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IMMUNOLOGICAL PROPHECY FROM ANCIENT HIEROGLYPHICS[1]

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OUR first half-century of modern immunology has been characterized by recurring waves of clinical hope and clinical disappointment. A hundred theoretically logical, monovalent, polyvalent, prophylactic and curative antisera proposed, clinically tested and commercially exploited during the transitional years of the twentieth century. Ninety-five per cent. of them thrown into the clinical discard. An equal number of theoretically logical, monovalent, polyvalent, prophylactic and therapeutic vaccines. A scant 5 per cent. of them of more than historic interest. A thousand frantic clinical trials with theoretically logical opsonic index and leucocytic extract. All shelved with the miasmas and phlebotomies of our Revolutionary ancestors.

And we call this scientific medicine.

This overwhelming clinical disappointment has served one useful purpose. It has graphically dramatized the errors and inadequacies of the immunological theories from which the proposed clinical methods were logical and consistent deductions. No immunological hypothesis of the past half-century has had a clinical verification probability of more than 5 per cent.

The pressing need of clinical medicine at the present time is a radically new immunological theory, basic hypotheses more nearly consistent with clinically verifiable fact. I have thought that we might possibly obtain hints as to the probable nature of such a theory from the discarded immunological "hunches" of primitive medicine, jungle hypotheses jettisoned by the shifting theologies of medieval civilization.

[1] Read before the Pasteur Society of Central California, San Francisco, California, May 1, 1929, and before the American Association for the Study of Allergy, Portland, Oregon, July, 1929.

A clinician whose collateral reading leads him into the field of primitive anthropology and comparative religion will be surprised to find that theoretical immunology, which he has previously considered the newest branch of scientific medicine, is in reality the oldest clinical science. The medicine-men of the Congo and the jungle doctors of the Orinoco have to-day an immunological theory that is more detailed and of wider clinical application than the boasted immuno-science of Nordic medicine. There is not a fundamental deduction from present-day infectious theory that was not known, predicted or parodied by the predynastic Osler's of ancient Egypt, fifty centuries before the nineteenth century renaissance of the same deductions.

I

In dealing with the basic hypotheses of jungle clinicians we are not dealing with primitive religion. In spite of the theological nomenclature in which so much of primitive anthropology is recorded, the pathological theory of the jungle clinic is not theology, but a material science—a pseudoscience, if you will—a nearer approach to the material science of the twentieth century than were any of the natural philosophies of European civilization down to and through the Elizabethan era.

This primitive pseudoscience is graphically illustrated by the Stone Age theory of water evaporation. To the jungle biochemist water is liquefied human soul, a soul fully conscious of its environment by a method of sense perception which jungle physiology fully explains. This liquid life is endowed with an intelligence equal to that of the legendary human ancestor from which it was originally condensed, with the retained memories, ambitions, likes, dislikes, instincts and tribal affiliations of that ancestor. At will this liquid personality may flow in any direction, may dance as waves, sleep in the form of ice, or fly away as mist or as invisible water vapor. A million individual Waters—oceans, lakes, streams and urines—broadcasting their hopes, fears, needs and ambitions through the great intangible over-personality, General Humidity.

Organized, directed and coordinated through this unseen, all-embracing Aqueous Intelligence, individual Waters may mobilize from the far horizon for offensive or defensive warfare. Falling in fruitful marriage with the soil, a desquamated fragment of General Humidity may be reborn or metamorphosed into one of the dual or triple subsouls of growing plants. Taken into the human stomach, an individual Water is ceremoniously baptized with gastric juice, formally adopted into harmonious communion with the human tissues, fused with or metamorphosed into a subunit of the human soul, thus raising man to the dignity of full material brotherhood with General Humidity.

