of life: these are, first, *pulmonary or thoracic digestion;* and, secondly, *gastric or abdominal digestion*.

40. All things that have life have an apparatus of some kind by which to obtain simple calorific moleculæ to vivify their circulating fluids. Man, and very many creatures, have lungs; some creatures, as ordinary fish, have gills; others, as perfect plants, have leaves, and some creatures have still other modifications of this apparatus. But whether this support of life be obtained from air, or water, or any other matter, this apparatus is always adjusted to suit the circumstances of the case.—We can live much longer without food than we can without air; so that whatsoever is acquired by the blood through the function of the lungs, is exceedingly, as well as continuously, essential to life.

41. Atmospheric air, consisting of oxygen and azote, when in the lungs, undergoes certain changes from the function of the lungs, which may be called pulmonary or thoracic digestion. The atmospherical nuclei of the oxygenous moleculæ, carrying atmospheres of pure caloric, pass through the membrane lining the air cells, and enter the atmospheres of, and become latent in the compound calorific moleculæ of the blood; the central nuclei of the said oxygenous moleculæ may also pass if needed, but they are usually expelled in the expired breath combined with carbon and mingled with azote and some other gases. No caloric is developed in this process: that is rendered latent with the nuclei to which it is attached; and therefore this is not a case of slow combustion, now-a-days called *eremacausis*. The simple calorific moleculæ which lately dwelt in the atmospheres of the inspired oxygenous moleculæ, are now riding latent in blood globules; and are carried by them, as they tumble along over one another, through the arterial tubes: this mode of travel and diffusion does not exactly correspond with that mutual pervadence which is called gaseous *endosmose*. It is a process, *sui generis*, requiring aid from vitality, and somewhat unlike any phenomenon of inanimate matter, although strictly in keeping with such.

42. The vital act or function by which the venous blood charges itself with simple calorific moleculæ separated from oxygen in the lungs, and renders them latent in its own compound calorific moleculæ, and thereby effects its own rubification or arteralization and æration, I have called *the arterial œrosis*. An almost identical process, by which the nerves became charged with simple frigorific moleculæ from food &c. in the stomach, I call *the neural œrosis*. And the charge itself of each respectively I call *the arterial aura* and *the neural aura*. I do not contend that the terms* are exactly suitable and unobjectionable; but I use them from the want of some more appropriate.

43. The arterial aura is carried withersoever arterial blood circulates, to effect a multitude of purposes: in all parts it aids growth and formation; in secreting organs it aids in their secretions; in muscular fibrillæ it aids muscular contractions and gives up its pure caloric to support animal temperature; in neurine throughout all ganglia it displaces simple frigorific moleculæ, and becomes latent in their stead, as they are developed for functional purposes; and it props up or supports one of the two forces, (the attraction between calorific moleculæ,) which are in antagonism from interchainment to constitute the equilibrium of life.

44. Food, consisting of oxygen, hydrogen, carbon, azote, and other elementary matters in multitudinous combinations, when in the stomach, undergoes certain changes, of an electrolytical character, from the function of the stomach, called gastric or abdominal digestion. New combinations are formed to constitute chyle, (the milky fluid absorbed to replenish the blood;) and during such new combinations lots of simple frigorific moleculæ are developed or set at liberty from a latent state; and thus enter into the terminations of the nerves of the great sympathetic system, to constitute the nervous fluid proper, or neural aura.

45. The motions of the neural aura, or the circulations of the nervous fluid as it might be called, is an exceedingly important subject; but it has never yet been properly approached or appreciated. Nevertheless, a knowledge of the phenomena of life in health and disease, and of the operation of food and remedies, which are indispensable to the scientific and successful treatment of diseases, can never be

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* *Arterial œrosis* (αιρεσις ab αιρεω to take) the vital act or function of the arteries of taking what they need or require from atmospheric air, namely, the arterial aura.

Neural œrosis (αιρεσις ab αιρεω to take) the vital act or function of the nerves of taking what they need or require from the contents of the stomach, namely, the neural aura.

The *neural aura*—the subtile halitus which circulates through the nerves; or which, separated from food, &c., in the stomach, travels throughout the nervous system, brain, ganglia, &c.

The *arterial aura*—the subtile halitus which pervades arterial blood; or which, separated from air in the lungs, travels in blood globules throughout the arterial system, heart, &c.

satisfactorily explained without first comprehending the motions of the neural aura. This is *the clavis*—the great key of medical philosophy.

46. The great sympathetic system of nerves is first charged with the newly acquired supply of neural aura. As its first journey, it is carried along the centripetal nervous fibrillæ, (tubular neurine) to innumerable ganglia. It next charges to saturation the visicular neurine of all the ganglia throughout the nervous system; and from those ganglia it is thrown back or reflected through the centrifugal nervous fibrillæ (tubular neurine) to every organ that has involuntary function to perform, whether it be a function of nutrition, or of secretion, or of muscular motion.

47. For all these purposes it is not essential that the neural aura should be rendered latent in vesicular neurine—it supports merely *involuntary* function, which is continuous as well during sleep as during volition. But it is essential and indispensable, for the purposes of *voluntary* function, that a portion of the neural aura should be rendered latent in vesicular neurine; and during sleep, a sufficient quantity of neural aura is thus rendered latent. The act of rendering latent neural aura in vesicular neurine, which takes place in perfect health by consent of the soul, constitutes the phenomenon of sleep; and when the vesicular neurine is saturated with neural aura, the animal awakes. The fiat of the soul, called the will, can then, for all the purposes of volition, set at liberty, or develope, the neural aura that was rendered latent during sleep; and it will effect this, with unerring precision in health, at the origin of any of the centrifugal nervous fibrillæ; and the now active neural aura will pass off; or be propagated along, the appropriate channels of tubular neurine to effect such muscular contractions as will execute the designs of the soul.

48. It should be well noticed, that when neural aura, which consists of simple frigorific moleculæ, is developed by the will from the atmospheres of compound frigorific moleculæ in vesicular neurine, the atmospheres of the immediately contiguous interchained compound calorific moleculæ receive a corresponding quantity of simple calorific moleculæ, from the arterial aura brought to the spot in arterial blood. This is the case during *voilition*; but the reverse of this takes place during *sleep:* as simple frigorific moleculæ become latent in neurine, a corresponding quantity of simple calorific moleculæ are displaced, and they are carried quietly off by the venous blood.

49. If arterial action be exceedingly weak, as after long vigilance, sleep will ensue without consent of the will; and to resist sleep under such circumstances, as occasionally occurs under impending dangers, by desperate mental volition, is liable to set up morbid cerebral action, and bring on typhus fever.

50. If the arterial ærosis be augmented, whether from inspiring air supersaturated with oxygen, or from breathing laughing gas, or from compressing common air in the lungs as when we strive to force thought, or from any means that shall supercharge arterial blood with arterial aura, sleep would be impracticable or difficult.

51. If the arterial ærosis be decreased, as by inspiring the vapors of chloroform or sulphuric ether, or the gases carbonic acid or sulphuretted hydrogen, or by any other means which allows to the neural ærosis a preponderance, sleep becomes unavoidable.

52. In perfect health, sleep takes place by consent of the soul; but if the nervous system be supersaturated with simple frigorific moleculæ, whether from the application of general and excessive cold to the skin, from taking full meals of generous food, wines, alcohol and anodyne medicines, or from venous blood when excessively nigrified, whether from inordinate long continued muscular action or at the fag end of fevers and other diseases, sleep, or a comatose state, will be compulsory.

53. In the cases above cited there is increased neural ærosis and neural action; decreased neural ærosis, the reverse condition, presents some singular phenomena. Inaniti n from long fasting, where sleeplessness results from want of food to prop up the neural ærosis, at the same time that the developement of neural aura has gone beyond the standard of habit by long vigilance, producing the condition of vesicular neurine favorable to sleep, is liable to give the preponderance to the arterial ærosis; and if phrenitis with extreme feebleness does not set in, (instead of phrenitis with morbid vigor,) and the sufferer obtain only an ordinary meal, (as if the neural aura had accumulated in the apparatus of gastric digestion and was now furnished in vast excess,) he will be stupified, as if overpowered with wine or narcotic medicine.

54. If the arterial ærosis be augmented, as by breathing oxygen gas or laughing gas, or if the action of the cerebral arteries be increased, or if mental effort be excited by circumstances, at the same time that the neural ærosis be augmented by generous food, wine, &c—*so that both* the powers in antagonism to constitute the equilibrium of life be augmented—the individual lives double, twice at once, and again directly. The every-day-man becomes the wit, or the poet, or the philosopher, or the warrior, or what not; and his prevailing passion, in this case as much as in death, becomes strong. The lover of good dinners and jovial company, can scarcely be ignorant of this state of his equilibrium of life, until he lose his equilibrium of body from the predominence of his neural ærosis.

55. When neural aura is developed by the fiat of the soul from its latent state in vesicular neurine, it passes into and along the nervous fibrillæ of tubular neurine which have their origin at the same spot; and it passes out at their other end into corresponding muscular fibrillæ situated at their terminations. Here it encounters its antagonist, the arterial aura, brought to the same fibrillæ by the arteries of the part.

56. Whilst the muscular fibrillæ were in a state of quiescence the arterial aura was steadily circulating through them; but now when a gush of neural aura rushes into these same fibrillæ, a sudden contraction ensues—the centres of their carneous globules approximate with considerable force.—But this is not the whole phenomenon: to comprehend the whole we must mentally place ourselves within one little fibril, and look about.

57. Before this gush of neural aura from the hemispherical ganglia arrived, neural aura, derived from neurine in ganglia of the great sympathetic system, as well as arterial aura, were both equably and steadily passing through the same fibrillæ to maintain the ordinary tone or tension of the fibres; so that this gush of neural aura derived from the hemispherical ganglia by an effort of the will—the fiat of the soul—is only a superaddition to a phenomenon that was continuously transpiring prior to its arrival.

58. The blood *enters* muscular fibrillæ *crimson*, being charged with simple calorific moleculæ; it *leaves* those fibrillæ *purple*, being charged with simple frigorific moleculæ. The atmospheres of the simple calorific moleculæ, pure caloric, are expelled to furnish animal heat; their central nuclei, as well as the simple frigorific moleculæ, become latent in venous blood, causing its nigrification.

59. When the nigrification of the venous blood is carried to a morbid excess, as happens when muscular action has been extreme and very long continued, and in the last stage of fevers, inflamations, and several diseases, a sense of debility ensues, and the condition called typhoid is established.

60. When the amount of simple frigorific moleculæ in the venous blood becomes greatly in excess, they re-enter the nervous system, (or rather they strive so to do,) through numerous nervous

fibrillæ that terminate in the veins, and press upon cerebral neurine for accommodation therein, causing coma and other symptoms.

61. When the neural aura which in health is sent to any secreting organ is not used up by the function of that organ, it is reflected or propagated back into the nervous system, and thrown upon other organs very variously, creating diseases of different character according to the organ from which it is reflected. If it be from the uterine system, it is hysteria, globus hystericus, &c., and the neural aura which ought to be used up in paroxysms of sexual delight, in catamenia, the formation of milk, &c., is thrown into the muscles, causing paroxysms of muscular convulsion. If it be from the kidneys, as in Asiatic cholera, it is thrown in excess into venous blood; in muscles, causing painful convulsions; upon the liver and other viscera, damaging their functions, &c.; and the watery parts of the blood, which ought to have been carried out of the system by the function of the kidneys, is vicariously removed, as half formed urine, by the skin, stomach and intestines. If the reflection be from the liver, it is typhus icteroides; if from the skin synocha and synochus; if from the larynx and pharynx, scarlatina and rubeola; if from the stomach or intestines, some kind of pock or pustulous disease, &c., &c.

62. The remedies, in all such cases, are uniformly efficient, in proportion as they excite the secreting organs generally, and the one primarily obstructed in particular, to perform their natural functions; both to use up the active neural aura in excess throughout the nervous system, and to draw off, or strain out, the excess latent in venous blood, through the liver, intestines, salivary glands and skin.

I have now finished my second glimpse of an improved medical philosophy, and I can easily conceive the knitted brows, and the indignant frowns, of the laborious experimentalist, (if he shall have patience enough to read thus far,) and the other modern worshippers at the shrine of Minerva. But let me observe, that, finding her goddesship in an impracticable path, with one leg (frigoric) strapped to her person; and the other (caloric) only reluctantly allowed her to hop along upon, I simply release, and give her the free use of both her natural limbs; whilst I fling under her feet a smooth carpet, bespangled with knots of interchained moleculæ, and variously tinted with life from initial and molecular attractions, so that she may progress with grace and dignity. But if she despise my flowery straight path, and prefer to hop upon one leg, or to blunder along among the rugged rocks that her devotees have placed in her way, her goddesship is as free as Zephyrus to do so—and to break her shins or crack her pate, as the case may happen. America is a free country; and all are at liberty to take a rugged and crooked track, if they prefer it to a smooth and straight one.

GLIMPSE THE THIRD.

I concluded my last glimpse in a parley with the angry worshippers at the shrine of Minerva; I shall begin this as a first-rate whip, mount my Phæton, look at my stud, and then—"Richard is himself again." —and "such a stud! my eye!"—Tho' I say it, that sho'dn't say it." Peg. and Rosa. are "a brace of thoro' bred sprightly bits o' blood, what wo'nt stop at nothin;" but "they run'd me too much round" last glimpse, and they must "take the short cut" this time.

63. The object of medical philosophy is the cure of diseases, or to relieve "the many ills that flesh is heir to;" and it may be conceded to have two stages, of which the following circumstances are the criteria: the first is, when patients shall cease to die of the doctor; the second is, when they shall die, if circumspect, only of old age. To the honor of my profession, I trust that the first stage has arrived or is about to arrive; the second may be more distant *in futuro*.

64. Symptomatology is the alphabet of medical philosophy—every symptom has, or ought to have, the power of a letter in orthography. The clown who does not know the powers of letters cannot spell a word; and the physician who does not know the indications of symptoms, cannot recognize the diseased action from which his patient may be suffering, nor judgmatically apply remedies. It is therefore of paramount importance to obtain a thorough knowledge of symptoms.

65. Symptoms are always indications of diseased action of some sort going on in the system: a person free from diseased action, or in absolutely perfect health, has no symptom whatever. But so soon as any function is disordered, or diseased action is set up in the system, symptoms show the fact. Symptomless function is characteristic of health; function with symptoms is characteristic of disease.

66. Medical philosophy, therefore, aims to acquire, among many other things, a knowledge of healthy function; in order that diseased function may be satisfactorily inferred. To attain her ends, she places in requisition every department of physical science; and grapples chiefly with those which promise the most satisfactory solution of her difficulties. On this occasion, it is proposed to seek for her a path through the interchainment of a pair of moleculæ of each of the constituents of water, oxygen and hydrogen.

67. Water, in one shape or another, is the most universal of all fluids—air only exceeds it in universality. The dependence of life, of every gradation, upon water, and upon air, indicates, *a priori*, some relationship of almost universal application. The reviving effect of a warm shower upon languid vegetable life, must long since have struck, rather forcibly, the close observers of nature. But it has remained until this day for medical philosophy to announce, that water, under gastric digestion, affords, from the atmospheres of its hydrogenous constituent, simple frigorific moleculæ, to be converted by the neural ærosis, into the neural aura of living beings; much as air, under pulmonary digestion, affords, from the atmospheres of its oxygenous constituent, simple calorific moleculæ, to be converted, by the arterial ærosis, into the arterial aura.—Thus life leans upon water and air; and if either be withheld too long, the equilibrium of life will be upset.

68. Hydrogen, as it exists in water, supplies neural aura—as it exists in alcoholic fluids it supplies the same in such free abundance as to cause drunkenness. Oxygen, as it exists in air, supplies arterial aura. Food, especially of the azotized and carbonaceous kinds, supplies chyle to make new blood, out of which the rest of the body is fabricated by function.

69. The interchainment of the constituent moleculæ of matter, under attraction, influences, more or less, all the phenomena of homogeneous matter; and the equilibrium of life, as it is maintained in vesicular neurine, is only a modification of the same circumstance. Water, in its fluid state, affords the best mean of guiding us to a comprehension of this arrangement of moleculæ. By taking a pair of moleculæ of hydrogen, and a pair of oxygen, and showing their interchainment, as they exist in fluid water, will simplify, as far as I know how, this subject.

70. I can scarcely pass this point without an exordium on water; but I am not ambitious of classifica-

tion with those "water doctors" who regulate their therapeutic manœuvres by quizzing, testing and tasting diseased urine; nor with those "water-cure doctors," of late so successful in deluding valetudinarians, who kindly roll up rheumatisms in wet blankets, drown dropsies as other folks do kittens, and quench flickering life as firemen extinguish city conflagrations. Water is an essential pabulum for the support of every kind of life: vegetables acquire it ordinarily by their roots, as animals by their stomach and intestines; and when these natural inlets fail in affording a supply, they both acquire the same, as far as they can, by their skins, lungs and leaves. Fish, sea-weeds and aquatic plants live in it, as animals and other plants live in air. Neptune wields it to rock the world; and it floats as vapor, visible and invisible, in the air, to fall as refreshing showers, hail or snow; and it yields on condensation, lightning or electric fluid and roaring thunder. The chemist uses it as almost a universal solvent; and the machinist, by disrupting the attractions between its constituent moleculæ, obtains from it his steam power. The electrician liberates the simple moleculæ latent in the atmospheres of its constituents for a supply of the galvanic fluids; or he gives its constituents separately, complete in their integrity, (as oxygen and hydrogen obtained electrolytically,) for purposes of combustion; and he uses it, in its fluid state, as a conductor, in its crystallized state (ice) as an electric. The crystallographer refers to it in ice as a type of other crystallizations; and uses it as a vehicle from which to obtain crystals of substances held in solution. The philosopher sees in it a type of gaseous existence in its two constituents, oxygen and hydrogen; of vaporous existence in its character as steam; of fluid existence in its character as water; of vitreous existence in its character as ice. And he traces the laws of temperature in inanimate matter, and those of the stimuli of all the external senses, not excepting light and sound, more readily through its mechanism than by any other means. And we shall now devote it to one other purpose: that of showing the mode of union between mind and matter, or the equilibrium of life, by using as a type, the attractions, in antagonism, between a pair of each of its constituent moleculæ, (hydrogenous and oxygenous,) under interchainment, as they exist in its fluid or liquid state.

