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As they look beyond the genome, cancer researchers are also awakening to the fact that some 90 percent of the protein-encoding cells in our body are microbes. We evolved with them in a symbiotic relationship, which raises the question of just who is occupying whom.

We are massively outnumbered, said Jeremy K. Nicholson, chairman of biological chemistry and head of the department of surgery and cancer at Imperial College London. Altogether, he said, 99 percent of the functional genes in the body are microbial. As the various cells are colluding, they may also be trading information with cells in another realm the micro-organisms in the mouth, skin, respiratory system, urogenital tract, stomach and digestive system. Each microbe has its own set of genes, which can interact with those in the human body by exchanging molecular signals.

The signaling these microbes do is dramatically complex, Dr. Nicholson said in an interview at Imperial College. They send metabolic signals to each other and they are sending chemicals out constantly that are stimulating our biological processes.

People in different geographical locales can harbor different microbial ecosystems. Last year scientists reported evidence that the Japanese microbiome has acquired a gene for a seaweed-digesting enzyme from a marine bacterium. The gene, not found in the guts of North Americans, may aid in the digestion of sushi wrappers. The idea that people in different regions of the world have co-evolved with different microbial ecosystems may be a factor along with diet, lifestyle and other environmental agents in explaining why they are often subject to different cancers.