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Integration of scientific disciplines as powerful means of elucidating functional design in biology**J N Maina**

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Scientific discovery, in which novel empirically sound knowledge is produced, constitutes a pinnacle of human intellectual and creative enterprise. Primary units of classification, scientific disciplines are an invention of the 19th century society. The word *disciplina*, which originates from Latin, means classification of knowledge for the purpose of teaching. Originally, a finite number of highly guarded scientific disciplines existed, but recently the number has increased and diversified as new ones have arisen and others merged. Barriers continue to exist between disciplines to the extent that even scientists in same general discipline are unfamiliar with work that colleagues in their field are doing. While split of scientific disciplines has been fundamental to the progress of science because more resources were directed towards answering fewer and more specific questions, the downside to that is that research questions are not addressed broadly. From appreciation of the inherent shortcomings in compartmentalizing science, gradual erosion of the artificial boundaries is occurring: traditional disciplines are merging to form more inclusive ones, e.g., biophysics, molecular biology, structural biology and synthetic biology, and collaboration between experts in different fields is becoming a norm rather than a rarity. Many complex biological states and processes have been mathematically and/or statistically modeled. In our continuing investigations of the exceptionally complex and efficient avian respiratory system, we have adopted various techniques to explicate its functional design. They include stereology, molecular biology, three-dimensional computer reconstruction, computational fluid dynamics, immunocytochemistry and mathematical modeling. The multidisciplinary approach has given robust answers to our research questions.

Biography

J N Maina completed his BVM at the University of Nairobi (Kenya) and PhD and DVSc at the University of Liverpool (UK). He has published more than 150 articles in peer reviewed journals and written several books in the area of the functional design of gas exchangers. He is an Associate Editor of the *Frontiers in Zoology* journal. His area of interest is in the comparative functional morphologies of gas exchangers – respiratory structures.

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