71. Those physical phenomena, whether in magnetism, electricity and galvanism, or in the radiation of light, heat, (and I will add cold,) which are usually regarded as instances of elementary repulsion, are throughout only apparent repulsion: they are a secondary force derivative from attraction, and are the result always of the predominance of one of the two attractions in antagonism. The term *extrusion* or *expulsion*, rather than repulsion, would express the fact: it is the squeezing out of one element, by the squeezing in of its antagonist, reciprocally.

72. The elasticity of this antagonism, whether it be noticed as regards its delicate sensitiveness to small forces, its incalculable power, its universality, its ability to convey and modify impulse interstitially, surpasses appreciation. It is in virtue of this elasticity that light is squirted from the sun to the earth in eight minutes, and that electricity has its darting speed. The radiation of caloric and frigoric, and the motions of the sensitive stimuli, (for they are all impulse variously modified,) are influenced or modulated by the beautiful elasticity of these two forces in antagonism.

73. A molecule of oxygen consists, first, of a central nucleus, and, secondly, of an atmosphere of pure caloric, charged to saturation with the nuclei of other calorific moleculæ, which may be simple and binary, and ternary and quaternary, &c. If it could receive only one more nucleus, that one would be instantaneously intruded from the millions always situated immediately circumjacent.

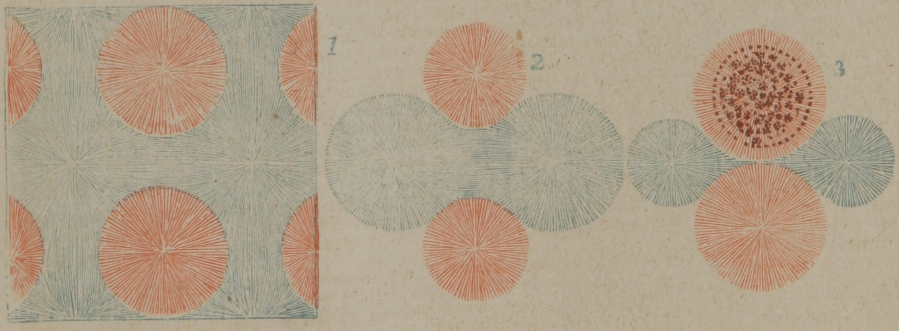
74. A molecule of hydrogen is an exact counterpart: it consists, first, of a central nucleus, and, secondly, of an atmosphere of pure *frigoric*, saturated with the nuclei of other frigorific moleculæ.

75. Caloric, as it exists latent in the atmospheres of an oxygenous molecule, is *always pure;* and it was equally pure in the atmospheres of the nuclei which dwell in the oxygenous molecule before they fell into it: it is always the same, and is always pure, under every possible circumstance of existence. The like may be said of *frigoric:* it is always the same, and always pure.

76. The phenomena which take place within the atmosphere of a molecule of oxygen, (or of hydrogen,) are exceedingly interesting to the experimental chemist and philosopher. When, as a constituent of the solvent, water, its atmosphere is receiving additional nuclei, it is called the chemical phenomenon of solution. When that atmosphere can contain no more, it is a case of saturation. When it accommodates some (perhaps less) nuclei, to the extrusion of other (perhaps larger) nuclei, it is a phenomenon of elective affinity. Its power to accommodate only a specific number under symmetrical arrangement, is called the chemical law of combination in definite proportions. Its power to accommodate dissimilar nuclei only in obedience to the same rule, is called the law of chemical equivalents. When pure caloric is mechanically forced from its interstitial (latent) position between the atmospherical nuclei, it is called the generation of heat by compression, by percussion, by friction, &c., as the cause may be. When simple atmospherical nuclei, instead of pure caloric, are expelled by the same mechanical means, it is called the generation of electricity by compression, or percussion, or friction. When the same atmospherical nuclei are extruded from the intrusion of caloric or frigoric into an antagonistical atmosphere—it is a case of thermo-electricity. If the same be expelled by the contact of two bodies which by contact can reciprocate their force of attraction, (and urge the force of either much beyond that of its antagonist in a third substance also in contact,) it is a case of development of galvanic fluid. If the central and atmospherical nucleus of a molecule of oxygen on combination with some other, yield up a portion of its interstitial (latent) pure caloric, it is called, in the laboratory, the generation of heat by chemical combination, in a fasciculus of muscular fibres the generation of animal heat. If that other body, at the moment of combination, throw out frigoric, so as to create a motion, or simply an impulse to move, in both caloric and frigoric from the same spot, (which gives the modification of impulse called light,) the phenomenon is called combustion. There are other less conspicuous changes which need not now be noticed. A molecule of hydrogen, of azote, or of any other matter, is subject to the same, or rather to similar changes, in infinitely diversified degrees. Chemical and philosophical experimentalists, have constantly to deal with such modifications. The physiologist, when he begins to investigate the laws of sensitive stimuli, and the electrician, in cases of the electrolytical decomposition of fluids into their elementary *ions*, have to recognize all these modifications—and yet still further modifications effected by the interchainment of central nuclei, under two attractions, in antagonism.

77. The foregoing circumstances can be most easily comprehended by considering the changes which take place in a single atmosphere, whether it be of oxygen or of any other element. Such changes are in part under the influence of initial attraction, or they are less exclusively under the control of the antagonistical molecular attractions, than some other phenomena. Nevertheless, it must be remembered, that such a body as a detached molecule, of any sort, cannot exist in matter:—it would be sure to fall, as far as it could, towards the central nucleus of the nearest molecule of the same family, that is fixed by interchainment; or else it would flit about, in a half governed character, (that is, governed only by electrical laws,) as electric fluid. We may now consider the moleculæ of matter, (those of water,) under interchainment, with the attractions of the two families in antagonism.

78. Take two moleculæ of oxygen, and two of hydrogen, and place them in interchainment as they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exist in water—"Take them yourself—I'll have nothing to do with such mity small matters," I suppose the captious reader to exclaim: well, I will take them; and supposing them magnified a million times, I will represent them to the eye; and if you do not like the imperitive mood, I will subjoin the subjunctive, and indicate in the indicative, my conceptions of their interchainment; and the modifications which that interchainment undergoes in water on passing from the temperature of 42 deg. F., or that of maximum density, down to 32 deg., the freezing point, and up to 212 deg., the boiling point.

79. In the figures are represented a pair of moleculæ of oxygen (red) and a pair of hydrogen (blue) as they are presumed to exist in water at the temperatures 42 deg., 32 deg., and 212 deg. Only one point of communication between the atmospheres of each pair is shown in figures 2 and 3; but each molecule has five others, by which it communicates with the atmospheres of other moleculæ of the same family situate in immediately circumjacent strata, as shown in figure 1st. Of these five points, three are in the same plane as that represented; and the other two, (which are not shown in these figures,) cross that plane at right angles to it. The lines of direction of these points all radiate from the central nucleus; and at the same distance from the centre are equidistant, at least so far as the atmosphere preserves its sphericity; but beyond this, and within the elongations of the atmosphere, those lines of direction may be warped by internal molecular motion.

Fig. 1 represents a section of two moleculæ of oxygen (red) and two of hydrogen (blue) in water at 42 deg. or the temperature of maximum density. Their atmospheres of equal magnitude, and their nuclei situate equidistant.

Fig. 2. The same at 32 deg., the freezing point. The points of communication between the red, situate behind the blue, are about to be disrupted or broken through, (as the blue may be seen to be in fig. 3, before the red,) when the water becomes ice.

Fig. 3. The same at 212 deg., the boiling point. The points of communication between the atmospheres of the blue are represented at the moment of disruption, as when water becomes steam.

In fig. 2 the atmospheres of the blue are augmented in volume by intruded frigoric; in fig. 3 the atmospheres of the red are augmented in volume by intruded caloric; and the elongation to the point of disruption of the intervenient antagonist is a consequence.

80. In fig. 3, one molecule of oxygen is represented with a central nucleus and several atmospherical nuclei of binary and ternary compound calorific moleculæ, as well as, (near the circumference,) a few detached nuclei, or nuclei of simple calorific moleculæ, which, when expelled by the vibrations of the central nuclei of matter, create electrical atmospheres. Whilst this charged atmosphere is under the eye, an idea may be gained of the symmetrical arrangement of atmospherical nuclei which regulates the principle of combination in definite proportions, the principle of saturation, of symmetrical crystallization, and of many other phenomena and qualities of matter. It must be remembered, that the adjoining molecule of hydrogen is entitled to the same atmospherical privileges as the one of oxygen; and in one of azote or nitrogen, or any other elementary matter, the same rights are conceded to their atmospheres. It may be worthy of remark that when a molecule of azote or nitrogen is interchained with a molecule of oxygen, whose atmosphere is charged chiefly with simple calorific moleculæ for atmospherical nuclei, they give the laughing gas or protoxide of nitrogen; if there be added to the oxygen another dose of atmospherical nuclei, they give the binoxide or deutoxide of nitrogen; if another dose be added, they give the hyponitrous acid; if yet another dose, they give the nitrous acid; and if yet another dose, they give the nitric acid. This last, strong, all-subduing acid consists of the same two elements, oxygen and azote, as pure air, or the health inspiring breeze that we breathe with impunity; but the moleculæ are dissimilarly arranged—in air by comminglement or mutual diffusion, instead of by antagonistical interchainment.

81. The passive, mobile, continuous, incompressible, pure caloric, which dwells latent between the atmospherical nuclei of this molecule, may be called either *interstitial*, *latent* or *atmospherical* caloric. And there is pure frigoric, with precisely similar attributes, dwelling latent in the atmosphere of a molecule of hydrogen.

82. It should be very well remembered, that not only may these atmospherical nuclei be expelled from, or accumulated in, these atmospheres, as in the many tricks played by elective affinity in the laboratory of the experimental chemist, and in the developement of electric and galvanic fluids by the experimental philosopher; but, also, the interstitial caloric and frigoric are susceptible of all manner of motions, with inappreciable mobile ease, *through and among* the atmospherical nuclei, and the central nuclei, whilst those nuclei themselves, in many instances, remain as fixed as fate.—Among, and made up of, the various modifications of impulse so conveyed by interstitial caloric and frigoric, will be found the stimuli of the external senses; as well as a solution of very many physical and vital phenomena.

83. If the *density* of atmospherical nuclei be *augmented*, whether by the intrusion of additional atmospherical nuclei, (absorption,) or by the straining out or extrusion of pure caloric, or pure frigoric, as the case may be, the force of attraction, (the apparent power of the central nucleus,) of the molecule, will be *augmented*.

84. If the atmosphere of a molecule be augmented in volume by intruded pure caloric, or frigoric, without additional nuclei, *the density* of atmospherical nuclei will be *decreased*, *by dilution*, as it were; and the force of attraction, (the apparent power of the central nucleus,) of the molecule, will be *decreased*.

85. When a pair of moleculæ of each family are interlocked or interchained, as is represented in the figures, as the central nuclei of the calorific pair *approximate*, those of their interchained antagonists, (the frigorific,) must *recede*, *et vice versa*.—Such motions always occur, more or less, in all phenomena of temperature; and momentarily, alternately, when the matter which they constitute, is propagating sound.

86. Nothing can cause these central nuclei to *recede*, except it be the intrusion of pure caloric or pure frigoric or atmospherical nuclei, each into the atmosphere of that of its own family: but they can be made to *approximate* mechanically, as by pressure, percussion, &c.

87. Caloric, (or frigoric ether,) is always *forced* into its interstitial position by the attraction of its antagonistical molculæ situated in the surrounding media; but atmospherical nuclei may be *either forced* also by the attraction of antagonistical moleculæ similarly situated, or they may be *attracted* to their atmospherical position by their own initial attraction.—Thus, when the atmospheres of two almost similar moleculæ of the same family blend, atmospherical moleculæ but imperfectly fixed in the circumference at the point of communication, (as in electrical atmospheres,) will move, if there be room to receive them, in that direction in which the density of attracting points *increases most rapidly*.

88. If interstitial caloric and interstitial frigoric be *both synchronously* impressed with an impulse to move, or be actually made to move, *in the same direction*, *neither* of the antagonistical forces *can yield* if

the impulse be about equal in each; and both impulses will then be propagated, as *through two inelastic tubes*, in all the interstices between the fixed atmospherical nuclei.—This is always the case in light; but if the impulse of either exceed, ever so little, that of the other, the light is called color. If the impulse conveyed by caloric predominate to the fullest extent that will constitute light, and fall just short of that which would constitute a phenomenon of temperature only, (which would enlarge the calorific atmospheres,) the color is called red; but if the impulse conveyed by frigoric predominate to the fullest extent that will constitute light, and fall just short of that which would constitute a phenomenon of mere temperature, (which would enlarge the frigorific atmospheres,) it is called violet.—The prismatic colors show different modifications of these relative impulses.

89. When very complex compound moleculæ are fixed lineally, and surrounded, tube fashion, by a membrane composed of very fine moleculæ closely united, (as in the structure of nervous and muscular fibrillæ,) the nuclei of the simple moleculæ in their atmospheres, (the neural aura particularly,) can move around their central nuclei as readily as interstitial caloric or frigoric. When simple nuclei are forced in at one extremity of a nervous fibril, a corresponding amount must be forced out at the other extremity; causing motion among similar atmospherical nuclei, around the nuclei fixed lineally, from one end to the other of the tube. It does not follow that those simple nuclei forced into one end of such tube, (a tube of tubular neurine is especially alluded to,) must necessarily appear immediately at the other extremity; but those forced into one extremity to day, may make their exit at the other to-morrow; or whenever the stream of atmospherical nuclei pouring around the lineally fixed nuclei moves them, in their turn, to the point of expulsion.—This is the motion of the neural aura, (simple frigorific moleculæ,) through nervous fibrillæ or tubular neurine.

90. When nuclei are not fixed or latent in the atmospheres of compound moleculæ whose central nuclei are also fixed by interchainment with an antagonist to form matter, they constitute magnetic, electric and galvanic fluids; and, as such, they are as mobile as caloric and frigoric.

91. The nuclei of simple moleculæ, imperfectly fixed in any species of matter, exist in myriads throughout the terrestrial atmosphere, as magnetic fluid; and in their capacity, as such, give rise to all the phenomena of magnetism. All terrestrial matters, and it is to be presumed that the matters of all planetary bodies within the sphere of the sun, are saturated with these nuclei; which are every where present, and ready to enter and become fixed as atmospherical nuclei about the nuclei of interchained moleculæ, whenever physical mutations present an opportunity.—Reader, pardon a digression, it may save you millions of ages of remorse and compunction if you are prone to atheism:—each of these little nuclei is endowed with its own initial attraction by sense infinite; of which the character is, as we can recognize through our own powers, to see, to hear, to feel, &c., as it is acted upon by elementary force; to recognize, emotionally, all joy and grief, love and hate, &c.; to intellectualize and cogitate, and thus as one whole, it exceeds our capacities, in every way, in every thing, as far as infinite can exceed finite power. What then may be—must be—the powers of Deity?—What will be your condition when there shall be bestowed on you a faculty of which time, space and sense infinite are the stimuli; and which will reveal to you all that has transpired and shall transpire, throughout immensity?—Light reveals to me yonder mountains; but such stimuli as these, as the powers of memory plainly show, can reveal something more!

92. When the same simple nuclei are liberated from their latent state in the atmospheres of interchained moleculæ, (by magnetized bodies sometimes, by friction from electrics, by chemical action in galvanic arrangement, by temperature occasionally,) they form a thin stratum along the surface of conductors, between that surface and the surface of the surrounding air, or other non-conducting surrounding medium, in apparent contact. In the atmospheres of the constituent moleculæ of that surrounding medium, they create one set of phenomena, which characterize an electric or polar atmosphere; in traversing the interior of conductors, and in passing from point to point through an electrolytic liquid, (like as in the passage of the neural aura, except that the tubular structure is wanting to guide the current,) they cause another set of phenomena; and in their various modes of developement, by friction, by metallic contact, by chemical action, by temperature, &c., they show yet another set of interesting phenomena.—In this, their half free state, they are only partially influenced by moleculæ under interchainment; and in return they can partially influence either of the forces in antagonism; but chiefly each nucleus is under the control of its own individual initial attraction.

93. They are held to the surface of conductors, first, because the density of attracting points, which reciprocate initial attraction with them, increases towards the centres of such conductors; and, secondly, because the surrounding medium, being already saturated, cannot accomodate them in a latent state; nor yet, without disruption of the two antagonistical forces, suffer them to pass. As they accumulate and gain sufficient intensity, they disrupt the antagonistical forces which oppose their diffusion, and go off in sparks, or snaps of baby thunder. Prior to these minute explosions, these nuclei, whilst they are held in their position by their initial attraction, force each other, simply by much crowding, into the circumferences of the atmospheres of the constituent moleculæ of both the conductor and the surrounding medium. In the latter, the more conspicuously, which ever family predominates, augments the volume of the atmospheres they penetrate, and the intensity of attraction by increased density, both at the same time; by which, simple nuclei, of the contrary family, are extruded from the atmospheres of their interchained antagonists. These liberated or displaced nuclei retreat, through, between, around and among, the fixed nuclei in the atmospheres of the same family that they inhabit, into circumjacent strata, the distance being regulated by many circumstances; and being here, they bestow a predominance, on precisely the same principle, in favor of the contrary attraction. By these means, an antagonism between the augmented forces at the two ends of a conductor, not unlike that appertaining between interchained moleculæ, and called a polarized or an electrical atmosphere, is established. If either one of these augmented forces be destroyed, by letting off the accumulated nuclei into their grand reservoir, the earth, the other is simultaneously annihilated. In all motions of these nuclei, in what are called currents of electric fluid, those of each family *decussate interveniently* one another, or appear to pass through one another; each passing in contrary directions, around the fixed nuclei in the atmospheres which each inhabits—as do interstitial caloric and frigoric in phenomena of temperature. So that when a sheet of paper is perforated by an electric spark, the burr at the edge of the perforation is forced in both directions alike; as if the electric explosion had taken place in the centre of the sheet of paper, and passed off in contrary directions equally.

94. We have now taken a casual glimpse at most of those phenomena that are, more or less, preliminary and introductory to the comprehension of the phenomena presented by the sensitive stimuli; upon the consideration of which we will now venture;

And next will come handy,
Phenomena morborum;
Et modus operandi,
Remediorum.