II

Apply this evaporation theory to all animals, plants and inanimate objects—each a material personality, that at will can change from a solid to a liquid, to a visible mist or to a wholly invisible gas. Picture human blood, gastric juice, saliva and perspiration as liquefied or melted Human Body. Surround and permeate the tangible body with an activating, directing, coordinating Human Gas. Handicap this gaseous colloid with a constant surface evaporation by which its material substance is slowly but inevitably lost to the environment. Motivate this colloidal gas with a compelling hunger for other solid, liquid and gaseous substances; its only compensation for surface loss. And you have the basic concept of jungle physiology.

Fill the environment with competitive, mutually carnivorous solids, liquids and gases. Aerial, aquatic, terrestrial and subterranean, visible and invisible, alert or dormant competitors. Tangible and intangible herbivorae, carnivorae and omnivorae. Weak, strong, brave, cowardly, loyal or disloyal, seen and unseen, friendly or unfriendly personalities. Organized visible and invisible bandits, formal declarations of war, surprise attacks, armistices and treaties of peace. The basic concept of jungle epidemiology.

Oppose this snarling world of visible and invisible hungers with man's own solid, liquid and gaseous transubstantiation resistance. Or with the organized colony of three, four, five, seven or more subsouls or subresistances with which the primitive human body is usually endowed. Subsouls sleeping in bones, finger-nails, teeth, hair and skin. Alert semi-liquid subpersonalities in muscles and internal organs. Wide-awake subentities actively patrolling the body as blood, gastric juice, urine, saliva and perspiration. Still more active invisible symbions hurling themselves in an aggressive respiratory tide against an ever-threatening environment. Advance gaseous scouts in body odors and visual emanations. The basic concept of jungle immunology.

With threatened visible or invisible invasion, consubstantiation or transubstantiation see how each loyal subpersonality springs to battle. The ever-ready stomach melts to a potent ghosticidal, gastric juice, narcotizing, paralyzing, enveloping and sweeping from the body visible and invisible nutritional pathogenicities. No wonder the gastric contents of friendly, loyal, ceremoniously adopted, domestic herbivorae are such powerful antitoxic agents to primitive science. Logical surgical dressings. Dependable internal salvarsans. Sacramental wafers of later religions.

See how the faithful, ever-alert, ghostolytic blood rushes to an area of local irritation. The primitive theory of inflammation. With what heroic self-sacrifice it spurts defiance against wound pathogenicities. See the semi-dormant flesh awake, melt to specially trained ghost-fighting pus, or to keenly alert antitoxic serous exudate.

And remember this is not poetry, but serious science, on which primitive man daily stakes his life.

III

Childish as such concepts seem to modern biology, they gave our jungle ancestors many logical deductions that modern medicine has resurrected and endorsed. Centuries before Fracastoro, for example, jungle physicians concluded that direct and indirect physical contacts are the main methods of disease transmission. Every instrument of jungle surgery is ceremoniously sterilized. Tobacco tea, chicken blood, gastro-intestinal contents, urine, saliva, or other equally potent, equally logical, loyal, friendly, ceremoniously adopted, primitive carbolic acids.

Contaminated with the blood of his slain enemy, the returned warrior marches with silent lips and averted eyes past wives and children. One touch may transfer enemy pathogenicity. With tobacco fumigation, perspiration gymnastics, cathartics, formal baptism in wide-awake, friendly, ceremoniously adopted running water, and a final sprinkling with loyal ghostolytic chicken blood, he frees his body from every visible and invisible, solid, liquid and gaseous trace of his contaminating foe.

With illness or death, every member of a patient's family, his dog, parrot, wearing apparel, weapons and cooking utensils are automatically untouchable. Safely touched only by the attending physician, whose natural transubstantiation resistance has been strengthened by ceremonious venesection, formal fasting, ritualistic purges and sexual conservation. Tobacco smudges in the hut. Sprays of loyal antitoxic herbivorous blood. The essential technique of modern sanitation.

As our forefathers passed beyond the stage of personified materialism into the stage of pagan religion, with its conception of man's slavery and exploitation by giant, invisible, non-material Entities, this early contact theory of material infection became illogical. What material created by a kindly god, or animated by a minor devil, can produce disease in an individual vitalized by omnipresent, semi-omnipotent, omni-antiseptic Osiris! Unless, of course, in just punishment for theological error, the individual has been abandoned to the ravages of demon-activated materials.

