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**Life at the Cell and Below-Cell Level:  
The Hidden History of a Fundamental  
Revolution in Biology**

by Gilbert N. Ling, Ph.D.

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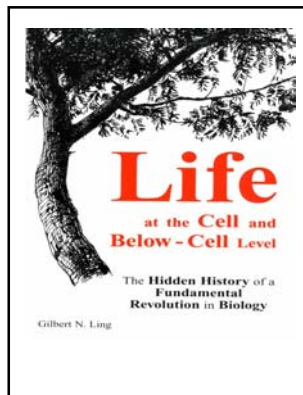
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**History Lessons**

Gilbert Ling, Ph.D., without doubt one of the most brilliant scientists in the last century, describes, in book, *Life at the Cell and Below-Cell Level, The Hidden History of a Fundamental Revolution in Biology*, exactly that: the hidden history of how the current paradigm for the structure and functioning of the cell – that basic unit of all living creatures – has persisted for a half-century, despite overwhelming evidence to the contrary. And that evidence, in great part, stems from the critical experiments conducted by Dr. Ling and his co-workers, and the theoretical models developed by Dr. Ling.

Dr. Ling does not castigate those of lesser acumen who made crucial mistakes that have carried on for the last several decades. Rather, he explains where the errors occurred, the technologies that had to be developed before the conflicting issues could be resolved, and the many experiments that -- independent of his theories -- gave the death knell to the membrane theory with its myriad pumps, and confirmed his own theories. He does not mince words, however, when it comes to his well-thought out conclusions. For instance: "The popular belief that life can only occur in whole and . . . protoplasm, existing in the liquid state, is the mental unit of life is certain to atrophy from those otherwise. *Wall Deficient Pathogens*, H. Mattman, Press LLC, 8493-8767-1)



**Barrier  
Basic  
and**

**Applied Clinical Practices**

John W. Campbell, Jr. (who received the rare honor of having a crater on the moon named after him), as editor of a leading science fiction magazine and a fantasy magazine, an accomplished storyteller in two distinct styles, a key developer of modern-day science fiction, and a patient teacher to many well-known writers, was foremost a persuasive essayist on every subject, forcing the rethinking of

accepted ideas and the challenging of pet themes. There is a breakdown, he once argued, between the research of medicine and the practice of medicine. The two fields simply don't communicate with one another. No matter how important or grand are the discoveries of basic research, there is no one to communicate these findings and treatment implications to those responsible for healing humans.

An example of this communication breakdown between basic research and clinical practice can be seen in the case of diabetes. In 1977 Rosalyn S. Yalow shared one-half of the Nobel Prize with Roger C.L. Guillemin and Andrew V. Schally. Diabetes was considered due to failure of the pancreas cells to produce sufficient insulin to enable the muscle and liver cells to store sugar in them. The Nobel Laureates showed that the pancreas produces either normal or excessive amounts of insulin in diabetics. Only a few physicians, such as William R. Philpott, M.D., Jennifer Daniels, M.D., and others, have followed through from this extremely important finding, accepting that diabetes is, in fact, inactivation or blocking of the normally formed insulin by some substance in the body. Usually, this substance can be identified as a product of an allergic reaction from some commonly consumed foods. When the foods are removed from the diet, the swollen beta cells in the pancreas that have inhibited release of insulin return to normal, and so the diabetes disappears as thousands of patients have discovered with the help of Drs. Philpott, Daniels and some other physicians. Meanwhile, the larger proportion of clinical physicians subscribe to drug oriented alleviation of the symptoms, to the benefit of pharmaceutical companies, related industries, and (indirectly) to themselves.

Nowhere is the communication breakdown between basic research and clinical practice more evident than in the continuing futile attempts to conquer cancer. More than 50 years of "the war against cancer" has resulted in thousands of munificent research grants. These, in turn, have produced millions of detailed reports signifying, for the most part, absolutely nothing so far as eliminating cancer.