95. I would observe, on entrance upon the subject, that physiologists and metaphysicians are rather stingy in their allowance of only five external senses to their fellow mortals: I shall be more liberal, and bestow upon them at least seven. St. John saw "seven spirits before the throne;" but an orthodox interpretation will scarcely admit that these seven spirits were typical of the seven external senses of animal nature—nor do I contend for such an interpretation. But St. John's language, as if he were relating a vision of vital nature, is apposite and applicable to the fact.—Nature adheres to the rule of seven often: we have not only seven senses, but also seven prismatic colors, which are all light; seven elementary notes, which are all noise; and, if we could as accurately discriminate as in the above cases, perhaps seven elementary odors, and seven elementary savors.

96. The seven external senses are, first, touching, of which the stimulus is pressure; secondly, feeling, of which the stimulus is temperature; thirdly, seeing, of which the stimulus is light; fourthly, hearing, of which the stimulus is sound; fifthly, smelling, of which the stimulus is odor; sixthly, tasting, of which the stimulus is savor, and seventhly, the sexual sense, of which the stimulus is an internal secretion.

97. Some persons may contend for our right to an eighth external sense—volition; of which the stimulus is gravity or weight. The fact is, we obtain a certain amount of information from the muscular effort demanded to counteract resistances of many kinds; and gravity or weight is amongst the number. If a man were to place his fingers under a blacksmith's anvil, and suffer from its weight only, on one occasion; and to place them in a blacksmith's vice, under the same amount of pressure, on another occasion, he would be unable to distinguish which of his feelings were due to weight as the stimulus. The sense of touch would recognize pressure only in both cases, whether from weight or the screw; but if the man were to endeavor to relieve himself by muscular effort, as by lifting the anvil, he would ease himself; whereas by struggling at the vice, (supposing it a fixture,) he would increase his pain; and he would gain a specific amount of knowledge from volition, including the weight of the anvil and the immobility of the vice, very distinct from sensation.

98. Metaphysicians sometimes appropriate to the sense of touching, to the unjust disparagement of seeing, hearing and the other external senses, the exclusive privilege of affording information of the shape, magnitude, distance, relative position, &c. of things. These are all within the province of the metaphysical faculty of mensurability, which recognizes all the relations of things to space; and the sense of touching, as well as seeing and the other external senses, and lots of other means, are appealed to, when necessary; but only to educate judgement.

99. Force, in the character of pressure, as the stimulus of the sense of touch, acts by causing the approximation of the centres of moleculæ arranged lineally as tubular neurine. The central nuclei may instantly recoil to their normal position; and the impulse be propagated by their atmospherical nuclei and their interstitial caloric and frigoric, by motion, or impulse only, acting around the fixed central nuclei. An impulse, when so acting upon finite sense in upholding the equilibrium of life, is felt, as hard or soft, rough or smooth, wet or dry, &c.

100. Wetness is an anomalous modification of these sensations, resulting from the softening and relaxation of the cuticle and skin; but it cannot be felt of itself, or without the pressure of some fluid conjoined. On taking the wet hands out of water, except they be rubbed against something or one another, there is no sensation of wetness except that the ordinary pressure of the atmosphere, acting upon the relaxed and softened skin, is felt in conjunction with some cold from evaporation.

101. On sawing through a muscle, on tearing it in two, on cutting through a stretched muscle with a sharp amputating knife, on the plucking off of sticking plaster, &c., the sensation bears no proportion to the pressure; for there may be a taking off, rather than a putting on of pressure. The pulling into two a fasiculus of living muscular fibre, if it could be effected without pinching or squeezing, ought not to be felt as a sensation of touch; for there is a taking off, rather than a putting on of pressure. So much of sensation, in such cases, as is not referable to simple pressure, must be referred to the numerous families of bodily pleasures and pains. The sting of a wasp, the sting of a mustard poultice, of a little cayenne pepper dust in the eye, the gout, the rheumatism, the cramp, the tooth ache, the tic doloreux, and a hundred other neuralgic affections, are not to be referred to either of the seven external senses; but they all belong to the families of bodily pleasures and pains.

102. The second external sense is feeling; of which the stimulus is temperature, or an impulse propagated by interstitial caloric and frigoric; this being influent, when that is effluent, *et vice versa*.

103. In taking a glimpse at the phenomena of temperature we have to recognize the co-existence and co-agency of frigoric and caloric—my stud, Rosa. and Peg.—Upon the existence or non existence of frigoric, hinges all that I am writing; and I am not from prejudice blind to the fact of the utter nothingness of my own effort, if frigoric be not existent. If frigoric exist, and exert an agency co-equal to that of caloric, in all the phenomena of nature, which I assume to be the case, that which I am writing, if I had but *nous* enough to do justice to the subject, would be the most glorious revealment to science that the annals of philosophy have ever yet recorded; whereas, if frigoric be a nonentity, this universal calo-frigorian hypothesis, though apparently explicative even of the phenomena of life itself, will burst like a soap bubble, and all its iridescent beauties will vanish.

104. We must refer again to two pairs of moleculæ, (a pair of calorific or oxygenous, and a pair of frigorific or hydrogenous,) as they exist interchained in water, to enable us to pursue our subject.—At 42 deg. F., or at the temperature of maximum density of water, the centres of each pair of moleculæ are assumed to be equidistant, and the magnitude of their atmospheres equal. As the temperature descends from 42 deg. to 32 deg. frigoric is being *intruded* (by the surrounding media) to the atmospheres of the frigorific pair; by which their *magnitude is increased*. At the same time caloric is being *extruded*, (by the augmentation of its antagonist,) from the atmospheres of the calorific pair; by which their *magnitude is decreased; and their centres are forced farther apart; and the point of communication of their atmospheres is elongated; until at* 32 deg. *it is disrupted;* and the water becomes ice. During the transition from 42 deg. to 32 deg., the atmospheres of the frigorific pair receive so much in volume *more* of frigoric than the atmospheres of the calorific pair give out of caloric, as to cause the known augmentation of volume which the two pairs, collectively, undergo.

105. The atmospherical nuclei in the frigorific pair have been *diluted* by intruded pure frigoric, and the *energy* of their attraction is consequently *decreased;* the atmospherical nuclei in the calorific pair have been *concentrated* by the extrusion of pure caloric, and the *energy* of their attraction is consequently *increased*. This position of their antagonism is brought about by no power in themselves; but by a force acting in the surrounding medium, or at a diatance.—When the frigorific atmospheres become sufficiently augmented to accommodate an additional dose of atmospherical nuclei, they will enter; and if the calorific atmospheres were to extrude atmospherical nuclei instead of pure caloric, they would create an electrical atmosphere on principles of thermo-electricity: but before arriving at 32 deg. neither of these phenomena transpire. But on passing from 33 deg. to 31 deg. both occur; and the water becomes ice, and a good electric.

106. We have now four forces, or *two* antagonisms, at work: one antagonism in the water, and another in the surrounding medium: each force in these acting *adversely upon its relative in the other*. The augmented density, and consequent energy, of the calorific pair, acting against the augmented volume (from frigoric forced into their atmospheres from another stratum still colder,) of its interchained antagonist, is precisely on the same principle in the surrounding medium, as in the water; but the surrounding medium must be colder than the water, and therefore the process has advanced farther; and consequently the antagonism in the medium, forces frigoric into the aqueus pair. In the water, the same force is acting to oppose the influx: so that the attraction between the calorific moleculæ in the medium, (through the instrumentality of interstitial frigoric,) is acting antagonistically upon the attraction between the calorific moleculæ in the water. A similar antagonism is also transpiring between the attractions of the frigorific pairs in the medium and in the water, through the instrumentality of interstitial caloric.—Modifications of this compound or double antagonism, (which above simply equilibrates temperature,) govern polar atmospheres, as the galvanic, electric and magnetic, including the earth from pole to pole, also it governs all apparent repulsions, whether of caloric or frigoric, or of light, or of electrified or magnetized bodies, and is the parent of lots of phenomena which seem enigmatical.

107. When from the forces at work in this double antagonism the junction between the pair of calorific atmospheres in the water, becomes disrupted, as in passing from 33 deg. to 31 deg., the pair of interchained frigorific moleculæ, having got rid of an opposing antagonism, can augment their atmospheres considerably, and accommodate lots of frigoric in a latent state; and at the same time extrude atmospherical caloric and nuclei from the atmospheres of their antagonists. This disruption occurs on the formation of ice or snow; and if there be added to the ice or snow any matter, (such as common salt,) that will re-establish the junction between the calorific atmospheres, liquidity will be re-produced, and the frigoric which was rendered latent in congealation will be extruded, as is the case in many frigorific mixtures. Frigoric, when thus liberated, becomes radiant; and obedient to the laws of reflection, and it otherwise, in every way, comports itself as does free caloric.—When experimental philosophy first reflected radiant frigoric liberated from frigorific mixtures, if she had called it cold or frigoric; or when she found radiant frigoric just without the solar spectrum upon the verge of the violet rays, instead of calling it coloring rays, or chemical rays, or deoxidizing rays, if she had called it the frigorific rays, the circumstances might have suggested, to some competent mind, a calo-frigorian theory; and philosophy would, probably long before this, have been much in advance of her present position.

108. We have noticed an augmentation of volume in water, from *intruded frigoric*, in descending from the temperature of 42 deg. to 32 deg.; and a still more considerable one in descending from 33 deg. through 32 deg. to 31 deg., accompanied by a change of character from water to ice; and a similar augmentation of volume, from *intruded caloric*, takes place in ascending from the temperature of 42 deg. to 212 deg.; and a still more considerable one in ascending from 211 through 212 deg. to 213 deg.; accompanied by a change of character, from water to steam. There is this remarkable difference: in one case, the change of character is from that of a liquid to that of a solid, as ice; in the other, from that of a liquid to that of vapor, as steam. There must, therefore, be some circumstance yet to be noticed.

109. In the case of conversion of water into steam, *all* the points of communication between the atmospheres of the frigorific moleculæ, are disrupted; but in the case of the conversion of water into ice, only *one series* of the points of communication between the atmospheres of the calorific moleculæ is disrupted. Which series is disrupted in the formation of ice, the crystalographer will recognize in the growth of the crystal, and in its cleavage after its formation. In other crystals, their powers of refraction, and double refraction, the stratification (as it were) of their electric powers, and some other minutiæ, (which are all out of our way,) will still further illustrate the subject.

110. If we take 1000 red pills and 1000 blue pills, the former as the central nuclei of the calorific moleculæ, and the latter as the central nuclei of the frigorific moleculæ, and lay 10 rows, 10 in a row, of red for a calorific stratum; and upon this lay 9 rows, 9 in a row of blue for a frigorific stratum; each blue resting midspace between 4 red. And then repeat the red, with 8 rows, of 8 in a row, each resting midspace between 4 blue; and thus continue to repeat the act of placing the pills in orderly superposition, stratum super stratum, to an apex, we shall obtain a semblance of one of the simplest crystaline forms. But lots of modifications of crystaline forms with equal numbers, and still other modifications from 3 red and 1 blue, *et vice versa*, and from yet other different proportions, may be generated, as is familiar to all crystalographers.

111. Select a pair of each immediately contiguous, and situated near to the centre of the pyramid just alluded to, and consider each interchained in every possible direction, and notice how many points of communication any one pill, or nucleus, can form with others of its own family situated in immediately circumjacent strata, both horizontally and vertically, and you will readily obtain a sufficient glimpse of our subject.—On the crystalization of water, or on the formation of ice by freezing, it may be inferred that disruption takes place between the calorific atmospheres in the horizontal series, leaving the vertical *strengthened* by a maximum condensation of atmospherical nuclei; and the volume of their atmospheres decreased from the latent caloric, (and some atmospherical nuclei,) thrown out. At the same time, the atmospheres of their interchained antagonists, one opposing force being annihilated, will be augmented in volume; and they will thus be enabled to accommodate lots of atmospherical frigoric, and extra nuclei.

112. The red and blue pills, being in contact, will represent the nuclei of moleculæ as they exist in a solid, as ice; and if we suppose them moved, equally throughout, to the eighth of an inch asunder, without disruption of communication between their atmospheres, they will represent the same nuclei as they exist in liquids—as in water; and if we suppose them removed to a quarter of an inch asunder in the same way, they will represent the same nuclei as they exist in vapor. But whilst one eye of the understanding recognizes in these pills a coarse type of the nuclei of moleculæ, the other eye must recognize the extreme minuteness of the constituent moleculæ of matter, of which the said pills, with supposed atmospheres, are the gross representations.

113. If we follow a descending temperature far beyond the point of consolidation of any matter, (below 32 in water,) a set of phenomena with which philosophy is at present unacquainted, may be, *a priori*, anticipated. If the intrusion of frigoric could be continued, by art, until disruption took place between another series of the points of communication of the calorific atmospheres, liquifaction would again ensue from the preponderance of frigoric, as it does at 33 deg. in water from the preponderance of caloric. And if we could continue the process still lower, until a total disruption of all the points of communication between the calorific atmospheres ensued, the æriform state, from an excess of frigoric, like steam at 313 deg. from an excess of caloric, would be a result.—I told you, that Peg. and Rosa. "won't stop at nothin';" and you see they have penetrated impenetrability; and galloped through thorough nothingness; and we may let them scamper on yet a little further.

114. If art shall ever succeed in contriving frigorific mixtures so as to concentrate frigoric until matter in contact shall readily combine with it, (which I trust Providence has rendered an impossibility,) and

throw out its latent frigoric in forming new combinations, as combustibles in contact with burning matter now do, and throw out lots of latent caloric, we should be able to raise a *frore*, as we now can raise a fire; and substances, in proportion to the latent frigoric they might contain, when cast upon it, would *defrorate*, as now they deflagrate, (witness nitre,) when thrown upon a fire. But to extinguish such a *frore*, if once kindled, by heaping upon it terrestrial matter, might be as impracticable as to extinguish a conflagration by heaping upon it torrents of gunpowder. Probably the world, sea and all, would *defrorate*—be blown up and destroyed—except we could surround the *frore* with fire; or quickly smother it up with matter filched from some of those fixed stars which shed a blue light; in which frigoric is probably the natural parent of fluidity and vaporization, as caloric is in the atmosphere of the sun.—Confound Peg. and Rosa :—they have again plunged out of the solar system.

115. It has been noticed that force, the result of mere pressure, in the exercise of the tactile sense, conveys its impulse by the whole moleculæ which constitute the nervous fibrillæ of the part. But if the force result from intruded caloric, the impulse is conveyed through and by the atmospherical caloric of the same moleculæ, and the sensation is that of heat; if it result from intruded frigoric, the impulse is conveyed through and by the atmospherical frigoric of the same moleculæ, and the sensation is that of cold. These are called sensations of temperature; and the sense which conveys them may properly enough be called the sense of feeling, in contradistinction to the sense of touching.

116. In the action of temperature, or in the exercise of the sense of feeling, as caloric is intruded into the nerves of a part, frigoric must be extruded from the nerves of the same part, *et vice versa*. But when caloric and frigoric are both at the same time intruded into a part, the impulse creates not a sensation of temperature, but one of light. This near relationship of these two stimuli, will render it expedient to view them together presently.

117. It is necessary to discriminate, among sensations of temperature, those which are properly such, from others that belong to the families of pleasures and pains; and which come more appropriately under consideration as a branch of symptomatology. The scorching pain created by handling frozen mercury at 40 degrees below zero, or at 138 degrees *below* the temperature of the blood; is scarcely less agonizing than that created by handling hot lead, or iron, at 236 degrees, which is 138 degrees *above* the temperature of the blood. In both cases blisters are raised, the skin is corrugated and soon disorganized, and the pain is intense: but this pain announces damage to structure—it is a morbid phenomenon; and it is not one of healthy customary sensation.

118. The modifications of impulse which create modifications of sensation, vary only by such slight and delicate shades that it will be expedient, in order that the reader may view them in juxtaposition, to notice those of several of the external senses together, or at the same time. All healthy sensations are the results of inter-molecular motion, or rather of a mere impulse to move, in the atmospheres of the constituent moleculæ of the nerves of sense. But, reader, you must think a bit, as well as read; or it will be of no use for me to write the revelations of St. Anthony's microscope.