It is true, pagan religion continued to stone lepers from the city gate. But this was not to avoid physical contact. A slap on the leper's face would not transmit leprosy. A kindly word to the sinful outcast might offend the Omniantiseptic, and thus induce the disease.

No wonder the suggested renaissance of the primitive contact theory of material infection during the early decades of the sixteenth century was heresy, logically followed by excommunication and burning at the stake. Even the thundered rhetoric of Oliver Wendell Holmes during the middle decades of the nineteenth century failed to convince American physicians of the logic of washing their hands between obstetrical deliveries or before surgical operations.

IV

Not all Stone Age medicine, however, was thus discarded. Many materialistic methods were endorsed by later paganisms—some even by still later Christianity. The Aztec drug, sarsaparilla, for example.

Centuries before Columbus, this subtropical bramble was developed by Mexican pseudoscience as a friendly, dependable, prophylactic and therapeutic plant soul. Its vigorous underground roots, a single plant often dominating a soil area sixty feet in diameter, amply proved to Aztec biologists that sarsaparilla is a materialized or condensed spirit, or gas, fully competent to penetrate, seek out, kill or repel alien ghosts from the remotest, most hidden parts of the human body. Its thorny aerial growth, smothering other plants, shunned by herbivorae, on which few birds nest and fewer insects feed, logically demonstrated its antiparasitic totemship. The red berries proclaimed its ability to gather redness or anti-anemia gas from the environment.

Adopted from Aztec pharmacy, sarsaparilla was endorsed by European clinicians as the particular bramble, woven into the crown of thorns, pressed on the Savior's brow, and thus eternally impregnated to the remotest representative of its species with the Satan-expelling blood of the medieval antiseptic Christ. Within a century sarsaparilla was raised to the dignity of the only dependable salvarsan for venereal sin, which proud position it held till the Victorian era.

V

The contact theory of material infection is but one of the primitive anticipations of modern bacteriology. Prophylactic and therapeutic vaccines, monovalent and polyvalent counter-inoculations, were among the commonest medicinal agents of our pre-pagan forefathers.

The technique of primitive vaccination, of course, does not always anticipate that of modern bacteriology. Inhaled gaseous vaccines, for example, have not yet been perfected by Nordic chemists. Nor are

visual, auditory, olfactory and telepathic vaccines within the range of immediate verification. But genito-urinary douche vaccines, spray vaccines for the nasal mucosa, immunizing pills and cutaneous massage with ceremoniously attenuated lipo-viruses may well be within the range of future interest.

Imagine an equatorial Indian whose chattering teeth proclaim infection with "mosquito gas." Tropical malaria, insect vectors, a thousand years before Theobald Smith. Fortified by fasting, sexual conservation, emesis, catharsis and a hilarious dose of loyal, fermented pre-Volstead antiseptic; protected by the volatilized gas from mosquitocidal bat-wings and insectivorous bird heads; preceded by an insect-narcotizing tobacco smudge; the air purified by the auditory vapors from insect-scaring tom-toms and bull-roarers, the tribal immunologist courageously approaches the patient. Grasping in his hand a whip made from some ceremoniously gathered, formally adopted, loyal, friendly, antiseptic wood, over which mosquitolytic wood no malarial gas can crawl or diffuse onto his own hand, he lashes the patient's bare back till blood gushes in streams. The physician now holds the dripping whip to the patient's lips. The patient swallows the autogenous blood. After an incubation period of from seven to fourteen days the patient is well.

Here the mosquito-impregnated autogenous blood is changed to an attenuated malarial vaccine by contact with the mosquitocidal whip.

It is interesting that this autogenous vaccine is not reintroduced through skin incisions, as is done with so many primitive vaccines. It is given orally, so that the partially licked mosquito gas may be brought into contact with tissues not yet injured, fatigued and discouraged by the infection. Such tissues will presumably dismember the attenuated malaria vapor and so terrorize the extra-gastric mosquito ghost that it will fly from the body.