Clinical successes for diabetes or cancer are not the only medical defaults that are limited by poor communication between basic researchers and clinicians. Almost every medical field suffers from similar myopia, as initially expressed by John W. Campbell, Jr. To mention briefly two more, consider blood circulation problems -- for which the overwhelming evidence is that EDTA chelation therapy will simply and effectively clear up 80% of peripheral circulation problems; or rheumatoid arthritis -- for which symptomatic relief breeds a multi-million dollar empire, by trial and error (both in their creation and in their use with patients) drugs.

Most well-taught biologists know that cell-wall deficient (pleomorphic, or, better still, "divergent forms") microorganisms are a result of the microorganisms' responses to environmental changes. This simple fact has yet to trickle down to the vast majority of practicing physicians.

Wilhelm Zopf (1892), Ernst Bernhard Almquist/Robert Koch (1881), Willibald Winkler, M.D. (1899), and later dozens of other brilliant biologists defined this dual relationship. Gerald J. Domingue, et. al. in "Naked Bacteria in Human Blood" (*Microbia*, Annee 1976, Tome 2, No. 2) published the definitive article demonstrating that the use of many antibiotics results in our immune system's inability to recognize the presence of a foreign invader, because the source of recognition, the microbes cell wall, is absent or incomplete. The microorganism is hidden from our immune system's view! Later, it reconstitutes itself, thus seeming to produce the illness again.

Unknowledgeable medical doctors will often conclude that "You've caught that same disease again! Here's another shot of antibiotics," which, of course, sets off the same cell-wall deficient condition in the invading microorganism, which hides it from view, etc.

The paradigm used is that for each disease there is one and only

belief that life can only occur in whole and . . . protoplasm, existing in the liquid state, is the mental unit of life is certain to atrophy from those otherwise. *Wall Deficient Pathogens*, H. Mattman, Press LLC, 8493-8767-1)

**Between  
Research**

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one corresponding microorganism, whereas, since at least 1892 biologists have recognized that change of internal bodily environment produces change in form and function of most invading microorganisms!

It is reasonable to assume that an accurate picture of how the cell functions would also lead to knowledge of how cancer can be fought and won. Several inaccurate models of the living cell are repeated in virtually every scientific paper, leading in many cases, of course, to inadequate conclusions regarding the meaning of the funded research. Clearly, if it can be shown that the model about the normal day-to-day operation of a cell is based on non-existent energy, then the cancer research, and in fact, all biological research, is defective.

This brings us to a fundamental discovery about life at its basic structural and functional level, basic research that has stood the test of a half century of laboratory research, and has been all but ignored in clinical research and practice.

Dr. Gilbert N. Ling's *Life at the Cell & Below-Cell Level* reflects extremely important laboratory discoveries on the nature of the human cell, and its relationship to disease and methodical selection of appropriate drugs for those diseases.

#### **A Long-Standing False Biological Model**

One such model, the sodium-potassium membrane pump (in uniaxial cells or cells with a single uniform cell membrane like muscle or nerve) is wholly false, according to Dr. Ling's outstanding research.

The currently taught model of a uniaxial cell -- such as a nerve or muscle cell -- would have us believe that these cells have a microscopically thin covering (*plasma membrane*) filled with lipids and proteins, with marvelous small structures such as "gates" and "pumps" that allow certain charged ions or other particles (e.g., potassium ion,  $K^+$ , or sodium ion,  $Na^+$ ) in and out of the cell, with a cell interior composed of free water. Furthermore, it is the "fixed charge" of either  $Na^+$  or  $K^+$  (outside or inside the cell) on the cell membrane, that, when the gates open or close, cause an "action potential." These pumps, it is said, operate at the expense of energy stored in high-energy-phosphate bonds of ATP and other organic phosphates. This theory requires continual energy expenditure to maintain an uneven balance between  $K^+$  inside the cell membrane, and  $Na^+$  outside the cell membrane.

The cellular Membrane-Pump theory -- developed to explain the low level of  $Na^+$  in cells such as muscle cells, nerve cells, and erythrocytes -- was a general theory attempting to deal with all solutes in living cells. According to Ling, "The Na pump theory has never attempted to offer more than an ad hoc, patchwork theory dealing with one solute,  $Na^+$ ."