119. In the sense of touch, pressure causes an approximation of the centres, or an impulse to approximate, in whole moleculæ, as they are lineally arranged in a fibril of tubular neurine; but without an effort of instantaneous resilition. If there were an effort of instantaneous resilition after the approximation, the impulse, instead of creating a sensation of touch, would, at least in nerves short enough and soft enough to communicate, in fact, such an impulse to the brain, create a sensation of sound. An impulse which causes approximation and instantaneous resilition, alternately, rapidly, in whole moleculæ, constitutes sonorous vibrations. In *feeling*, the central and atmospherical nuclei of the same lineally arranged moleculæ, remain fixed; and their interstitial caloric or frigoric, *either alone*, conveys the impulse. The impulse acts lineally, *between, through and among those fixed nuclei;* and as either caloric or frigoric moves, or only tends to move, centripetally, or towards the brain, the other moves, or only tends to move, centrifugally, or from the brain. The atmospheres of the moleculæ, whether calorific or frigorific, which carry the impulse, expand in exact proportion to the impulse which they convey; and the atmospheres of their interchained antagonists contract, in an exactly correspondent ratio. In *seeing*, the central and atmospherical nuclei of the constituent moleculæ of the optic nerves also *remain perfectly fixed;* and the impulse of light is conveyed by their interstitial caloric and frigoric, *both at the same time, in the same direction*. The impulse of light tends to distend the atmospheres of both calorific and frigorific moleculæ at the same time; *and therefore it cannot distend either; and it is consequently conveyed, as if by incompressible matter, in inelastic tubes*, to the brain. This is precisely the case in white light, and very nearly also in green color; but in *colored light*, the impulse conveyed by interstitial caloric, is, to that conveyed by interstitial frigoric, *never quite equal*—it is always more or less; and there will be some augmentations of volume in that atmosphere, whether calorific or frigorific, which conveys the stronger impulse; and at the same time an exactly correspondent decrease of volume in that of its antagonist, conveying the weaker impulse. But even in the weaker one, there must be force of antagonism sufficient to convert the nervous fibrillæ into nearly inelastic tubes; or the impulse would fail to communicate a sensation of color, and would give one of temperature only—as is the case in the solar spectrum, on the verge of the red, just without the range of the colored spectrum. The impulses which create the sensation called red, augment the calorific atmospheres; those which create the sensation of violet, augment the frigorific atmospheres; and the atmospheres of their interchained antagonists, in each case, is decreased in a corresponding proportion. When the equilibrium which is maintained by these antagonistical forces, has been thus warped, by either color, in the expansion of the optic nerves, (the retina,) it will regain its normal condition on removal of the stimulus, (as on closing the eyelids;) and in doing so, it will yield the phenomenon called occular spectra.—The relative impulses conveyed by interstitial caloric and frigoric, to create sensations of the prismatic colors and of temperatures, may be approximately represented, in tabular form, as follows:

	Intensity of Impulse by Caloric.	Intensity of Impulse by Frigoric.
Cold	0	8
Violet	1	7
Indigo	2	6
Blue	3	5
Green	4	4
Yellow	5	3
Orange	6	2
Red	7	1
Heat	8	0

120. When noticing the co-agency of caloric and frigoric, we have often alluded to exceedingly

similar characteristics; and we have recognized them, though so similar in many features, yet brought constantly into antagonism by the interchainment of the constituent moleculæ of matter; but there is one other point, the bamboozling point of many sages, which requires yet to be noticed. The violet rays of light, consisting of impulses of which seven eighths are conveyed by frigoric, are the most refrangible; and the red rays, consisting of impulses of which seven-eighths are conveyed by caloric, are the least refrangible; but the rays of both kinds, red and violet, are bent toward the centre of any mass, or toward the centre of the globe, on entering it from a rarer medium. It is also well known that the concentration of caloric leads to fusion, fluidity, vaporization, &c.; and the concentration of frigoric leads to fixity or solidity. These circumstances, and many others, depend on the constitution of the earth and its atmosphere: the earth is the reservoir of frigoric, its atmosphere of caloric. A tree has its roots, which are its intestines, in the earth, the reservoir of frigoric; and its leaves, which are its lungs, in the air, the reservoir of caloric; and these two, balance each other, and maintain the equilibrium of vegetable life, through the whole tree. When such phenomena as evaporation take place, whether of water or other liquids, the *caloric* which is undergoing a modification of arrangement *goes off centrifugally* with the steam or vapor; but the *frigoric*, during the transition of state, *retreats centripetally* into the mass. This mode of retreat of frigoric has hitherto eluded the prying sagacity of experimentalists; but they have caught caloric, again and again, whilst doing its work. When water in a watch glass, placed over another vessel containing concentrated sulphuric acid, and both placed in an exhausted receiver of an air pump, is frozen by the evaporation which ensues, the caloric goes with the vapor; but the frigoric retreats into the water in the watch glass, and converts it into ice. When evaporation from the surface of the earth, or in any other case, takes place, the vapor carries with it the caloric which just prior was in the fluid, and was fixed there by the interchainment of the moleculæ in whose atmospheres it dwelt; but the frigoric of the same fluid, so soon as it is liberated from its interchainment with its antagonist, retreats instantly centripetally or towards its own reservoir. Those phenomena which are relied on to support the hypothesis that cold is only the negation of heat, are instances chiefly of this habit of frigoric of retreating centripetally, or into the freezing liquid, or into the more solid of the two characters of matter concerned in such changes.

121. Odor and savor, as stimuli of the senses smelling and tasting, consist of impulses communicated to, and conveyed by, atmospherical nuclei; the central nuclei remaining fixed. These impulses are caused by the absorption of additional atmospherical nuclei, from fragrant and sapid matter.

122. When the atmospheres of compound moleculæ are being charged with several varieties of moleculæ, as by the absortion of what are called soluble substances in a suitable menstruum, a vast variety of chemical phenomena ensue; but of all these the most interesting to the psychologist are those which take place in the moisture upon the schneiderian membrane and the papillæ of the tongue, and create the sensations of odor and savor.

123. Although electric fluid and galvanic fluid consist of simple moleculæ, yet the two fluids differ, in the phenomena which they produce; and odor and savor, although they both consist of the very same, yet they differ in precisely the same way and ratio. Electric fluid is ordor, and you can smell it; and galvanic fluid is savor, and you can taste it.—The experimental philosopher, like a greyhound, follows his game only by the eye; and a greyhound, in pursuit of a hare, will sometimes run his head against a stump or an emmet bank, perform a summersault, at the risk of a broken neck, and, sitting upon his tail and staring contrary way to that which the game is running, will look, in his bewilderment, as grave a fool as any philosopher.

124. The phenomena which result from the nuclei of moleculæ being partially free to obey their initial attraction—that is to say, from nuclei being not entirely fixed in the atmospheres of any interchained moleculæ—as in magnetism, electricity, galvanism, odor, savor. (overlooking the motions of the neural aura the while,) present a series of apparently enigmatical mutations; but they are all governed by the initial attraction of each individual nucleus. Each little fellow has an endowment of specific power, quite his own; and according to the circumstances by which he is surrounded, he will act. *He reciprocates attraction with all nuclei circumjacent, being of his own family.* If, by this reciprocation, he be urged towards a, with a force equal to 2, and towards b, with a force equal to 1, he will move, (if he can, or as antagonism will permit,) or tend to move, towards a, with a force equal to 1.—This is simple enough: and, also, ample enough for all things.

125. In the earth's atmosphere, partially free nuclei, (called magnetic fluid,) are retained about the earth, instead of being centrifugally hurled off into space by the diurnal motion of the earth, because the density of attracting points, with which they reciprocate attraction, increases towards the centre of the earth—it is, in short, little else than a modification of gravity, which retains them. Also the same increase of density in attracting points, causes their congregation about the poles of the earth, about certain localities called magnetic poles, about magnets and magnetized iron, and about other bodies. When electric fluid is extruded from its latent state in glass or rosin, and hurled for a small distance into the circumjacent air, it is retained about conductors by the same initial attraction of each individual nucleus; and some of these nuclei occupy, or form a stratum, like galvanic fluid, between the circumjacent air and the conductor.—When galvanic fluid is developed by chemical action, from its latent state in the atmospheres of interchained moleculæ, it occupies or forms a stratum between the surface of some conductor and the surrounding air; but some of it becomes insinuated into the surrounding air, and then becomes identical with electric fluid.

126. Odor is electric fluid; savor is galvanic fluid.—Odor, being free nuclei emitted, (perhaps to the eighth of an inch,) into air from some fragrant body, (say a tube rose,) may be smelt at some yards distance.—When I lived on the upper Mall, Hammersmith, I had specimens of the magnolia grandiflora, in full blossom one moist warm evening, and their odor was smelt very beautifully over the Thames, a distance of three or four hundred yards; but the emanations from the blossoms probably never penetrated the air so far as one yard off. They produced, nevertheless, full sensation across the Thames; acting upon my schneiderian membrane, and through my olfactory nerves upon my brain. A farthing rushlight, at the tail of a paper kite, one mile high, would be seen, on a clear dark night, for a mile all around: a sphere, two miles in diameter, would thus be filled with an impulse, called light, by the combustion of perhaps ten grains of tallow, per minute.

127. It is not essential that the identical nuclei which were emitted by the magnolia or tube rose, should ever come within a hundred yards of any one's nose, in order that it may be smelt; any more than it would be essential that the caloric and frigoric which are simultaneously escaping from the rush light at the kite's tail, (and which could not be detected by any instrument at ten yards off except in their character as light,) should arrive at the retina of some one's eyes, in order that it may be seen. The impulse, and that alone, is essential in both cases; and so beautifully elastic and sensitive is the antagonism between the constituent moleculæ, which governs these impulses, that the impulse, called light, is squirted the distance of the earth from the sun in eight minutes.

128. If the nuclei emitted from, and rendered free by, a fragrant body, (say a rose,) were of one family only, whether calorific or frigorific, they would create an electrical atmosphere about that body, instead of an impulse called odor. There must be some of each family emitted simultaneously; and in proportions varying according to the odor. Each, therefore, prevents the other from entering, augmenting and becoming latent in, the atmospheres of the moleculæ of its own family in the surrounding air; and the joint effort of the two, which constitutes the impulse called odor, is propagated to a considerable distance around.

129. If the nuclei emitted by a fragrant body could become latent in the atmospheres of the moleculæ which constitute the surrounding medium, (as air,) they would not communicate any sensation of odor to a nose at one foot distance: they would at once become savor; and if the surrounding medium were a liquid instead of a gas or gases, they would yield the sensations of taste on application to the tongue.

130. In sapid matter, these nuclei dwell in the atmospheres of its constituent moleculæ—as they do also in zinc, copper, and other materials of which galvanic piles are formed—and when such matter is placed in contact with the wet tongue, they pass from the atmospheres of its constituent moleculæ into those of the saliva or moisture of the tongue. An impulse is thus originated in close contact with the papillæ of the tongue; and it is communicated through the gustatory nerves to the brain.

131. When sapid matter is placed in the mouth, combinations on chemical principles ensue, between its constituent moleculæ and those of the saliva; and these combinations are very extensively modified by mere mechanical pressure, and multifarious admixtures. The atmospherical nuclei are liberated from their latent state, precisely as they are in a galvanic pile, and also as they are from food undergoing gastric digestion to afford a supply of the neural aura. Tasting is, in short, only the beginning of gastric digestion.

132. Tasting is the beginning of gastric digestion in the mouth; and smelling is the beginning of pulmonary digestion in the nostrils. Tasting and smelling are sentinels on duty, to welcome friends and ward off foes; the former for the protection of gastric digestion; the latter for the protection of pulmonary digestion.

133. The stimulus of the seventh sense is a secretion within the body. The other senses are subservient to the preservation of the individual; the seventh is subservient to procreation, requiring dual reciprocation, for the production of new beings.

134. This sense is commingled with emotional feeling, and it presents exceedingly interesting subjects of contemplation, upon which a large volume might be written. But it will be expedient here to remark only that the production of sexual difference, called male and female, by the same parents, under circumstances that the individuals concerned cannot recognise as being in any way dissimilar, will be discovered to depend on the prior insulation, at the moment of impregnation, of a pair or set of calorific moleculæ and the subordinate insulation of a set of frigorific moleculæ, for the one sex; and the prior insulation of a set of frigorific moleculæ and the subordinate insulation of a set of calorific moleculæ, for the contrary sex.—The subject is not, however, over suitable for our present essay.

135. Bodily pleasures and pains come more appropriately under consideration as symptoms of diseases—as vowels in the alphabet of symptomatology—and they will therefore not be noticed in the present Glimpse.

136. On closing this third Glimpse, it may be observed, that our views have been, for the most part, directed to phenomena which transpire exteriorly to the animal frame. It will now be necessary to penetrate the interior—to gallop our stud up and down the nerves of living beings—to explain the phenomena of diseases and the mode of operation of remedies. Bodily pleasures, bodily pains and periodicity, as leading morbid phenomena, are chiefly to be noticed. These, however, are sufficient to yield "Glimpses," such as the annals of medical philosophy have never yet recorded; and the juvenile Æsculapius who can comprehend my excursive random glimpses, will recognize visions of glory to medical science that would justify any paroxysm of rhapsody into which his mind may be hurried.

GLIMPSE THE FOURTH.

137. In perfect *health*, every part of the body receives a specific amount of arterial blood, charged with the arterial aura; and also a specific amount of neural aura, brought by the nerves of the part; and these are both used up by the *healthy* function of each part. But if the amount of either arterial aura or neural aura sent, or brought to any part of the body, *exceed* this healthy or specific amount; or if it *fall short* of it; or if it be *not used up* by the function of the part; some modification of disease will ensue.

138. Phlegmonous inflammation furnishes an example of *arterial* aura brought *in excess* to parts inflamed. Syncope from hemorrhage, shows the character of a *deficient supply* of the arterial aura. Convulsions afford instances of *neural* aura sent in *excess* to muscular structures; and paralysis affords an instance of a *deficient supply* of neural aura to the same structures. When the neural aura which is sent to any organ *is not used up* by its function, it *is reflected*, or thrown back into the nervous system: hysteria is a remarkable instance, in which the neural aura, which should be used up by the function of the uterus, is thrown back into the nerves: and conveyed by them, in excess, to various parts, in the muscles causing convulsions.

139. Besides these extreme cases of morbid condition, there are many less conspicuous aberrations, and various morbid modifications, to which the distribution of the arterial aura and neural aura, through the animal system is exposed; and a correct appreciation of all these deviations from health, is very essential to the successful treatment of diseases.

140. *The equilibrium of life*, in man, animals, vegetables, down to the least perfectly organized existence, *is a balance of two attractions, acting in antagonism, by the interchainment of the constituent moleculæ of matter*—being modifications of that which appertains in water, and other fluids, to uphold their characteristics.

141. In all matter, animate and inanimate, infinite sense bestows and upholds initial attraction. Its *first* modification is the result of congregating many nuclei about one governing nucleus, to form compound moleculæ. These being of two kinds, calorific and frigorific, become interchained; creating an antagonism which maintains the characteristics of all matter, and entirely governs all physical phenomena. A modification of this antagonism, under which one of the antagonistical forces is influenced by caloric in its reservoir the air, and the other by frigoric in its reservoir the earth, constitutes the equilibrium of *vegetable* life. In living beings, especially in man and the more perfect animals, there is an *additional modification* of this antagonism: the antagonistical forces are influenced by two exceedingly important and indispensable animal functions, called digestions, situated in organs and

cavities of the body, separated by a diaphragm. Pulmonary digestion influences one of these antagonistical forces; gastric digestion the other; and this modification of the same antagonism is called the equilibrium of animal life. In plants and trees, these functions are not exceedingly dissimilar: in them the leaves serve for lungs, and the roots for stomach

142. Vegetables live, and grow, and propagate their species, as distinctly as do animals and man; but they have *not will*, and power of locomotion, nor external senses, as have man and animals. Animal life, therefore, enjoys some superaddition to vegetable life; and in virtue of which it can govern, to a limited extent, the equilibrium of life: animals enjoy senses, and possess powers of locomotion—they can seek pleasures and avoid pains, in infinitely varying degrees.

143. If a crow be hatched on the top of a tree, or a fish be spawned at the bottom of the sea, or a pig be littered in a sty, or a prince be born upon a down bed, each receives, from the font of infinite sense, a finite amount of sense, insulated from the infinite—*that amount which its organisation is designed to educate* —In man, this finite amount of sense is called, the human soul.

144. Like its omnipotent and omniscient parent, infinite sense, ("the spirit of power," "the spirit of truth," "the comforter," "the Holy Ghost,") this finite amount of sense, the soul, *can modify attraction* between the constituent moleculæ of vesicular neurine, by its fiat or will; and in governing that attraction, it is enabled to perceive sensitive impulses, and every variety of elementary force which can, in any way, act upon the power which it upholds. By governing the two forces in antagonism to constitute the equilibrium of life, the soul is enabled to effect the developement, from its latent state, of neural aura; and at the origin of any nervous fibrillæ that will, through the instrumentality of muscular contractions, accomplish its designs.

145. In perfect animal life, we have to recognize *three* modifications of antagonism: 1st, that which is bestowed and upheld by sense infinite, by which neurine, and other living animal substances, maintain their characteristics as matter, whether during life or after death; 2dly, that which is upheld and modified by finite sense, and in virtue of which we perceive sensitive stimuli, sleep, perform volitions, cogitate, &c., and which is extinguished by death; and 3dly, that which consists of pulmonary and gastric digestions, each supporting one of the forces in antagonism in neurine. This last also expires at death and it is particularly subject to morbific derangement during life.—There are, moreover, many local antagonisms going on in functional organs—as in muscles, the liver, kidneys, &c., &c., but it is desirable to keep them out of the present category.

146. Not knowing any suitable term in use to express the acquisition of simple calorific moleculæ by the arterial blood in passing through and leaving the lungs, when the same are separated from inspired air by pulmonary or thoracic digestion, I have heretofore called the act, *the arterial œrosis*, in order to distinguish this act from the act of the separation of carbon, azote, &c., from venous blood on entering the pulmonary circulation, called æration. And to express the acquisition of simple frigorific moleculæ, by the sympathetic nerves distributed over the stomach and intestines, when the said moleculæ are separated from food, drink and medicine, by gastric or abdominal digestion, I have used the term *neural œrosis*.—The arterial ærosis, a result of pulmonary digestion; and the neural ærosis, a result of gastric digestion; *balance each other*, or act in antagonism, *throughout the whole living frame*. The neurine of variously dispersed ganglia are centres for these antagonisms almost the same as in vegetable life; but in the neurine of the hemispherical ganglia especially they modify, momentarily, and in multitudinous modes and degrees, the equilibrium of life.

147. A full meal of generous food, free libations of ale, wine, brandy or alcoholic liquors of various kinds, opium and other narcotics, *increase the neural* ærosis; and supply the neural aura in *vast abundance*, which presses upon the equilibrium of life for accommodation, in vesicular neurine; and if the arterial ærosis be not at the same time augmented to balance the neural, *the individual will go to sleep*, and snore like a bull frog.—A London alderman, after a turtle feast, his ledgers being altogether satisfactory, and with no companion but a wife of twenty years' standing, will afford an illustration in point. But if the arterial ærosis be at *the same time* augmented by an effort of the soul, so as fully to balance the neural ærosis, the individual *lives double* life, and twice at once. Thus, the same London alderman, after his turtle feast, if his business affairs demand vo untary mental effort, or if he have very exciting company, becomes capable of almost superhuman cogitation, and one of the most facetious beings living.

148 When the neural ærosis is augmented as above, if the arterial ærosis *be also augmented* by breathing laughing gas or pure oxygen, the individual becomes half frantic, his imagination poetical, and "his eyes in a fine frenzy rolling." If the balance be effected *simply by increased action* of the cerebral arteries, a temporary phrensy, conspicuously like phrenitis, ensues—a morbid condition, in which nearly the same circumstances appertain.

149. In the last stage of fevers, inflammations, and in many diseases prior to death, coma, and what is called the comatose state, is noticed: this state results from the *arterial œrosis being overpowered* by an excess of neural aura, throughout the venous blood and the whole nervous system; which neural aura presses for accommodation in vesicular neurine; but ineffectually, because that is already supersaturated.

150. If the arterial ærosis *be weakened*, as by inspiring the vapors of sulphuric æther, or of chloroform, even without any disturbance of the neural ærosis, the latter will obtain an ascendency; and a state of *coma*, with *insensibility to pain*, will be the consequence. To administer brandy, or other alcoholic liquors, or opium, or a full meal, or to do any other thing which would considerably augment the neural ærosis, prior to breathing chloroform or vapors of æther, *might totally destroy* the equilibrium of life.

151. If the arterial ærosis be for a moment *totally suspended*, as on breathing azote, or carbonic acid gas, or any gas that very greedily appropriates all the oxygen in the lungs, the equilibrium of life will be instantaneously destroyed.