More complex methods of virus attenuation are often practiced. Desiccation of enemy livers in prophylactic cannibalism, exposure of infected dung to sunshine, dilution of snake venom with tobacco tea, putrefaction, fermentation, neutralization with saliva, with animal blood, and even detotemization by animal passage. A living chicken, for example, plucked of its insect-resisting feathers, may be sprinkled with the autogenous malarial blood till the chicken tissues are saturated with mosquito gas. The pulsating chicken heart is now plucked out, and given to the patient to swallow. A true toxin-antitoxin mixture, the malarial gas being cowed, partially licked by its inward diffusion through insectivorous chicken tissues.

In further anticipation of William Park and Theobald Smith, the mosquito-impregnated chicken heart must be plucked from the insectivorous bird without delay, before the malarial gas is completely licked, adopted or metamorphosed into chicken flesh. An over-licked toxin-antitoxin mixture would afford no specific exercise to the gastro-intestinal tract.

Primitive immunology often obtains attenuated viruses by drawing vaccines from some part of the body whose local resistance is presumably sufficient to adequately lick the infection. In the prenuptial anti-venereal cross-vaccinations of Northern Africa, for example, attenuated groom semen and bride vaginal secretion are not always used. Certain Arab tribes use cross-baptism with fully virulent bride and groom urine. Or oral immunization with fully active bride and groom blood.

One of the earliest forecasts of modern anaphylaxis is contained in such ceremonials. The prenuptial anti-venereal cross-inoculation at first produces a specific venereal hypersusceptibility. This absolutely prevents the biological consummation of marriage till the end of the hypersensitive period, usually fourteen to thirty days. In certain Arab tribes the transient hypersensitiveness lasts seven weeks, exactly the same as the modern transient hypersensitiveness in canine anaphylaxis.

VI

In addition to etiologically specific vaccines, primitive medicine abounds in symptom-specific inoculations. According to early Egyptian pathology, for example, baldness is due to a local scalp infection with capilliphagic ghosts. In the presence of these hair-eating gases no hair dare show itself above the surface. A logical symptom-specific vaccine, therefore, was obtained from attenuated anti-hairiness potential of frog skin.

It was an essential in this symptom-specific scalp immunization, as it was in the nineteenth century renaissance of symptom-specific vaccines by Hahnemann, that the baldness-producing virus must be administered in minute, wholly non-toxic doses, doses which the fatigued and discouraged scalp can easily lick. Otherwise in place of an increased scalp-courage an increased hair-timidity or scalp-cowardice might result.

VII

In a few cases, primitive medicine actually anticipated modern vaccination technique. For example, the early Spanish explorers brought to America cattle, syphilis, smallpox and cow-pox. Syphilis and smallpox are known to-day as "Caucasian disease" by certain equatorial Indians. What more logical, therefore, than for Aztec hygienists to conclude that cow-pox is "Caucasian disease" attenuated, detotemized or partially adopted to Aztec loyalty by animal passage. Two centuries before Jenner, they found cow-pox inoculation a reliable preventive of smallpox.

Dilute snake venom or minute doses of scorpion extract introduced into ceremonious skin incisions, and poison ivy leaves chewed as an oral vaccine, are other Aztec anticipations of modern technique.

VIII

Primitive medicine also abounds in logical and consistent methods of passive immunization. Baptism with convalescent urine is still practiced in many primitive societies. Massage with convalescent dung, a routine method in ancient Egypt, the birthplace of the latest renaissance of primitive fecal therapy, under the modern jargon, "bacteriophage." Pills of convalescent pus. Convalescent semen, perspiration, hair, finger-nails. The fat of a ceremoniously killed, senility-resistant chief. The body of a new-born babe painted with the experienced blood of its father. The heroic tribal physician who bled himself to death that every member of his small tribe might drink of his ceremoniously strengthened blood.

