MOLECULAR SIGNALING
What is so unacceptable for ultra-orthodox scientists?

The Current Theory:
"structural matching"

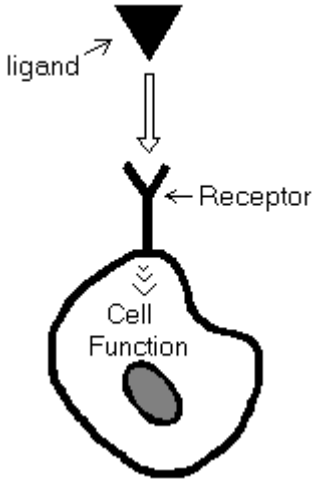

Fig A

The 3D structure of the ligand molecule, e.g. an antigen (or an agonist) matches the 3D structure of the antibody (or the receptor, respectively). This physical contact induces the cell function.
More about this...

The Proposed Theory:
"electromagnetic signals"

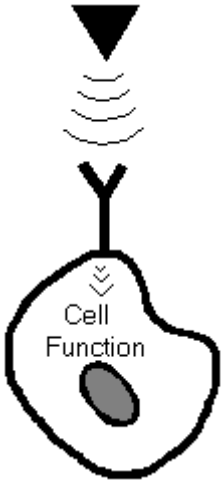

Fig B

The agonist molecule carries and emits an EM signal which coresonates with the receptor's molecules thus activating it and inducing the cell function.
More about this...

The Current Theory: "structural matching"

The presently dominant QSAR (quantitative structure-activity relationship) theory of molecular signaling claims that two structurally matching molecular objects exchange specific information by mere contact. (Sometimes also refered to as the Key/Keyhole interaction model). Specific molecular interactions happen after random collisions between partners on a trial-and-error basis, using electrostatic, short range (two to three times the molecule size) forces. But this kind of random encounter, amidst the bulk of molecules which are foreign to a given biochemical reaction, would give to these meetings statistically little chance of occuring. Thus, the simplest biological event might require a very long time to happen. This paradox is still unexplained by those adhering to this theory...
The shortcomings of this approach are best illustrated by the now widely-recognized failure of "drugdesign" to produce the expected volumes of new therapeutic substances.
In this context, it is worth noting that the words "molecular signal" are routinely used by biologists, yet receive no precise physical definition.

The Proposed Theory: "electromagnetic signals"

Using various experimental protocols we are able to activate specific cell functions with the corresponding low frequency (<20kHz) electromagnetic waves. This prompted us to hypothesize that the molecular signal is composed of such low frequency waves and that the ligand coresonates with the receptor pretty much as the tuning of a radio device.
It is important to remark that these concepts do not violate any current biological or physical basic principle. It is well-documented that:

1) molecules emit specific frequencies;
2) a complex set of high frequency waves can produce low frequencies according to the "beat frequency" phenomenon,
3) all biological interactions occur in water, since, on the average, there are ten thousand molecules of water per molecule of protein.

Quantum electrodynamics calls for the existence of long range electromagnetic fields that can be transmitted by large - hundreds of angstroms - coherent domains present in water (adapted from E. Del Giudice & E. Preparata, 1994, Journal of Biological Physics, vol. 20, p. 105). Such long range EM fields would be capable of transmitting the EM message coming from molecules, thus generating a long distance specific attraction between two molecules with matching spectra, excluding non-resonating, unwanted random events. The field resulting from the aggregation of the two coresonating molecules would obviously exhibit a different frequency which would then coresonate with the next molecule or cluster of molecules which intervene in the next step of the biochemical reaction, and so forth and so on... The fact that small changes in the spectrum of a molecule (e.g. induced by a tiny structural change) would profoundly alter its resonating characteristics, would explain how minute changes (e.g. phosphorylation, replacement of an ion by a similar one, switching of two peptides...) radically modify the molecular tertiary structure and function.

Summary

In summary, the current short range electrostatic theory of molecule interaction-recognition via random collision cannot help us understand how biological reactions really work. The key/keyhole and the structural matching are just cartoonesque descriptions of the exceedingly more sophisticated mechanism which is required to command the extraordinarily complex and rapid cascade of intricate biochemical reactions supporting life. By contrast, the EM interactions afforded by the capacity of water to support long range EM fields provide fascinating possibilities for understanding:

1) the specific and rapid long distance attraction of coresonating mates;
2) how the formation of aggregates with appropriate frequencies initiates the next step in the biochemical sequence;
3) how the steric structure of molecules can be altered or stabilized by subtle changes in their primary composition.