152. If the arterial ærosis be *augmented*, so as to preponderate, whether by breathing laughing gas or pure oxygen, or by compressing common atmospheric air in the lungs, as when we strive to force thought, or by hurried pulmonary circulation, much like as from increased action of the cerebral arteries as in phrenitis, furious mania, &c., even if the neural æroses be not disturbed, it will be *impossible* for the individual *to go to sleep*; this condition presents an obstacle to the neural aura becoming latent in vesicular neurine, which is indispensable to sleep.

153. We have now noticed some of the more conspicuous phenomena which result from the preponderance of either ærosis, in cerebral substance; but the equilibrium of life appertains in *all the organs* throughout the body, and is essential to the integrity of their functions. The whole animal structure is very beautifully contrived to keep the arterial aura and the neural aura from acting each upon the other until they meet in the different organs at the extreme points of the arteries and nerves; where they come into antagonism again, to fulfil the functions of the organ, be it whatever it may.

154. When the arterial blood is passing out from the capillary arteries into the capillary veins, *the*

arterial aura is brought into contact and antagonism with the neural aura which is brought to the same point by the minute terminations of the nerves of the part. The neural aura, (simple frigorific moleculæ,) unites with the blood; and it expels the pure caloric, (to furnish animal heat,) which dwelt, until now, in the atmospheres of the simple calorific moleculæ, constituting the arterial aura; and this phenomenon effects the nigrification of the blood, or renders it venous.

155. We have just expressed the *healthy* function of parts: but if either neural aura or arterial aura be brought in excess to any part, some disorder or disease is the consequence. If the neural aura be sent *in excess* to any organ, so that it be *not used* up by the function of the part, it is very readily *reflected*, or propagated back into the whole nervous system, by influent nerves following another route than the one by which it was brought; and causing a multitude of morbid phenomena, which have always very much puzzled the practical physician. Hysteria in females, as has been already named, is a conspicuous instance, in which the neural aura, supplied through the *cauda equina* to the uterine system, when freely supplied under some trifling sexual excitement, and which, according to nature, ought to be used up in paroxysms of sexual delight, in uterine secretions, in the support of a *fœtus in utero*, in the formation of milk, &c., *being unused up*, is thrown upon the great sympathetic system of nerves, causing violent contractions of the stomach or *globus hystericus*, and into every ganglion of that system, whence it is again reflected into innumerable muscles, causing universal convulsions. Again, in hysteritis, if it be attended by a *suspension* of the uterine secretions, all the symptoms of hysteria are more or less plainly shown; whereas, if hysteritis be attended with morbidly *increased* secretion of the organ, although there be increased arterial action, yet the *globus hystericus* and convulsions are superseded; because the neural aura sent to the organ *is* used up by its increased secretion.

156. Inflammations are usually regarded as phenomena resulting from increased arterial action of the part; but generally, in such cases, a morbid influx of neural aura to the part affected, *precedes* the increased arterial action, and is the cause of it. In gout, rheumatism, odontalgia, tic doloreoux, and every species of neuralgia, the accompanying increased arterial action of the part affected, is *preceded* by a morbid influx of neural aura, which liberates *more* than an ordinary quantity of caloric from the arterial blood traversing the seat of the disease, and causes pain, heat and increased arterial action. But the disease being once set up, that is to say, the increased arterial action being once established, there is then an increased quantity of arterial blood, charged with arterial aura, brought *to and through* the part.

157. When secreting organs become the seat of inflammation, they are sometimes self relieved by what has been called the *vis medicatrix naturæ;* or, in these cases, by their natural function running wild, and *secreting in excess*, so as to use up the morbid influx of both neural aura and arterial aura brought to the part. The schneiderian membrane in common catarrh, the lining membrane of the trachea in croup, that of the bronchial tubes in bronchitis, that of the urethra in gonorrhœa, are familiar instances. But on other occasions, instead of an increased secretion resulting from this morbid condition, the function of the organ becomes *quite suspended;* and the neural aura sent to the organ, instead of being used up, is reflected back into the nervous system; and creates pyrexial phenomena more or less distressing. Hepatitis and renitis, accompanied by non-secretion, or by diminished instead of increased secretion of bile and urine, are familiar instances.

158. Vegetable and animal poisons, floating in the atmosphere, called miasmata, contagion, &c., when received into the living body, cause the *suspension* of secretion in different organs, without preceding inflammation. When the neural aura which those organs use up in health, is thus reflected back into the nervous system, it creates very formidable pyrexial symptoms. Plague, Asiatic cholera, small pox, measles, scarlet fever, bilious fevers, &c., present an awful phalanx of morbid conditions so created.

159. A morbid condition is sometimes slowly created by the newly developed neural aura being *not carried freely off* from the stomach and intestines by the sympathetic system of nerves. It requires to be drawn off from those organs as it is developed, and to be carried to medullary substance throughout the encephalon, medulla oblongata, medulla spinalis, and all the lesser ganglia; and from their neurine to be reflected to all involuntary muscles, to voluntary muscles also to maintain their ordinary tonicity, to all secreting organs to perfect their functions, and to all parts of the living frame to support growth and change; and if it be not drawn off from the stomach and intestines freely as it is developed, and used up for these various purposes, a train of morbid phenomena ensues. The overfed idle section of the community, are sufficiently conversant with this class of morbid phenomena, under the names of the blues, nervousness, dyspepsia, hypochondriasis, &c; and the potent efficacy of moderate feeding, and a little cheerful hard work, like a jolly good foxchase, to draw off and use up their superfluous neural aura, is familiar to most of such valetudinarians.

160. Having grouped together several morbid phenomena which result from the irregular distribution of the neural aura, it may be well to take a glimpse at bodily pleasures and pains: these are kindred phenomena, and require to be noticed together.

161. Bodily pleasures and bodily pains depend on different *modifications of elementary force*, propagated to, and acting against, the equilibrium of life, maintained by the soul.—If that force act *moderately and gently*, so as to prop up the equilibrium of life, and so as to support the same without any effort from the soul, it temporarily relieves the soul so far from duty, and is felt as *bodily pleasure*. If, however, that force act *violently*, so as to require additional or even desperate effort on the part of the soul to preserve or maintain the equilibrium of life, it is felt as *bodily pain*.

162. One instance of bodily pleasure is that of "scratching where it itches." When the Duke of Argyle obtained an act of parliament for the first turnpike road in Scotland, and erected mile posts, the natives supposed that his Grace erected the same as rubbing posts for those who happened to be afflicted with the itch; and one suffering Scot, as he denuded his itch pimples, ejaculated "God bless the Duke of Argyle," and thus expressed, at once, his gratitude for the supposed boon, and "the pleasure of scratching where it itches." A scurfy pig, or horse, or cow, or other animal, or a mangy dog, when scratched, expresses, scarcely less emphatically, "the pleasure of scratching where it itches." These unfortunates are said to have no soul: they must, however, have something to maintain the equilibrium of life; and the said something can feel bodily pleasures and pains.

163 The constant irritation of itching in any part, worries, teases and tires the soul, to superintend the economy of that part of the brain to which the irritation is propagated; and when that constant irritation is superseded by a distinct scratch, at the same spot, even if it should be violent enough to create some little pain, it *modifies the duty of, and rests* the soul, and is recognized as bodily pleasure. The cessation of a long continued sound, as the constant rumble of carriages in a much frequented street, or of any other too long continued sensation from an easily endured impulse, affords bodily pleasure on the same principle.

164. Tickling, or exciting easily endured sensations in parts which *usually* feel nothing, modifies the duty of the soul in superintending the economy of that part of the brain to which the tickle is propagated; and it is recognized as bodily pleasure. On the same principle, gentle rubbing with very smooth

objects, as polished marble, hair powder, oily liniments, &c., affords bodily pleasure through the tactile sense.

165. The sense of *feeling*, of which temperature is the stimulus, furnishes also some bodily pleasures. A part that is in pain from cold, that is to say, when the impulse propagated through the interstitial frigoric of the nerves of feeling presses painfully upon the equilibrium of life, so as to require considerable effort on the part of the soul to preserve uninjured the economy of that part of the brain to which the impulse is propagated, the application of *warmth aids* the soul, and relieves it of duty; and the result is felt as bodily pleasure. On the same principle, when an impulse propagated through interstitial caloric of the same nerves becomes painful, the application of cold is felt as bodily pleasure.—The Russians, who alternately plunge into baths a little short of scalding, and then roll in snow below zero, act thus to cultivate these pleasures, and play a tune upon the sense of feeling.

166. The eye and the ear, or seeing and hearing, are more particularly designed to admit ideal pleasures, such as beauty of every kind kindles, to minister to the emotional powers of the soul: they furnish, nevertheless, bodily pleasures in some degree.

167. Light, which consists neither of particles projected from luminous objects like shots from a fowling piece, nor of undulations like sound, consists of an impulse of the nature of *a steady continuous squeeze*, propagated through and by interstitial caloric and frigoric, both at the same time, in the same direction. Sunshine, or the light of the sun, is an impulse of this kind: it is steady pressure upon the perfectly continuous, incompressible, and inconceivably elastic media which occupy the plenum between the sun and the earth, resulting from the attraction subsisting between those two orbs; but the impulse can be propagated only through or by *interstitial* caloric and frigoric, and *not by the nuclei* of the moleculæ in which these dwell. In every variety of ordinary combustion, there is always an impulse to move, in both interstitial caloric and frigoric, at the same time, in the same direction: if their impulse to move acted in *contrary* directions, it would constitute a phenomenon of temperature.—In passing, let us observe, that Newton's laws of light are the laws of impulse propagated through highly elastic media; and, therefore, they suit, to admiration, the laws by which impulse squirts from the sun to the earth in eight minutes. But if light actually consisted of infinitely small particles, projected with the necessary velocity, "the solid globe and all that it inhabit," would be reduced to an impalpable powder in half a day. And if light consisted of undulations like sound, which requires vibratory motion in the central nuclei of moleculæ, it would, like sound, never travel the distance of the sun from the earth: no one has ever yet heard the thunder of the sun, nor the most obstreperous *feu de joi* of the solelians. Undulations would be neutralized, after a relatively short journey, as in sound they are, by the attraction between interchained moleculæ—the very circumstance that squirts light, with its extreme velocity; and yet so delicately gentle as not to impart motion to the feeblest tuft of swan's down upon which it may inpinge.

168. When we behold violet color, seven-eighths of the impulse of light are conveyed by instertitial frigoric, and one-eighth by interstitial caloric; and when we behold red color, this relative condition is exactly reversed: caloric conveys seven-eighths, and frigoric one-eighth, of the impulse of light. As the impulse conveyed by either descends from seven to one and that conveyed by its antagonist ascends from one to seven, all the prismatic colors will be successionally perceived. In cases of ocular spectra, after looking steadily upon bright red, the atmospheres of the calorific moleculæ of the retina and optic nerve have been augmented by caloric intruded by a force equal to seven, and the atmospheres of the interchained frigorific moleculæ have been decreased in a corresponding proportion by extruding frigoric; and if we now close the eye-lids, to allow the moleculæ of both families to acquire their normal condition, or return to their unexcited state, all the prismatic colors will be successionally perceived, *because they have to pass through all the relative conditions of impulse* in prismatic colors.

169. Such being the mode of action of the impulses of light in prismatic colors, sense, or the soul, where it upholds the equilibrium of life at the origin of the optic nerves, must be squeezed by these impulses in precisely similar relative proportions; and on beholding red, when seven-eighths of the impulse of light tend to augment the atmospheres of the calorific moleculæ, *the soul must augment* the attraction between the interchained frigorific moleculæ to a force equal to six-eighths, (one-eighth being supported by frigoric,) to preserve the economy of the part, or maintain uninjured the equilibrium of life. And the soul will have to act in a similar mode, in reference to the modifications of the incident impulses of light, in all the other prismatic colors.

170. But why the sensations of red, orange, yellow, green, blue, indigo and violet, should arise in soul under the appropriate circumstances, we can by no manner of means recognize; any more than we can recognize why other sensations should arise in soul under other and dissimilar modifications of impulse. That it is the nature or power of an immaterial essence, like sense, to be so affected under the appropriate circumstances, there can be no doubt; but we cannot recognize aught for one gradation further. We will, however, ask, in passing this point,—if such be the capabilities and powers of finite sense, what may be the capabilities and powers of infinite sense, the font whence the finite is derived?—Infidels and atheists would do well to answer the question.

171. When the vision is wholly filled by one color, as by red, on beholding a glorious sunset, or by green on beholding a field of thriving young wheat, or by blue on beholding a clear sky or the ocean occasionally, a sensation of bodily pleasure, but very slight indeed, is derived through the eye; but the soul is so fully occupied by emotional delight on such occasions, that it is difficult to recognize separately the bodily pleasure. The French philosopher who constructed an ocular harpsichord, by wholly filling the vision with different prismatic colors in alternations, like filling the ear with musical notes in rapid succession, may be presumed to have enjoyed an appreciation of this kind of bodily pleasure exceeding that which falls to the lot of ordinary mortals.

172. The ear, or the sense of hearing, affords much emotional delight; but it is not easy to recognize the bodily pleasure it affords. Any one note, *per se*, affords bodily pleasure, as does any one color to the eye; but when we listen to music, the cadence, rhythm, harmony, melody, &c., appeal so potently to the emotional powers of the soul, that we can scarcely recognize the bodily pleasures afforded by the notes.

173. Sound, the stimulus of hearing, is an impulse propagated through or by whole moleculæ—their *centres approach and recede* alternately, in very rapid succession, (called vibrations;) and as the centres of the calorific approach, those of their interchained antagonists, the frigorific, recede, *et vice versa;* and they thus maintain the equilibrium of life at the origin of the *portio mollis* of the auditory nerves, without much effort being required of the soul to superintend the economy of the part. The circumstances which give rise to bodily pleasure, a relief from the duty of vigilant superintendence on the part of the soul, almost continuously appertain at the origin of these nerves during the continuance of agreeable sounds; so that those sounds always afford some bodily pleasure. But when the duty of the soul is *continually and momentarily shifting and varying*, accordingly as the impulse of sound acts with greater or less stress now upon calorific and now upon frigorific moleculæ, and yet always with such safe and easy gradations and transi-

tions that the soul is never distressed or embarrassed, it becomes delighted, as through the tactile sense by tickling, beyond the ordinary scale of enjoyment.

174. The nose, or the sense of smelling, affords a rich supply of bodily pleasures, which are very readily recognized. Nevertheless, we do not hear of any artist inclined to construct a nasal harpsichord, to play a tune upon the nose; except indeed those coarse athletæ, called pugilists, may be said to evince a taste for beating a tune upon noses.

175. Odor, the stimulus of the sense of smelling, consists of unfixed calorific and frigorific moleculæ, mostly simple like electric fluid; but nevertheless they may be also binary, ternary, &c., compound moleculæ, *provided they be unfixed*, or not too completely fixed, in the atmospheres of interchained moleculæ, by attraction to their central nuclei. As the nuclei of such odorous moleculæ endeavor, by the force of their initial attraction, to penetrate the atmospheres of the constituent moleculæ of the air which surrounds a fragrant body, they cause similar nuclei to be extruded, in proportion as they succeed, from the atmospheres of other constituent moleculæ of air, being of the same family, wherever, within a limited distance, (say one hundred yards,) there exists matter, (like the juices on the pituitary membrane,) that will readily receive them; and thence it happens, that the identical nuclei which escape from a fragrant body may never travel one yard, or one foot, (except the air in which they are entangled be wafted away by a passing breeze,) from the body which emits them; yet, nevertheless, the odor operates upon schneiderian membranes at one hundred or more yards distant.

176. As the nuclei of oderous moleculæ are absorbed by the juices of the pituitary membrane, they pass through those juices into the atmospheres of the moleculæ which constitute the terminations of the olfactory nerves; and after having entered those atmospheres, they fall to their central nuclei, by initial attraction, just as they fall to conductors, so far as they can, in electrical atmospheres; or just as occurs in chemical phenomena of solution and absorption.

177. The odorous nuclei now become atmospherical nuclei, to the compound moleculæ which constitute the terminations of the olfactory nerves; and in their capacity of atmospherical nuclei, they augment the force of attraction between every two contiguous central nuclei; each aiding its own family, whether calorific or frigorific. A diffusion of these atmospherical nuclei through the atmospheres of all the moleculæ, (each being necessarily true to its own family,) of the olfactory nerves, quite up to their origin in the brain, instantly ensues; augmenting the attraction of *all* their centres. The word diffusion, is used to enable readers unaccustomed to such thoughts to comprehend the phenomenon; but it is mal-appropriate as regards these atmospherical nuclei, and appropriate only as regards the *impulse* of odor. The *identical* odorous nuclei *which penetrate* the terminations of the olfactory nerves, may be a day, or a year, before *they* reach the brain—but they cause an instantaneous condensation, (a crowding together about central nuclei,) of atmospherical nuclei *similar to themselves*, quite up to the brain; and, consequently, an instantaneous augmentation of attraction between the central nuclei of the constituent moleculæ of the nerve. This augmentation of attraction is the modification of force which is felt by sense, or recognized by the soul, as odor.

178. The bodily pleasures, which are many, various, and some very beautiful, of this modification of impulse, are sufficiently distinct from emotional feelings. The odor of a rose may be associated mentally with the sight of a beautiful flower, and emotionally with many love kindling reminiscences; yet, nevertheless, the pleasurable odor is prominently distinct from any of these associations.

179. Pleasurable odors are intimately associated with salubrious air, and its exhilarating effects through the agency of the lungs. They are designed to indicate the air which it is desirable to admit through the larynx; and, in the next degree, to indicate the food which it is desirable to seek, to pass through the pharynx. In the latter character, they operate as a powerful stimulus of action upon animals seeking food, especially upon beasts of prey. They have also a considerable influence in reference to sexual feelings.

180. When the attraction between the centres of the calorific moleculæ of the olfactory nerves has been considerably *more* augmented by the intrusion to their atmospheres of odorous nuclei of their own family, than the attraction between the centres of their interchained antagonists has been similarly augmented, the soul can partially withdraw its supervision over the attraction between the calorific moleculæ, or *rest from that duty*, whilst it *has to augment* the attraction between the interchained frigorific moleculæ, to preserve, in tact, the equilibrium of life in the part; and this modification of duty is felt as bodily pleasure. If on the contrary the attraction between the centres of the frigorific moleculæ be more augmented than that between the centres of the interchained calorific moleculæ, the duty of the soul will be exactly reversed; but this modification of duty will also be recognized as another bodily pleasure.