Modern medicine has no monopoly on medical heroes.

IX

Such parodies of twentieth century logic are of slight interest to modern clinicians unless they suggest possibilities not yet adequately tested by potential Jenners. I believe they contain a dozen untested possibilities. From the crude ore of Stone Age prescriptions, ceremonials and taboos, I have, therefore, attempted to extract or reconstruct the basic hypotheses in my own narrow field of immunological interest.

According to the predynastic Pavlovs of ancient Egypt a protein molecule is a minute, living, spiritually independent, self-propagating, materialized, or condensed animal or plant soul. This pulsating molecular individual injected into human tissues carries with it the gender, ambitions and tribal friendships of the animal or plant from which it was obtained. Introduced into human tissues, this minute alien personality may be excommunicated by the molecular subsouls of its human host. Or it may be enslaved and trained to cooperative service with human molecules. Desirable aliens may be adopted into full colloidal brotherhood with the human body, married to native somatic proteins, and become the parents of half-caste, quarter-caste or eighth-caste molecular hybrids. Mongrel proteins. Bastard colloids. Semi-permanent symbions with the human body. Eventually even raised to the dignity of subcommand.

X

Translated into modern nomenclature, this conception assumes that a desirable foreign protein is gradually naturalized or hybridized with human tissues, or otherwise changed to an immunological specificity approaching that of the host. This is not as silly as it seems. Two intermediary denaturization stages are experimentally demonstrable.

Horse protein injected intravenously into normal dogs, for example. By the end of four days, this protein completely loses its power to call forth recognizable anaphylactic reactions on massive transfusion into hypersensitive dogs.[2] By the end of six days, it loses its power to stimulate the production of active sensitization in normal dogs.[3] Titrations by means of rabbit precipitin indicate that neither of these losses is due to a quantitative reduction of horse protein in the donor's blood.

By the end of thirty days a second denaturization stage is demonstrable. This is shown by a marked decrease in the intensity of the precipitin reaction in low dilutions, but with no reduction in horse protein titer as determined by high dilutions.[4] Additions of a small amount of fresh horse protein to the titrated samples give no indication that this zonal precipitin response is due to an inhibiting antibody.

The thirty-day precipitin reaction is exactly the one we would predict from an alien protein specificity midway between that of horse and dog. A true protein hybrid of ancient metaphor. If this is not actual semi-caninization of horse proteins, what is it?

XI

A second prediction from the hybridization metaphor is that the number of alien molecules may actually increase in the body of the new host, that is, that the alien protein has the same self-propagating potential as that currently assigned to the bacteriophage. Parallel precipitin titrations of dog blood at varying intervals after subcutaneous injection with horse protein give readings that suggest such multiplication. By the seventh day there is an apparent 100 per cent. absorption of the injected horse proteins into the blood stream, rising to an apparent 200 per cent. or even 400 per cent. absorption by the fourteenth to twenty-first day.

Such an apparent increase, of course, does not necessarily prove chemical multiplication. An apparent increase might conceivably result from proteolysis, provided it is possible for an alien protein to fragment into two or more daughter proteins of the same group-specificity. Such symmetrical proteolysis, however, has not yet been experimentally demonstrated.

An apparent increase might conceivably result from a specific alienization of body proteins—again a possibility no biochemist will admit, nor is pre-

[2] *Jour. Immunol.*, 1927, 13: 357.
[3] *Ibid.*, 1928, 15: 109.
[4] *J. A. M. A.*, 1928, 90: 2090.

pared to deny. Biochemical alienization of body proteins is, of course, well known. But the production of denaturization products of the same group-specificity as antigens has not been demonstrated.

The apparent increase, of course, is based on the assumption that the precipitin reaction is a reliable qualitative and quantitative index of protein specificity under the relatively complex conditions of our mixed serum tests. Till this is proved or disproved the apparent bacteriophage-like proliferation is but an interesting challenge to future biochemists.