Here is what Ling says regarding the cellular Membrane-Pump theory:

"The membrane theory's apparent strength in simplicity is also its fatal weakness. When Nasonov, Aizenberg and Kamnev demonstrated that the cell membrane is in fact permeable to sucrose and galactose, the paradigm of cells as membrane-enclosed dilute solution faced grave difficulties.

"In the crisis thus created, the sodium pump was installed. However, one (sodium) pump is not enough. To keep the cell afloat, an ever-lengthening list of pumps has been introduced. Yet the sodium pump at the cell membrane alone would require at least 15 to 30 times the total energy available to the cell -- under rigorously controlled conditions and with the assumption that the cell needs no energy at all beyond pumping sodium (pg. 235) . . . The disproof of the sodium pump hypothesis on the basis of energy considerations relied on the employment" of two tools: the radioactive tracer technology and the Gerard-Graham-Ling capillary microelectrode (pg. 237).

No one, says Ling, has yet given even a rough estimate of just how many pumps are required to keep afloat the cellular Membrane-Pump theory of "uniaxial" cellular functions. There simply is no Maxwellian demon that can sustain it. The famous scientist of history, Maxwell, described a small demon that could sit inside a tube of flowing fluid, and separate out hot from cold molecules without utilizing additional energy. Ling's studies clearly show that an energy-free Maxwell demon must prevail for the Membrane-Pump model to work for cellular membranes. (On the other hand, "bifacial" cells such as epithelial, frog skin, intestinal mucosa, kidney tubules, etc. have two different types of membranes. Active transport of  $Na^+$  and other solutes across bifacial cells is not disputed.) Ling's exceptional and patient basic laboratory work clearly demonstrates insufficient energy for there to exist an actual sodium/potassium pump in a given cell, not to speak of the total energy required for hundreds of other special pumps often postulated for that same cell.

And here is what Ling says about the resting and action potentials:

As for the action potential, the basis for a nerve or muscle impulse, Ling's laboratory experiments show that the insides of nerve and muscle cells are not dilute solutions containing free ions and water, as once believed. A membrane potential does not seem to exist in the real world, living or non-living (pg. 265). The membrane potential -- as currently defined by most scientists -- using the demonstrably incorrect model of the Membrane-Pump hypothesis simply doesn't exist.

Dr. Ling produces additional laboratory evidence to support his claim in this and in his earlier book, *A Revolution in the Physiology of the Living Cell* (Krieger Publishing Company, Malabar, Florida, USA; ISBN 0-89464-398-3; 378 pages, hardcover, 1992, \$64.50).

#### **Benefits of Ling's Discoveries**

But there are many other basic scientific discoveries nicely laid out in Dr. Ling's *Life at the Cell and Below-Cell Level* that will lead you to two profound conclusions:

1. the membrane-pump hypothesis is dead;
2. a new cellular paradigm is due, one Ling has titled "the Association-Induction" hypothesis.

After reading this marvelously communicative book, one will wonder how the stumbling block of the Membrane-Pump Hypothesis has lasted so long. Perhaps the fact that the originator of the Membrane-Pump Hypothesis received the Nobel Prize for an imaginative construction, non-experimentally derived, contributed to its unwarranted and pervasive longevity.

Changing from the defective Membrane-Pump Hypothesis to Ling's Association-Induction Hypothesis:

1. has already brought into existence the Magnetic Resonance Imaging (MRI) device;
2. laid the groundwork for a true science of drug selection, as opposed to present-day trial and error;
3. demonstrates that biological axioms need laboratory proof based on evidence and logic;
4. presents a unifying theory of life at the cell and below-cell level.

#### **Scope of the Book**

*Life at the Cell and Below-Cell Level* contains 17 chapters including five devoted to Ling's Association-Induction Hypothesis, an outline of the entire history of cell and subcellular life science, 72 text figures, 6 tables, an appendix, a list of abbreviations, over 550 references, an author index, and a subject index, a "super glossary" containing over 900 scientific names, technical terms and basic concepts, and an "Answers to Readers Queries" that explains how best to read the book and make use of the "Super Glossary." (We strongly recommend following Dr. Ling's advice to start with Chapter 17

Medical data is for informational purposes only. You should always consult your family physician or one of our referral physicians. (“Epilogue”), then Chapter 16 (“Summary Plus”), then the “Preface,” to best appreciate the book.)