181. An approximation to the same relative modifications of impulse that appertain in prismatic colors, will be found to appertain also in elementary odors, as well as in elementary sounds and savors. As yet we posess no satisfactory classification of elementary odors; but it is possible that future discovery may enable us to divide them into two grand classes, namely, first, those which augment, the more considerably, the attraction between the calorific moleculæ of the nerves of smell; and, secondly, those which do the same in the frigorific moleculæ of the same nerves.

182. The tongue and palate, or the sense of tasting, supplies many bodily pleasures. Savor, the stimulus of this sense, consists of simple, binary, ternary, &c., moleculæ of both families. Often, but not always, they are identical with those of odor; but odorous nuclei are *ejected from* the atmospheres of the constituent moleculæ of fragrant bodies, to some small distance, *into air;* whereas flavorous nuclei *dwell in* the atmospheres of the constituent moleculæ of *sapid bodies, until those bodies combine chemically* with other matter, as the saliva and various liquids; when, by the play of attractions between perhaps four, or six, or eight, or more forces, in antagonistical pairs of two, they are expelled from their latent state, into the atmospheres of moleculæ in contact, which offer least resistance to their reception—on the same principles as galvanic fluid is developed from water between zinc and copper; and on the same principles precisely as neural aura is developed from the same sapid bodies, when they are undergoing gastric digestion.

183. Savor requires a *liquid* for its vehicle; odor requires *air* or some gas. Sapid bodies require *actual contact* with the wet papillæ of the tongue, or else solution in a liquid which is in actual contact with the said papillæ, in order to transfer their flavorous nuclei to the atmospheres of the moleculæ which constitute the terminations of the gustatory nerves; whereas fragrant bodies transfer their oderous nuclei, *for a short distance*, into air; and communicate an impulse of odor to a considerable distance around.

184. So soon as flavorous nuclei become located in the atmospheres of the moleculæ which constitute the terminations of the gustatory nerves, they become obedient to nearly the same laws which regulate odors. Pleasurable odors and pleasurable savors, although they differ in some respects, yet they so nearly resemble each other in most respects, that it may fairly be hoped, in case the well under-

stood constitution of sugar, salts, acids, alkalis, &c., &c., should ever afford the means of satisfactorily classifying savors, that the same means may furnish a clue to the classification of odors.

185. The seventh, or sexual sense, supplies bodily pleasure of a singularly overpowering kind; and very strangely blended with emotional feelings: but we will leave the discussion of this subject to the voluptuary and sensualist.

186. The stomach is an organ that affords a liberal supply of bodily pleasures; but of a character different from those afforded by the external senses. They are after the nature of satisfaction: they arise from the *removal of some want* of the constitution by satisfying that want. Thirst, or the want of additional water in the blood; hunger, or the want of additional chyle in the blood; exhaustion, or the want of a supply of neural aura in the nerves and brain, are instimulations to urge animals to drink, to eat and to select the most generous drink and food. The *removal* of thirst, hunger and exhaustion, affords a class of bodily pleasures in which the wine bibber and the epicure luxuriate.

187. The lungs afford no acknowledged bodily pleasure; but the need of a supply of arterial aura in the blood, is so continuous that without breathing animals can live only for a very short time. The want of air, or the instimulation *to breathe*, affords no acknowledged bodily pleasure when satisfied; but to cease to breathe, would be death.

188. The bodily pleasures derived from the external senses, result from impulses conveyed by calorific and frigorific moleculæ *conjointly;* but in the pleasures afforded by the stomach and lungs, they *no longer act conjointly* The stomach is the laboratory for the elimination of frigorific nuclei; the lungs the laboratory for the elimination of calorific nuclei. These two sorts of nuclei are *kept apart*, by the structure of the animal frame, till they meet in antagonism again in the brain, in the muscles, in all secreting organs, and in every living structure.—A knowledge of the circulation of the arterial aura with arterial blood, and of the circulation of the neural aura throughout the nerves, ganglia and brain, will be incomparably more conducive to the advancement of medical philosophy than a knowledge of the circulation of the blood, in which physiologists have chiefly prided themselves ever since the days of Harvey, yet I have never read the lucubrations of any author whatever that evinced an approximate perception of these two important circulations. *Dr.* M Hall's work on "the Diseases and Derangements of the Nervous System" comes the nearest to a recognition of the circulation of the neural aura. I expect no better reception for my account of these two circulations now than to procure for me the reputation of a visionary half-cracked enthusiast. But never mind—I am growing old, and must die; and I desire, first, to publish these "Glimpses of an Improved Medical Philosophy," for the next generation.

189. When sapid bodies, in the mouth, are acted upon by the salivary secretions, flavorous nuclei are developed; and when the same substances have been swallowed, and passed into the stomach, they are acted upon with still greater intensity by the gastric juices, and similar nuclei, in vast abundance, are developed by gastric digestion

190. Of the nuclei developed by gastric digestion from the contents of the stomach, *those only of the frigorific family*, in the character of neural aura, pass into the nerves of the great sympathetic system. The vital action by which these nuclei are separated, and selected from those of the calorific family, and passed into the nervous system, I have called the *neural* ærosis.

191. The neural aura, developed from the contents of the stomach, selected and passed by the neural ærosis into the great sympathetic system of nerves, is *distributed*, through tubular neurine, *to all* the ganglia throughout the whole nervous system, including the hemespherical ganglia, the medulla oblongata and spinalis; and the vesicular neurine, throughout all the said ganglia, becomes to a healthy and specific extent only, *saturated* with neural aura.

162 The neural aura received by the various ganglia scattered throughout the nervous system, *after being released* from tubular confinement by entering the vesicular neurine of the said ganglia, *re-enters* the tubular neurine of nervous fibrillæ *effluent* from the same ganglia, to fulfil multitudes of functional purposes throughout the living frame.

193. That portion of neural aura which enters the vesicular neurine of the hemespherical ganglia, where the soul presides, surrounds the central nuclei of the frigorific moleculæ; and each nucleus of the neural aura strives or *endeavors*, by its force of initial attraction, to *find accommodation*, or become latent, in their atmospheres: this effort of the nuclei of the neural aura causes *the feeling of sleepiness*. In proportion as these nuclei succeed in obtaining accommodation in the atmospheres of these compound frigorific moleculæ of vesicular neurine, they augment the force of attraction between their centres; and relieve the soul from the duties of supervision and upholding the same attraction; and this modification of duty affords the bodily pleasure of indulged drowsiness.

194. When in this condition of the circumstances, if the soul *augment* the force of attraction between the interchained *calorific* moleculæ, so as to maintain in full tact and perfection the equilibrium of life in the part, every sense, and every power of the mind, becomes *augmented*. On the contrary, if the soul *withhold* the superadditional force of attraction from the said *calorific* moleculæ, the atmospheres of the interchained frigorific moleculæ will be enlarged and admit to a latent state lots of neural aura; and *the condition called sleep* will be established.

195. The modifications of duty required of the soul under the above various circumstances as withdrawing its supervision of attraction between frigorific moleculæ in some cases, and of augmenting attraction between calorific moleculæ in other cases, are felt as various acknowledged bodily pleasures—the bodily pleasures which are the delight of the glutton, the wine bibber, the drunkard and the opium eater.

196. If the contrary state of the nervous system to that which has just been noticed should appertain—that is to say, when there is a *deficiency* of neural aura throughout the nervous system, as is the case after long fasting, continued labor and vigilance—feelings very far from pleasurable supervene, called exhaustion, famishing, &c.; which certainly do not, especially when extreme in degree, come within the present category of bodily pleasures.

197. There is yet to be noticed one other source of bodily pleasures, if they can be so called: those acquirable through the instrumentality of the lungs. By breathing laughing gas, or pure oxygen gas, we *augment* the arterial ærosis; by breathing the vapors of chloroform, or of sulphuric ether, we *diminish* the arterial ærosis. These are results of modern discovery: the ancients possessed no practical expedients for playing tricks with the soul through the agency of pulmonary digestion.

198 When oxygen is inspired, whether it be mingled with azote in the usual proportion of atmospheric air, or in increased proportion, or combined with azote, (not exceeding one proportional of each element,) as in nitrous oxide or laughing gas, its atmospherical nuclei, whether simple, binary, ternary, &c., *each enveloped in its own specific amount of pure caloric*, are transferred by the vital function called the arterial ærosis to the nigrified blood, as it enters the pulmonary circulation; and the *central* nuclei of the same oxygen become variously disposed of, as *refuse*, in the expired breath. The *atmospheres* of oxy-

genous moleculæ thus furnish the arterial aura; their central nuclei become refuse, and are found mingled with azote, and combined with carbon, &c, in the residuary expired air.

199. The blood in the lungs having become charged with arterial aura, (arteralized,) it leaves the lungs, and returns to the heart; by which organ it is distributed throughout the living frame. On leaving the minute terminations of the arteries, and before entering the terminations, (or origins, if the notion be more acceptable,) of the veins, in every part of the frame, the *arterial aura is brought into contact and antagonism with neural aura* conducted to the same points by the minute terminations of the nerv s. The most interesting phenomena of life, both in health and disease, transpire at these points, and are results of the antagonisms which there ensue; but we have here to notice chiefly those only which occur in vesicular neurine.

200. In the vesicular neurine of all the ganglia throughout the whole nervous system, *the arterial aura maintains an antagonism with the neural aura;* sometimes *displacing* neural aura from its latent state in the atmospheres of compound frigorific moleculæ (which is thence conducted away by tubular neurine,) and becoming latent itself in the atmospheres of interchained calorific moleculæ On other occasions, it is *displaced*, from its la ent state, by the neural aura, (when it is thence conducted away in venous blood,) to admit the neural aura to become latent in the atmospheres of interchained frigorific moleculæ —In vegetable life, and in life without will, and in the organs of all involuntary functions of man and animals, this kind of antagonism, multifariously varied, constitutes the equilibrium of life, even where there exists no vesicular neurine.

201. In the vesicular neurine of the hemespherical ganglia, in which the soul upholds the additional equilibrium called life, the same antagonism transpires for the fulfilment of *involuntary* function; but here it is, more or less, subject to the governance of the soul, in virtue of its supervision of this additional equilibrium. By its fiat, *the soul can develope* neural aura at the origin of such fibrillæ of tubular neurine as will throw into action those muscles which will effect any purpose designed; and, by its fiat, it can also, to a limited extent only, prevent neural aura from becoming latent in vesicular neurine.

202 It is interesting to observe, that pulmonary digestion, for the elimination of arterial aura, and gastric digestion, for the elimination of neural aura, each an independent function, are, in *their effects* upon the living frame, antagonistical. And the arterial ærosis and the neural ærosis are also, in their effects on vesicular neurine, *antagonistical*. These vital functions, *independently*, eliminate arterial aura in the lungs, and neural aura in the stomach; and these aura are kept apart, by the mechanism of the blood vessels and tubular nerves, until they meet at the extreme terminations of the arteries and nerves. Here they have to create *local* antagonisms; which are modified to an extent difficult to determine, by modes always appropriate, however varying, with the functions of the organ and part.

203. If the vital force generated and sustained by pulmonary digestion, and the arterial ærosis, be stimulated and *augmented until it preponderate* over its antagonist, its ascendency will be characterised by specific symptoms. And if the vital force generated and sustained by gastric digestion, and the neural ærosis, be stimulated and *augmented until it preponderate* over its antagonist, its ascendency will be characterised by a *very opposite set* of specific symptoms. By whatever means that force which is based upon *caloric* predominates, its prominent characteristic will be *excitation;* and by whatever means that force which is based on *frigoric* predominates, its prominent characteristic will be *sedative* and *soothing*. The inspiration of air to which has been made an addition of pure oxygen, or the inspiration of nitrous oxide or laughing gas, the compression of air in the lungs as is customary to force thought, voluntary rapid inspirations, as on blowing with the mouth at a common fire, will *augment* the arterial ærosis, and cause symptoms of *excitement*. On the contrary, the inspirations of the vapors of chloroform or sulphuric ether, or of air with a safe admixture of carbonic acid, or any gas that may be safely inspired if it but slightly deprives of oxygen the air in the lungs, will *decrease* the arterial ærosis; and give the *preponderance* to the neural ærosis, and cause *soothing* symptoms, even sleep and insensibility to bodily pain. These are results obtained by or through pulmonary digestion; and results, in many respects similar, may be obtained by or through gas ric digestion. Taking into the stomach a meal of generous food, brandy, wine, ale, all alcoholic liquors, opium, &c., will *augment* the neural ærosis, and cause *soothing* symptoms. Fasting and protracted labor *decrease* the neural ærosis, and give the *preponderance* to the arterial ærosis, and cause symptoms of *excitement*, with feebleness.—The inspiration of gases, which from their greedy affinity for oxygen will suffer *none* to be given up to the blood, as azote, carbonic oxide, &c, will *totally suspend* the arterial ærosis, and thereby instantly destroy the equilibrium of life; and the swallowing of many poisons will *totally suspend* the neural ærosis, and quickly destroy the equilibrium of life. To *decrease* the arterial ærosis by breathing vapors of chloroform, &c., whilst the neural ærosis is *augmented* by taking food, alcoholic liquors, opium, &c., must endanger the equilibrium of life. To *decrease* the neural ærosis, by fasting and fatigue, whilst the arterial ærosis is *augmented* by breathing oxygen, laughing gas, &c., must endanger superinducing phrenitis. If the arterial ærosis be *augmented*, in *any way* whatever, whilst the neural ærosis is at the *same time augmented*, the powers of life, and of mind, and every energy of the body, will be doubled: and if these two vital forces be both at the same time *decreased*, the powers of life, mind and body, will be reduced to that of, perhaps, half self.

204. The facility with which these two vital forces oscillate, to equilibrate each other, *locally*, in different organs, to maintain functional integrity, has been long recognized as the *vis medicatrix naturæ;* but still, not one-hundredth of the beautiful results—of the delicately varying shades of disease and shadows of shades, which the future physician will view with extreme admiration as unerring guides for practice—has ever yet been appreciated The two universal characteristics of predominence of these antagonistical forces, *excitement and soothing*, must never be lost sight of. Throughout *all* vital nature, both in health and disease, these two characteristics are discernable, more or less distinctly in proportion as the influence of caloric or frigoric predominates over the influence of its antagonist—including the hibernal sleep of vegetable and some varieties of animal natures from winter's cold; and the renewal of excitement, in the same, from summer's heat.

205. When the rubification of the arterial blood has been carried *to excess*, as on breathing laughing gas, the arterial aura will expel neural aura from its latent state in vesicular neurine, and in the hemispherical ganglia, over which the soul presides, it will effectually hinder neural aura from becoming latent, and thereby prevent sleep. Morbidly increased action of the cerebral arteries produce many of the same results. The mental excitement, giddiness, &c., fantastical muscular contractions, laughing, &c., which attend these circumstances, have been regarded by persons of a peculiar idiosyncrasy as modifications of bodily pleasure. Their novelty, probably, is the circumstance which has given to these conditions their claim to be entered in the category of bodily pleasures:—but "every one to his liking," as said the old woman who kissed her cow. That bright thoughts may be excited by thus augmenting

the arterial ærosis, and by increased action of the cerebral arteries, as they are morbidly in phrenitis, must be admitted; but that bright though s are bodily pleasures, may be doubted.

206. When the vapors of chloroform, or of sulphuric æther, are received, with air, into the lungs, the arterial ærosis is much decreased. It is probable that several other vapors, of an inflammable character, such as eagerly combine with oxygen, if they could be inhaled with impunity, would have a similar effect. When the arterial ærosis has been thus *weakened*, the neural ærosis *predominates without being augmented*—the scale of existence is let down a notch—and the circumstances produce sleepiness, sleep, and insensibility to pain, which have been regarded as bodily pleasures by some persons. Carbonic acid gas, fire damp, &c., so greedily monopolize oxygen, that when they are inhaled, even if largely diluted with air, they speedily suspend the arterial ærosis, and the blood in the arteries becomes venous in character. The accompanying sleepiness is so void of pain, that suicides sometimes expose themselves to the vapors of burning charcoal to effect their cowardly design. The inhalations of vapors of chloroform, and of sulphuric æther, are now usually employed to produce insensibility to pain during grand surgical operations; but some patients have died, not from the operation, but distinctly from the inhalation—died of the remedy. In such cases it is probable that the patient, with the view of keeping up his courage to the sticking point, had indulged in a glass of spirits, or wine, or taken a dose of opium, or eaten of generous food. Such an error, by augmenting the neural ærosis at the time the arterial ærosis is depressed by the action of chloroform, would be exceedingly likely to destroy the equilibrium of life. If a patient undergoing a long surgical operation, when rendered insensible to pain by the action of chloroform or sulphuric æther, were to inhale several inspirations of laughing gas, it would be likely "to make him laugh on the wrong side of his mouth;" for the arterial ærosis would be quickly re established in tone, and even strengthened, and his sensibility to pain would be restored too soon, so that he would acutely feel all the balance of the operation.

207. We may now see that whenever the neural ærosis gently *predominates*, we have bodily pleasures of the *soothing, drowsy, sleepy kind*. If the predominance result from *augmentation*, as when produced by generous food, wine, opium, &c., the individual *if unexcited* by any circumstance, will readily drop off *pleasurably into sleep;* but *if the soul augment* the arterial action up to the standard of equilibrium, the individual enjoys an *exalted existence, instead of sleeping*. If the *predominance* result from *decreasing* the *arterial ærosis, without any augmentation of the neural ærosis*, (as on breathing chloroform vapor,) the usual drowsy, soothing, sleepiness, a state of subexistence and insensibility to pain, will prevail. When the *arterial ærosis gently predominates*, we witness, on the contrary, mental and cerebral *excitement*, (sometimes running into phrenitis,) and to *sleep becomes impossible*. If the *predominance* result from *augmentation*, as when produced by inhaling laughing gas, a variety of antics, and capers, and thoughts that scintillate with wit, ensue. If the *predominance result from depressing the neural ærosis, without any augmentation of the arterial ærosis*, as by very long fasting, excessive fatigue, extreme secretions, and at the fag end of very many fatal diseases, a peculiar sort of *feeble restlessness with delirium*, which the practical physician often shrinks on beholding, instead of any variety of bodily pleasure, is observed.