XII

A third prediction from the hybridization metaphor is that mongrel proteins may become permanently symbiotic with the human body. A prolonged retention of alien proteins is rank heresy to modern physiology. Nevertheless, in our hands, rabbit precipitin titrations indicate a very nearly quantitative retention of hybridized horse proteins in the canine circulation for at least four months. If this is not symbiosis, what is it?

Such possible molecular symbiosis introduces the element of pure drama into the human body. Each man an organized colloidal society of ceremoniously adopted ancestral infections and partially digested dinners. The ancient Pavlovs did not make the mistake of assuming that foods always lose their specific alien totemism following formal baptism with gastric juice, any more than they assumed that captive enemies were always won to full, dependable, tribal loyalty by formal sprinkling with tribal blood.

XIII

The hybridization metaphor further suggests that, in addition to first-generation mongrels, there are second-generation, third-generation and even more remote hybrids, antibodies or protein denaturization stages. Such a suggestion is rank heresy against our current orthodox dogma, which pictures all circulating antibodies as desquamated specific chemical angels with which the fixed tissues of Adam were miraculously endowed.

That at least two chemically distinct antibodies are formed or liberated following injection with a single foreign protein is readily shown by transfusion tests. Fractional transfusion from a protein immune dog, for example, will not confer passive hypersensitiveness on a normal dog, as it would if the difference between the hypersensitive antibody and the immune antibody were purely quantitative.[5] Fractional transfusion from an immune dog will even desensitize hypersensitive canine tissues.[6] Fractional transfusion from a hypersensitive dog occasionally confers on a normal dog a higher degree of specific sensitization than that shown by the donor.

These are exactly the results one would predict from the assumption that the so-called anaphylactic antibody is a relatively unstable primary antibody chemically related to or derived from the foreign protein, while the so-called immune antibody is a relatively stable secondary hybrid of antagonistic or supplementary physiological function.

Even more convincing evidence of dual antibodies is furnished by protein-denaturizing rate. Representing the horse-protein-denaturization rate in normal dogs by one, the denaturization coefficient in hypersensitive dogs is 6 to 8.[7] In immune dogs there is the opposite of this, a denaturization inhibition, the rate being about 0.7.

XIV

Probably the most important clinical suggestion from the ancient hybridization metaphor is the doubt it would cast on the current assumption that each and every specific serum property demonstrable by test-tube reactions is an "antibody," that is, a specific defensive chemical substance. For two generations test-tube "antibodies" have been taken as presumptive evidence of clinical immunity, in spite of puzzling lack of parallelism between serum titer and clinical outcome. Test-tube "antibodies" have justified the commercial exploitation of a hundred alleged specific "antisera."

The hybridization metaphor would picture test-tube "antibodies" as retention products or symbiotic derivatives from injected antigens, with no suggestion as to their probable immunological function. Many retention products are presumably physiologically inert. Unstable products might conceivably play a hypersensitive rôle. A few products are conceivably protective.

A very opportune illustration of what the hybridization metaphor may do to clinical serology is contained in a recent paper by Kryshanowski.[8] Kryshanowski confirms the conclusion of previous workers that the living diphtheria bacillus does not secrete a preformed toxin. The toxin of current nomenclature is a hybrid product with environmental proteins. He finds that, *in vitro*, the non-toxic bacterial substance hybridizes with serum albumin to form a specific toxin. With certain serum globulins the resulting protein mongrel is a specific antitoxin. Intermediary serum bastards are physiologically inert. The language is mine, but the alleged facts are Kryshanowski's.

[5] *Ibid.*, 1926, 86: 1271.
[6] *Jour. Immunol.*, 1927, 13: 59.
[7] *Proc. Soc. Exper. Biol. and Med.*, 1929, 26: 525.
[8] *Centralbl. f. Bakt.*, 1929, 110: 1.

From Kryshanowski's aggressive albuminous bastards and loyal mongrel globulins there may in time be written a new immunological poem, worthy successor to the specific receptor allegory of current nomenclature.