While some knowledge of biology, physics and chemistry are useful, the “Super Glossary” provides detailed background information, thus insuring that the reader can understand without outside help.

#### Who Should Read This Book?

Most health professionals, having had some smattering of chemistry, physics and math, pride themselves on their “scientific” background. Very well! Read this book! All doctors and other health professionals should read this book!

It is also written for science-oriented, career-seeking students; dedicated biology teachers; medical-pharmaceutical researchers; physics, mathematics or chemistry teachers, and sophisticated, adventure-some readers who are unsatisfied with what they have read about our most precious possession -- life itself!

Dr. Ling’s Association-Induction Hypothesis (AI) was first presented in 1962. A decade before, in 1952, he published Ling’s Fixed Charge Hypothesis (LFCH), and in 1965 his Polarized Multi-layer theory (already incorporated within the AI Hypothesis). These hypotheses, and their experimental confirmation worldwide over the last half-century, cause us to reflect when we realize that the scientific community, by-and-large, has ignored these hypotheses and the confirmatory research. The current paradigm has been disproved, time and again, yet hangs on like an albatross around the neck of science. Ling’s AI Hypothesis, has been consistently confirmed, yet is ignored. This book is long overdue, and every student of biology, medicine and history (not to mention the “scientifically” oriented health professional) owes it to themselves -- and to the future -- to read how this insane situation was allowed to occur -- as Ling also captures the history of cellular biology in extremely clear prose.

#### What Others Have Said

Nobel Laureate C.N. Yang (Institute for Advanced Studies, Princeton, NJ, April 12, 1961), speaking of Ling’s *A Revolution in the Physiology of the Living Cell*, said, “At a time when we look forward to the merging of the physical and biological sciences, this is a most stimulating book, distinguished by a bold and inquisitive attitude on the one hand, and careful experimental methods on the other.”

Nobel Laureate Albert Szent-Gyorgyi (MBL, Woods Hole, Jan 16, 1962) said, “Dr. Ling is one of the most inventive biochemists I have ever met.”

Describing Ling’s latest book, *Life at the Cell and Below-Cell Level* -- a further development of *A Revolution in the Physiology of the Living Cell* -- others have said:

“The work is genuinely revolutionary. The thesis is full of penetrating insights in the inner workings of the cell, offering a dramatic alternative to the ‘conventional wisdom’ of current views. Ling demonstrates that many textbook axioms of cell function are incompatible with evidence and logic, and goes on to produce a richly detailed construct that shows promise of being largely correct. It is both a fascinating read and a monumental contribution to science.” (Prof. Gerald H. Pollack, University of Washington, Seattle, WA.)

“Gilbert Ling’s new book arrives in perhaps the last hour to provide the true historical aspect of the search for understanding of the living cell . . . a compact description of all the elements of the Association-Induction hypothesis with only the most compelling experimental supports behind each component . . . embedded in an extensive (and to our best knowledge, fully complete) historical background in such a way that despite its scientific authenticity, the volume appears as highly colorful and enjoyable to read.” (Assist. Prof. Tamas Henics, Department of Microbiology and Immunology, Uni-

versity of Pecs, Pecs, Hungary; *Intercell*, Vienna, Austria.)

“Dr. Ling’s work is sophisticated and essential. This book will guide its readers to the new era of genuine biology.” (Dr. Hirohisa Tamagawa, Gifu University, Gifu, Japan.)

We believe that Gilbert Ling, Ph.D. through his lifetime of inspired research projects demonstrates that present day physiology teaching on the cell’s functioning is in error and thus leads to faulty medical paradigms resulting in slow or no progress in disease resolution. Ling’s keen insight demonstrates how the cell does function, thereby producing numerous formerly undiscerned phenomena which, when searched for, are found and lead to new and wonderful medical discoveries, such as the Magnetic Resonance Imaging (MRI) procedures.

This is an outstanding book, marking Dr. Ling’s lifetime achievements in discovering the true biochemical basis for life itself -- a remarkable achievement more than deserving of a Nobel Prize!

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