208. Having been rather too prolix on the subject of bodily *pleasures*, it will be necessary to say the less on the subject of bodily *pains*: the former are introductory to the latter. Bodily pleasures and pains are modifications of the same conditions or circumstances: that circumstance transpiring in a nerve, which, *when moderate, yields pleasure; when intense yields pain*. An impulse, through the influent or sensory nerves, to any part of the hemespherical ganglia, (parts which cannot of themselves feel nevertheless, except by pressure,) of such intensity as to require *a desperate effort* of soul to preserve the equilibrium of life, is always felt as *bodily pain*.

209 A severe blow, a stab, a pinch in a vice, a lash from a cat o'ninetails, a scratch by the claws of an enraged cat, and lots of other cases, afford pains by the same sense which affords pleasure on "scratching where it itches" and by tickling. Fire, red hot iron, boiling water, frozen mercury, &c., afford pain, (and blisters also,) by the same sense that affords pleasure from moderate warmth and cold. Light, when intensely bright, and sound when tremendous, afford some pain through the senses of seeing and hearing. Smelling, when odors are extremely rank and strong, also yields some pain; and savors, judging by the wry faces of those who swallow physic, afford a sufficient supply of pain through the sense of tasting.

210. Very bright white lights, in which the constituent impulses may be as four through caloric and four through frigoric, and intense light from about the middle of the prismatic colors, in which the constituent impulses may be as five caloric and three frigoric, or three caloric and five frigoric, cannot very readily endanger the equilibrium of life at the origin of the optic nerves; because, as one force is augmented, so is that of its antagonist, in *nearly an equal* degree: the sensations will be more or less vivid according to the intensity of the *two* impulses united. The pain to the vision, from such colors, is less than from beholding red and violet of equal intensity. A bright red, as sunlight, burning metal, &c., in which seven-eighths of the impulses are conveyed by interstitial caloric, is quite painfully irritating to vision; and a bright violet, in which seven-eighths of the impulses are conveyed through interstitial frigoric, is equally painful; but the latter being also soothing, instead of irritating, it is puzzling to the vision.

211. Bodily pains, not being modifications of pleasurable impressions derived through any of the external senses, but as symptoms of diseases, are exceedingly numerous. Parts that feel nothing on ordinary occasions become occasionally intensely painful in disease. They are divisible into two distinct classes; *first*, those in which the impulse that creates them is propagated chiefly through interstitial caloric and calorific moleculæ; and, *secondly*, those in which the impulse that creates them is propagated chiefly through interstitial frigoric and frigorific moleculæ.

212. The *former* class of symptomatic pains are always irritating, restlessness creating, and tending to furor. The *latter* class, on the contrary, are always more or less dull, sleepiness promoting, and tending to stupor and coma. Just as we may recognize in vegetable and animal life, for as in health so also in disease in this respect, *heat* or caloric *excites*, cold or frigoric *soothes to sleep*. Thus we see increasing tension of caloric awakes vegetable life, insect life, hibernating animals, &c., in spring and summer; whereas increasing tension of frigoric soothes to sleep vegetable life, insect life, and hibernating animals, (and man also if the cold be extreme,) in winter.

213. The arterial aura, as has been often remarked, consists of calorific moleculæ; the neural aura of frigorific moleculæ. And every phemonenon throughout the living frame, whether in health or disease, in which the former moleculæ are predominantly influential, will be distinguished by some characteristic irritation; whereas, when the latter moleculæ are predominantly influential, the distinguishing characteristic will always be of the sedative or soothing kind.

214. *From* a part at which pain is felt, and this may be a part which never before felt pain or pleasure or gave any sensation whatever, there must be always an impulse, of an intensity corresponding with the pain, up to the vesicular neurine, in the hemispherical ganglia, situate at the origin of the nerves of the

part—often called "the sensorium." If that impulse cause actual motion in the atmospherical nuclei of tubular neurine, those nuclei, when set free from tubular confinement in vesicular neurine, *are at liberty to return*, or be reflected elsewhere, along *other* fibrillæ of tubular neurine, originating in the same ganglion. They are so reflected, in the first degree, along those fibrillæ originating *at the precise spot* of the influx, causing often inflammation, increased heat, tumefaction, &c., at the seat of pain; and in a second degree, along those fibrillæ opening into the vesicular neurine of the same ganglion, but situate *more distant* from the spot of the influx, and going to parts *other than* the seat of pain, causing more or less generally diffused pyrexial symptoms; and in a third degree, along fibrillæ opening into ganglia *having only commissural union* with the ganglion into which the morbid influx is pouring, and thus creating extensive morbid action through the nervous system, and causing often very general pyrexia.

215. It is desirable, as regards what has yet to be said on *sleep and volition, periodicity and paroxysmal phenomena*, to express over again, but in a varied form, the widely diffused influence, throughout the living frame, of the two vital functions, called gastric and pulmonary digestions.

216. The atmospherical nuclei of frigorific moleculæ, liberated from matter undergoing change in the stomach by gastric digestion, pass into the nerves, (by the neural ærosis,) and spread throughout the nervous system, (as neural aura,) including nervous cords and ganglia. They *move in the atmospheres* around the fixed central nuclei of compound frigorific moleculæ in tubular neurine. They are *confined within these tubes*, so that those which enter at one end of a nervous fibril must cause an equal amount synchronously to pass out at the other end. They are *not free* to dart about, as is the character of galvanic and electric fluids, nor even to pass through the very thin membrane forming their tubes, to the next adjoining tubes. But those nuclei which arrive in vesicular neurine in any ganglion, *are liberated* from these tubes; and they may *either* become latent in vesicular neurine, (causing sleep if in the hemispherical ganglia,) or they may re enter other nerve-tubes which begin precisely adjoining where terminated those from which they have just escaped. By these effluent tubes they are conveyed to all parts of the frame; and they are, or should be, used up by the function of each part. Those nuclei which arrive in muscular fibres, *after* causing a muscular contraction, or simply maintaining muscular tonicity, and liberating caloric from the arterial blood brought to the same fibres, *become latent* in venous blood, causing its nigrification. Those nuclei sent to any organ that are not used up by the function of the part, are forced forward, by those behind them, in the same nerve-tube, till they escape into, and become latent in, venous blood; which is their usual receptacle; and by which the venous blood, in such cases of disease, becomes over nigrified. But the obstacle to passage through the organ of which the *function is suspended*, is propagated as a pressure *backwards* up the nerve-tubes; and the nuclei in the nerve-tubes can escape from this pressure, at one end into venous blood as above specified, causing morbid heat, over nigrification, &c., or at the other end, into vesicular neurine in some ganglion. These *latter* pass into many ganglia through commissural connection; and they escape through many effluent nerve tubes, causing very many morbid phenomena. Those nuclei which were but now neural aura, when they have arrived in venous blood, are *no longer* confined by nerve tubes; *nor are they free* to dart about like galvanic fluid; but *they have become* latent in venous blood, as galvanic fluid is latent in hydrogen in water—that is, they have fallen into the atmospheres of the compound frigorific moleculæ existing in blood globules; and are held to their central nuclei by initial attraction. They now ride in, and are conveyed by, these compound frigorific moleculæ, withersoever go the blood globules, tumbling along over one another, in the veins. When there are more of these nuclei than can find accommodation in a latent state, in the atmospheres of these compound frigorific moleculæ, (that is, as a chemist would say, when the venous blood is more than saturated) they propagate *a pressure backwards into the whole* nervous system; and the texture of the blood becomes damaged—*the putrid condition* is established, and the blood will no longer coagulate. Now, all these changes, from the time of setting in of slightly morbid symptoms to the highest stage of putridity, can be traced, by the observant physician, as distinctly as can be traced the motions of the hands of a clock, in typhus fever, and many diseases of a putrid type; and every symptom betrays the predominant influence of frigorific nuclei, (or neural aura,) throughout the venous blood, and nervous system. Moreover, all febrifuge remedies will be efficient, or non-efficient, in precise proportion as the excess of neural aura is drawn off, or used up, by various secreting organs, and especially by re-establishing, and gently exciting, the function or functions which have been suspended. The characteristics of the action of frigorific nuclei, *in excess*, upon the equilibrium of life, will all along predominate, up to the comatose delirium and subsultus tendinum which precede death; and the hasty decomposition of the fluids and body after death, is a continous demonstration of the same fact.

217. The atmospherical nuclei of compound calorific moleculæ, when liberated, by pulmonary digestion, from a latent state in common air or oxygen gas, pass, or are passed, by the arterial ærosis, into venous blood, as it is brought by the pulmonary arteries into the lungs. These calorific nuclei, as arterial aura, having arrived in venous blood, *fall into the atmospheres of compound calorific moleculæ* existing in blood globules; and are held fixed to their central nuclei by initial attraction; to effect the rubification or arterialization of the blood. Thus fixed, or rendered latent in the atmospheres of compound calorific moleculæ, these calorific nuclei, (as arterial aura,) are carried by the blood globules, as they tumble along over one another, in the pulmonary veins, through the heart, and along the arteries, withersoever circulates arterial blood. Those calorific nuclei which arrive in muscular fibres are acted upon by, that is brought into antagonism with, the neural aura brought to the same fibres; and in the contest *they give up*, to furnish animal heat, the pure caloric which has accompanied them; and a muscular contraction attends this change. These calorific nuclei, thus extruded from the atmospheres of the compound calorific moleculæ in which they have been travelling, form a new combination with other matter in venous blood, to be got rid of, or expelled from the circulation, probably as bile, in the liver. Those calorific nuclei which arrive in vesicular neurine throughout all the ganglia of the nervous system, disperse the neural aura brought to the same points, *just as fast as it arrives during health*, to maintain ordinary muscular tonicity, and general functional action; and if the supply of neural aura fail, as after long fasting it may, *they develope* that which is latent in the same vesicular neurine, and which was rendered latent when the supply was ample, as after dinner and during repose. The sensation of *feebleness* which arises on fasting past the usual meal times, and the sensation of *satisfactory invigoration* which follows the taking of a meal, indicate very plainly when the supply of neural aura fails, and a draw is necessarily made upon that latent in neurine; and also when the supply is ample. Those calorific nuclei which arrive in the vesicular neurine of the hemispherical ganglia also disperse neural aura *as it arrives*, and develope that which is latent *if* the supply fail, just as in all other ganglia, to maintain ordinary function during sleep and volition; but *over and above* this, they furnish a supply to be at the command of the will—that is, to become latent in vesicular neurine on the developement of latent neural aura by the fiat of the soul. That neural aura which has been rendered latent in vesicular neurine during sleep, and which is, in health, developed by the fiat of the soul, is thus superseded by the arterial aura; but if the developement of latent neural aura be effected *without* the fiat of the soul, as has been just stated in the case when the ordinary

supply for functional purposes fails, and as is the case if the arterial ærosis be augmented beyond the ordinary standard, as on inhaling laughing gas, and also as is the case from morbid arterial action in phrenitis, and some other diseases, the fact is recognized as diseased action, during which sleep is precluded as an impossibility. The arterial aura which arrives in the vesicular neurine of the hemispherical ganglia performs yet other offices:—that of exciting thought, or stimulating the mind; and that of maintaining, at the origin of all the nerves of sensation, the condition of susceptibility to impressions from sensitive stimuli.

218. Sleep and volition, the matutinal remissions and vesperal exacerbations of pyrexial diseases generally, the paroxysmal phenomena of intermittents, &c., are kindred phenomena, in so far that *periodicity* is, in them all, a remarkable characteristic:—we will then take *a glimpse at periodicity* in living beings.

219. Nature throughout is more or less subject to *periodicity:* the seasons are dependent on the periodical revolutions of planetary bodies; and vital nature, in many respects, is influenced by the seasons. But the seasons act upon vital nature through the medium or instrumentality of caloric and frigoric.

220. It has been often observed that caloric is an excitant; that its influence, as an excitant, is evinced by its effects upon vegetable life, and upon hibernant animals in spring, and also, it may be added, upon eggs during incubation, and upon seeds during germination. Again, pulmonary digestion and the arterial ærosis, which are *vital functions for propagating calorific influence into the systems of living beings*, are excitant also. And the arterial aura, consisting of the atmospherical nuclei of compound calorific moleculæ, in its effects upon vesicular neurine, is also an excitant. When the cerebral arteries, which carry the arterial aura, assume increased action, morbid excitement results, as in phrenitis, furious delirium, &c. In the stimuli of all the external senses, as far as the case can be at present recognized, when the impulse conveyed by caloric or calorific moleculæ *predominates* over the impulse conveyed by frigoric or frigorific moleculæ, *excitation results*, exceeding that which ensues when the influence of the frigorific family predominates. *In every instance*, whether in health or disease, in which calorific influence becomes predominant over frigorific influence in living beings, the circumstance is indicated by characteristics of *excitement*.

221. On the contrary, frigoric is *a sedative;* and its influence, as a sedative, is shown by its effects upon vegetable and animal life, during winter's cold. Gastric digestion and the neural ærosis, which are *vital functions for the propagation of frigorific influence into the system of living beings, are sedative.* The neural aura, consisting of the atmospherical nuclei of compound frigorific moleculæ, is, in its effect upon vesicular neurine, sedative also. When the nervous system and venous blood are *overcharged* with the neural aura, *morbid* sleep, coma, or the comatose state, are superinduced. And whenever frigoric becomes *predominantly* influential in the system of living beings, the circumstance will be indicated by *soothing or sedative* characteristics.

222. There is variety of periodicity in nature; but the phenomena, in vital existences, of which periodicity is the parent, are modifications of *one* phenomenon. The annular or cylindrical deposition of ligneous matter in the majestic oak, or the rings upon a stag's antlers, the results of annual growth, afford a coarse type of the results of periodicity in other cases. Accretion for a limited period, is always the result of periodicity. In vegetable life, *after the accretive period* has expired, *accretion is suspended;* and in animal life, so far as mere growth is implicated, the same is the case. But in the higher orders of vital phenomena, after accretion, *in the character of absorption to saturation*, has gone on in one direction to a specific extent, accretion, still in the character of absorption to saturation, takes place in the *contrary* direction, *antagonistically*, to a specific extent also.

223. Spring and summer, during which caloric becomes more and more predominantly influential, is a period of excitement to vegetable life, to animals, and in some degree to man also. Autumn and winter, during which frigoric becomes more and more predominantly influential, is a period of repose for vegetable life, for animals, and in some degree for man. This may be called *annual* periodicity.—There is a *lunar* periodicity, of which one of the most remarkable characteristics, as regards its influence upon living beings, is excitement of the uterine functions of the human female. Its influence is also recognized in cases of mania, epilepsy, hysteria, &c. There is a *diurnal* periodicity, alternations of excitement and repose, volition and sleep, which exerts great influence upon living beings, both during health and under disease. In disease there is one variety of periodicity which obeys the *diurnal*, as in the exacerbations and remissions of pyrexial diseases; and another, as in ague, that will conform to the diurnal periodicity *only irregularly and imperfectly*, and sometimes has mutable periods.

224. At about sunrise, (and the magnetic needle gives a slight vibration that indicates the precise moment,) pressure upon the rare matter of the plenum between the sun and the earth, (from their mutual attraction,) begins; and at the *same instant* caloric begins to pour from space to the earth, and frigoric to retreat into the earth; and man, animals and vegetables, begin to rejoice with excitation. At about sunset, (and the magnetic needle again vibrates to indicate the precise moment,)—the pressure upon the plenum between the two globes is suspended, or rather it is not felt over that portion of the earth from which the sun has set; and at the *same instant*, caloric begins to retreat from the earth into space, and frigoric to advance from the earth; and man in a state of nature, and animals, except such as have now to seek their prey or food, and vegetables, are soothed to repose.

225. During the nocturnal period—that is during the diurnal reign of frigoric in terrestrial atmosphere, man has slept, or ought to have been sleeping, until the vesicular neurine of all the ganglia throughout his nervous system, has been *fully saturated* with latent neural aura; and the arterial aura that had become latent in vesicular neurine during the hours of volition, has been *developed, or extruded* from the atmospheres of compound calorific moleculæ, and passed quietly off in venous blood. From the orient period till sunset, or during the diurnal reign of caloric in the terrestrial atmosphere, man, by volition, uses up, or ought to use up, the neural aura that was rendered latent in vesicular neurine *during sleep;* and the arterial aura will become latent in vesicular neurine, as the neural aura is thus developed by the fiat of the soul. This is particularly the case in the hemispherical ganglia which are under the governance of the soul; but it appertains also, though in a less degree, in all ganglia. In man and animals, in a state of nature and in perfect health, these conditions of their vesicular neurine *periodically recur, alternately, at specific times;* and the periods become so far *habitual* to the constitution that they can only with difficulty be postponed. The times for sleeping and waking, the hours of repose and volition, are indeed constantly changed by individuals living an artificial mode of life: but never without some effect upon the living system.

226. When the vesicular neurine of the hemispherical ganglia has become exhausted, by vigil and exercise, of latent neural aura, to a specific customary amount, *sleep*, or under some very pressing necessity for continued vigil, a *dozing state*, becomes nearly unavoidable, and is quite indispensable to comfort. Further exhaustion, to any considerable extent, is a distressing effort; and if it be persevered in too far, under some very urgent necessity, by a desperate effort of soul, a morbid action of the cerebral arteries is liable to be established. When, by sleep, the vesicular neurine of the hemispherical ganglia has be-

come saturated, to a specific customary extent, with latent neural aura, the individual *awakes;* but awaking is not quite a voluntary effort. Idle persons sometimes indulge in habitual snoozing until they become disgustingly owlish. When the vesicular neurine is once *fully saturated* with latent neural aura, if there be *still more pressing* for accommodation, whether the excess result from taking narcotics, or alcohol, or from the over nigrification of the venous blood, as in the latter stages of typhoid diseases, the fact is recognized as a morbid condition, and is called the comatose state.

227. The *consent* of the soul and *emotional quiescence, customary exhaustion* of latent neural aura, and *moderate action of the cerebral arteries*, must all precede healthy sound sleep. In other words, the attraction upheld by the soul between contiguous compound calorific moleculæ of vesicular neurine, must, by the fiat of the soul, be moderated, until it becomes *inferior* to the attraction between their interchained compound frigorific moleculæ, in order to allow the atmospheres of the latter to become augmented in volume, and to receive, and accommodate in a latent state, additional atmospherical nuclei from the supply of neural aura; and also the latter atmospheres must be *exhausted* to some extent, (for if they be already full or saturated they can receive or hold no more, without commencing an additional dose and a new snooze,) by vigilance and volition; and the action of the cerebral arteries, which physiologically supports the energy of the attraction between the compound calorific moleculæ of vesicular neurine, must likewise be *moderate*, before the atmospheres of their interchained compound frigorific moleculæ can receive additional atmospherical nuclei, to realize the phenomenon of healthy sleep.