XV

The hybridization metaphor offers logical and consistent explanations of many experimental and clinical facts inexplicable by present hypotheses. Torrey and Kahn's recent experimental findings, for example.[9] These investigators report that *B. welchii* filtrate, injected intravenously into rabbits, produces a slight anemia from which the rabbits rapidly recover and become immune. A much smaller dose injected into a single bone marrow is followed within eighteen hours by degeneration of all bone marrows of the body, with a resulting chronic, persistent, often fatal anemia. Evidently we are here dealing with a secondary autointoxication, some *B. welchii*-bone-marrow hybrid, a specific cytotoxin for marrow cells. Again, the language is mine.

XVI

If perchance the ancient hybridization theory is resurrected as the guiding immunological metaphor of the future, there are but few current immunoclinical methods that will escape revision. According to current hypotheses, for example, more valuable therapeutic effects are logically expected from so-called hyperimmune antisera than from earlier sera with the same antigen. The marked specific protein-denaturizing acceleration with hypersensitive antibodies, contrasted with the denaturization inhibition with immune antibodies suggests that future clinicians may seek their therapeutic effects not with immune serum but with hypersensitive serum. Or with hypersensitive serum followed by but not mixed with immune serum.

The possibility that the dominant factors in acquired immunity are not test-tube "antibodies," but unknown substances revealed only by therapeutic tests, may in time harmonize clinical experience with serological data.

The heresy that the chemical nature of "antibodies" varies with the dosage of the injected antigen, with its concentration, portal of entry and subsequent topographical distribution, may in time lead to a renaissance of the discarded vaccine therapy of Wright, whose premature optimism led a generation of progressive physicians into such a morass of clinical failure.[10] Postulate for a moment a dozen chemically different antigen hybrids with local tissues, not forgetting preliminary hybrids in the culture medium. What new hope it breathes into this disheartening field!

Remember the newer biochemical evidence of tissue specificity. The demonstration that fixed tissue proteins are of a different immunological subspecificity from circulation proteins. Muscle hemoglobin sharply differentiated from blood hemoglobin, for example.[11] Liver proteins in the urine of patients suffering from hepatic lesions. Then reexamine the heroic illogic of Rosenow,[12] who in defiance of the dominant unitarian dogma of antibody formation, has insisted for two decades on an irrational elective localization of micro-organisms in tissues. Under the magic touch of the hybridization metaphor this ostracized heresy becomes the consistent logic of clinical expectation.

The hybridization metaphor also suggests the heterodox conception that asthma, hay-fever and other forms of protein hypersensitiveness are due to atypical, perverted or deficient protein denaturization. Subnormal denaturization coefficient. Hypofunction of some unknown protein-adopting insulin. Logic might no longer seek to throw asthmatics into prolonged sub-shock to carry them through a pollenization season, but might turn its sole attention to therapeutic aids to the underlying immunity hormone, that unstable hypersensitive protein bastards may be fully detotemized to dependable or stable tissue loyalty.

XVII

If you conceive the human body to be a mass of dead, inert material colloids, animated, coordinated and motivated by some great super-material vital purpose, this is all nonsense. But if you are attempting to explain biological organization on a purely material basis, you must seek the unit of vital phenomena in individual molecules, atoms and subatoms. To be consistent you must endow the antigen molecule with just the same unit life as that proudly reserved for your own colloids.

Breathe a metaphorical soul into the alien protein molecule.

As soon as you have accustomed yourself to this theo-biochemical heresy, the ancient food hybridization theory emerges from the discarded superstitions of dead paganisms. A prophetic metaphor. The next great immunochemical challenge to pioneers and prospectors in clinical truth.

As a challenge, rather than as demonstrated fact, I present it to you.

[9] *Amer. Jour. Path.*, 1929, 5: 117.
[10] *J. A. M. A.*, 1929, 92: 864.
[11] *Jour. Infect. Dis.*, 1928, 42: 31.
[12] "The Newer Knowledge of Bacteriology and Immunology," University of Chicago Press, 1928, Chap. xviii, p. 576.