228. When the atmospheres of the compound frigorific moleculæ of vesicular neurine have received, and accommodated in a latent state—that is to say, when they have absorbed and retained by initial attraction to their central nuclei—such an amount of atmospherical nuclei as they have *ordinarily* been accustomed to receive during sleep, they may be said to be *saturated*; and the individual *now awakes*. After this condition of saturation has been acquired, if the individual indulge often in an idle snooze, these atmospheres will begin to receive an *extra* dose of atmospherical nuclei; and there will be created a dreamy sluggard's somnolency, often a headache and an inaptitude for business, and a habit of requiring five or six hours instead of four for sleep. If the same system of snoozing be still further persisted in, there will be created a craving for seven, or eight, or nine hours to be consumed in sleep; and a half stupid lethargic peculiarity will become established, and conspicuously perceptible for the first hour or two in the morning after arising. The unpitied feelings of lassitude and depression which such somnolency creates, whilst there exists in the system a full magazine of animal power, requiring only to be used up, are usually known as *ennui*.

229. In the vesicular neurine of the various ganglia scattered throughout the nervous system, the consent of the soul is *not* indispensable, nor immediately required, in order to allow of its saturation with neural aura. The *preponderance of the neural ærosis* over the arterial ærosis, as after taking a meal of generous food, or a little wine, is all that is required in order to effect its saturation. And the *preponderance of the arterial ærosis* over the neural ærosis, is enough to effect its developement when and as it is required.—At this point it may be well to observe, that there are many typhoid diseases in which inspirations of laughing gas, and extra oxygen, would seem, (but for this circumstance,) exceedingly appropriate remedies. But they would be rendered abortive thus: the over rubification of the blood in passing through the lungs, though well calculated to correct its over nigrification in circulating through all the rest of the sanguineous system, will cause an *extra developement* of neural aura in every ganglion of the whole nervous system, and will thus *increase* the mischief, or augment the nigrification, of the venous blood. If we lessen the quantity of blood by bleeding, with the view of decreasing arterial action and the developement of neural aura, the *remnant* of blood will have to receive the morbid excess of neural aura in the system; and being less in quantity, it will be the sooner advanced to the highest stage of putridity. To *draw off, by using up in the secretions, the excess* of neural aura, is at present the practitioner's *very best* resource; and, the secretions being once re-established, to supply to the blood a little new chyle. On the principle of supplying a little new chyle to the damaged blood, I have again and again seen happier effects result from an ounce or two of lean mutton chop, with plenty of pepper and salt, with from two to four ounces of good sound ale, among patients accustomed to such articles for food, than I ever witnessed from bark, ammonia, camphor, or any other medicine during convalescence from typhoid diseases. But such medical food can be ventured on with safety only at *the right nick of time*—that is to say, when the secretions, especially of the skin, have been fairly re-established; and soon after the commencement of a matutinal remission of the febrile symptoms. When I was in practice, a rival practitioner, evidently of the brunonian school, who was censuring my treatment of a then prevalent epidemic typhoid fever, on being twitted with the remark—"If your treatment is so much better than Mr. King's, how happens it that half your patients die, and all Mr. King's get well?" He replied that "All Mr. King's were mild cases." He could not recognize the fact, that the mode of treatment made them "all mild cases."

230. At this point it was originally intended to examine the phenomena of spasmodic diseases, pyrexial diseases, and typhoid diseases; but this essay has already exceeded the proposed limits, and I shall therefore take a glimpse at the phenomena of ague, and bring it to a close.

231. Here is a patient going to have an ague fit—just observe him.—He *yawns*—for what purpose does he do that?—Persons do the same during the reign of the impressional symptoms of many febrile diseases; and also in health, if they be drowsy, or have over slept, and have occasion to shake off their lethargic state. And whilst they yawn they make a *deep* inspiration, *compress the air* in their lungs, and expel it *slowly*. These are the features of the phenomenon of yawning; and every feature has its signification. The patient wants to take into the blood a *little extra oxygen*, to expel the *used up air* from his lungs, and to *get rid* of the carbonized air and vapors about the larynx and fauces generally. This is always the case when a man yawns; and the most ready way to obtain a little extra oxygen—for laughing gas is not always at hand—is to draw into the lungs a *large* volume of fresh air, and to *compress* it when in the lungs, to *facilitate the transfer* of oxygen to the blood by pressure. The drowsy sluggard requires extra oxygen to augment the arterial ærosis, in order to render effluent the current of neural aura when it is influent; and the ague patient requires it for precisely the same purpose. The very first impressional symptom, then, in ague, *yawning*, indicates *a morbid influx* of neural aura from the circumference to the centres, (ganglia,) of the nervous system—just as is the case in unwelcome sleep.

232. Observe again—our ague patient *stretches* now one limb, and now another, and now many; and presently he will do so again. He still behaves like a man who has had a snooze too much, or like one visited by a snoozing propensity when it is inconvenient to entertain such company. He *wants to feel a gush* of neural aura into the fibres of his muscles; but it will not come from the ganglia that usually supply it to sustain the ordinary tonicity of muscular fibres; and he is compelled to have recourse to the hemispherical ganglia, *and send a gush* of neural aura by the fiat of the soul. When a sluggard awakes from a prolonged snooze, he does the same thing for the same purpose; but in ague there is morbid action; and our ague patient will have a harder job than the sluggard *to turn* the neural aura from being influent

to being effluent.—Before matters grow worse with our ague patient, if one were to tell him that his sweetheart is a frightful jilt, or in some way enrage him thoroughly, and settle the matter by a boxing match on the instant; or set his house on fire, and, (if it be uninsured,) put him to work the fire engine, the ague fit might probably be put off by an effort of soul; but presently he will not be able either to fight or to work a fire engine. A few inspirations of air supercharged with oxygen, would develope neural aura from the various ganglia; and at this stage of the disease, might set matters as nearly about right as art could accomplish. But emetics are all the fashion at this period; and as they reverse the peristaltic action of the stomach, the great elaborator of neural aura, and create a general gush of neural aura from that organ to all the nervous system, they often thus do much good, as well as remove crudities.

233. Observe again—a short time only has elapsed, and our ague patient has grown so *listless, languid and weak*, and so dislikes muscular motion, that he would scarcely work the fire engine if his house were on fire, or strike one blow to save his beautiful girl from being transformed by slander into a monster; neither could he, if he would. There is no neural aura pouring into his muscles: it all *goes the other way*. There is none developed from his ganglia: there is not sufficient *arterial action* to develope neural aura from its latent state in his ganglia. The pulse betrays that the heart and arteries participate in the debility of all muscular fibres. They can no longer propel arterial blood with sufficient energy to force a passage through the minute vessels. There is therefore a difficiency of arterial blood in the skin, the muscles and all secreting organs: that blood which ought to distend these parts *has accumulated in the large interior veins*. As consequences, the face is pale, the limbs are shrunken, and the secreting organs have their functions suspended. The veins of the interior parts, which are most yielding and void of contractility, are now gorged with the blood that ought to distend the capillaries: but they cannot endure this condition long with impunity. There is then, in ague, *first*, a diminished supply of arterial blood in all the minute arteries; and, *secondly*, a diminished supply of neural aura in the same parts to develope caloric from the small quantity of arterial aura which is brought to those parts: a condition precisely *the reverse* of that which appertains locally in phlegmonous inflammation. And, *thirdly*, arterial action is too feeble to develope neural aura from ganglia, and render it effluent.

234. Observe our patient again—he *feels cold, the thermometer indicates cold* below the standard of health, and *cold shiverings* are set in. This bunch of morbid phenomena, in a less conspicuous degree, accompanies the impressional symptoms of most febrile diseases; they also occur in health on exposing the unclad body to cold air, cold water, cold dampness, &c.; they also arise on the formation of pus, at the commencement of mortification, and on some other occasions. The insufficient developement of caloric from arterial aura must be the *immediate* cause of coldness in diseases; and the insufficient developement of caloric from arterial aura must be referred to a defficient supply of neural aura in the fibres of muscles and the capillary vessels; and the deficient supply of neural aura in the fibres of muscles and capillary vessels must be referred to non-developement in ganglia from feebleness of arterial action. It has already been stated that in ague there exists generally a condition the reverse of that which appertains locally in phlegmonous inflammation. The neural aura is pressing, in morbid excess, upon all ganglia for accommodation therein; and venous blood is accumulating in the large interior veins; and the arterial action is feeble in the capillary vessels and in the vesicular neurine of all ganglia.—The shiverings that accompany the formation of pus, the setting in of mortification, &c, *succeed or follow* an excessive influx, to the part diseased, of neural aura and arterial blood; and the phenomenon, shivering, arises from the neural aura being used up in the formation of pus, instead of being used for the development of caloric from arterial aura, as it was prior to the shiverings. But in ague, the shiverings *precede* a morbid influx to the cold parts of neural aura; which morbid influx, when it occurs, will produce increased heat, as it does in pyrexial diseases generally.

235. The shivers themselves are but irregular contractions of individual fibres of muscles. To maintain the ordinary tonicity of muscular fibres, in health, there is always a flow of arterial blood and of neural aura into each fibre of a muscle; and after the contraction of each fibre, its blood, now nigrified, moves onward into the veins; and a new supply, both of arterial blood and of neural aura, flows into the same fibre. But in our ague case, the renewal of arterial blood in the fibres of muscles is not effected with sufficient promptitude, as is evinced by the lassitude, feebleness, &c.; neither is the supply of neural aura to the same fibres sufficient to effect the developement of caloric, or cause a contraction, in those fibres generally and continuously, like as in health. But among the many millions of muscular fibres, *some few* momentarily act as their venous blood is moved onwards; and these momentary contractions of individual fibres constitute the shivers. During the reign of the impressional symptoms these shivers begin; and after reaction has commenced, they continue for a period—that is to say, until the venous blood shall be freely moved onwards out of, and a regular supply of arterial blood and of neural aura shall be poured into, these fibres; and then the coldness and shivering will cease, and *increased heat* will ensue.

236. The condition of vesicular neurine during these shivers, requires to be considered conjointly with the condition of muscular fibres. Shivering is a momentary contraction of individual fibres of muscles, one here, there and everywhere. When a fibre has contracted, the blood which it contains should be moved onward into the capillary veins, to carry off the used blood, and the neural aura that have become latent in it; and a fresh supply of arterial blood, well charged with arterial aura, should pour into the same fibre, in order that another contraction should ensue, when a gush of neural aura arrives within it. This double, or complex process, takes place imperfectly at this stage of our ague case: neural aura is *not* being developed from vesicular neurine, but *it is being rendered latent in it* to a morbid excess. The irregular contractions of muscular fibres which constitute shivering, are never voluntary: these fibres do not receive their supply of neural aura exclusively from ganglia under the control of the soul, but from all ganglia. All ganglia afford neural aura, in health, to a specific extent, to maintain the ordinary tonicity of muscular fibres, and to support all involuntary functions. But in ague, all ganglia lose this power from the disease. The *first yawn* indicates a morbid influx of neural aura to the ganglia; *the first shiver* indicates an effort to render the neural aura effluent. Now at one, now at another, now at ten thousand points, in these ganglia, the over-saturated vesicular neurine begins to repel the influent neural aura, and by degrees to render it effluent; and in every muscular fibre to which a little neural aura is thus sent, before the muscles generally recover their tonicity, a shiver contraction ensues. If there were no collateral evils to apprehend, a few inspirations of oxygen or of laughing gas, would much aid the change which is now taking place. All along up to this stage of the disease, additional oxygen would seem more appropriate to oppose the impressional symptoms than brandy, or wine, or opium, or stimulants of any kind taken into the stomach; but now, as reaction has commenced, the inspiration of additional oxygen would augment the morbid phenomena about to ensue.

237. The excess of neural aura that became latent in vesicular neurine during the reign of the impressional symptoms, has now to be developed; and as much of the excess of venous blood that accumulated in the large internal veins as can be got rid of, has now to be moved off with accelerated ve-

locity. As this blood becomes arterialized, and as it re-penetrates the capillary arteries, and as the freely developed neural aura repenetrates the minute terminations of the nerves, the parts which were, during the existence of the impressional symptoms, shrunken and cold, become, on the contrary, *plumped up and hot*; and a condition, like that which appertains locally in phlegmon, will be established throughout the whole frame. This condition may be regarded as the reaction of the nervous system; to rectify the morbid state which was created during the existence of the impressional symptoms.

238. Reaction having commenced, neural aura is developed *in excess*. The blood which has accumulated in the large interior veins, has now to pass through the heart to the lungs; and back from the lungs through the heart; in *morbid excess*, before the circulation can be equalized, as in health. The increased development of neural aura from ganglia, bestows increased action upon the heart, arteries, muscles, and secreting organs generally. By the increased action of the heart and arteries, the arterial blood is impelled with *augmented force* through the capillaries every where; and in vesicular neurine, it facilitates the *excessive developement* of neural aura, There is thus a race between several important functions apparently in mischief making: three or four of the central powers of life are disordered, and each is urging the other into extravagant action.

239. Both neural aura and arterial blood are now, at the same time, moving in morbid excess *from the centres* to the circumferences of the two systems: during the existence of the impressional symptoms, neural aura and the venous blood, were both moving, in morbid excess, *from the circumferences* to the centres of the two systems. Any part into which neural aura and arterial blood are received at the same time, in morbid excess, as locally in phlegmon, becomes swollen, preternaturally hot and sensible.

240. The function of secreting organs, circumstanced as above, will be either augmented or diminished: they will be *augmented*, if the neural aura be *used up*; or they will be *diminished*, if the neural aura *be not used up*, but reflected into the nervous system. In ague, often, the neural aura sent in excess to many secreting organs is not used up by their functions; and these organs frequently suffer permanent mischief in consequence. But the skin goes on to perform double and treble duty; and it thus uses up lots of the neural aura which has been reflected from other secreting organs whose functions have been diminished or suspended; and it thereby supersedes many serious evils.

241. If the skin were to *fail* to perform this duty, as sometimes it does, the disease would assume the *character of typhus*. The excessive amount of neural aura would become latent in venous blood, causing its over nigrification, putridity, comatose delirium, &c. But ordinarily the skin, by performing double duty, uses up much of the excess of neural aura, and supersedes other evils; and the patient gets well until another paroxysm sets in. The kidneys, liver, intestines, salivary glands, &c., sometimes augment their functions, and help the skin still further to relieve the whole system.

242. After two or three days, our ague patient will have another paroxysm, much like the last—why should he?—A man who sleeps for 4, or 6, or 8 or 10 hours, in the 24, has got into that habit by permitting the saturation of his vesicular neurine to proceed to a *customary specific* extent; and he will now sleep habitually until the saturation of his vesicular neurine has gone on to the *same* customary specific extent; when he will *spontaneously* awake, and feel as if that job were well done. And our ague patient, when he has had his vesicular neurine once saturated to a *specific morbid* extent by a first paroxysm, will be very prone, supposing the disease to receive no impetus from exciting causes, and no check from remedies, to have the saturation of his vesicular neurine carried to the *same specific morbid* extent on the next, and several future paroxysms: the disease is liable to become almost habitual, like sleep.

243. A man who keeps awake usually for 20, or 18, or 16, or 14 hours in the 24, supposing him to pass the day in his customary way, will feel the want of sleep when the usual time is up: his vesicular neurine will have become *exhausted* of latent neural aura, by vigil and volition, *to its customary specific extent*; and the process can go no further without creating the feeling of want of sleep. And in our ague patient, during the interval between the paroxysms, the vesicular neurine of all the ganglia scattered throughout his whole nervous system, has gone on discharging, gradually, since the sweating stage of the last paroxysm, more neural aura than is customary in health to maintain muscular tonicity and keep the involuntary functions at work; and when exhaustion arrives at the pitch to which it has gone on *prior occasions*, supposing the morbid condition to have received no impetus from the original cause, and no check from remedies, it will stop as regularly as a man requires sleep, or as the sleeper awakes, and a fresh paroxysm will begin.—Thus the saturation and exhaustion of vesicular neurine with neural aura, like alternations of sleep and volition in health, but modified by various circumstances, are the cause of periodicity in *all* pyrexial diseases.

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244. By way of concluding remarks, it may be now observed, that the co-existence and co-agency of caloric and frigoric, which the foregoing essays admit, in contradistinction to the favorite hypothesis of the day that cold is non-existent, might be here discussed if it were desirable; and also a foundation might thereupon be laid for a universal calo-frigorian system of philosophy. To this point all modern experimental research and discovery are rapidly converging; although the ingenious authors of those discoveries seem totally unconscious of the fact. Nature throughout is but one grand whole, governed by initial attraction, bestowed and upheld by sense infinite; and there is not one phenomenon in which the existence of caloric and frigoric, as the passive instruments of attraction, is not required. Overlooking the existence of frigoric was philosophy's grand error; and this error was the parent of hypothetical errors innumerable. Caloric, by those who admitted its existence, was endowed with an atomic mode of being, and with a repulsive power between its own atoms. Others, because heat was sometimes generated by percussion, friction and motion, and because temperature is always a modification of force, were led to deny or to doubt the existence of caloric altogether, as well as frigoric. And there were others who, recognizing the impossibility of nature acting as nature acts without some subtile element, called up a subtile ether, of which we know nothing, to fill space, and perform the offices of caloric and frigoric. The supposed repulsion between the atoms of caloric, was also conferred on the particles of which light was suppposed to consist; and magnetic, electric, &c., repulsions seemed a visible exhibition of a repulsive power existing in nature. All natural phenomena were construed subserviently to the prevailing hypothesis that calorific repulsion, as the antagonist of atomic attraction, was a universal power of nature. Whereas *two* attractions, which might almost with literal propriety be called male and female, both bestowed and upheld by sense, are the primary powers of nature; and repulsion is always derivative from these attractions in antagonism.—The expansion of water, in descending from the temperature of 42 deg. to 32 deg., must be attributed to intruded frigoric; and if this fact be admitted, the legitimate consequence will be, a universal calo-frigorian system of philosophy; which, as science advances, will leave no phenomenon of nature, either physical or vital, unsatisfactorily explained.

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GLIMPSE IV.