Lynen in 1964) had shown that squalene is a biogenetic precursor of lanosterol and cholesterol. Thus, the mevalonic acid–to–squalene pathway is central not only to terpenoid but also to steroid biosynthesis.

Rita Cornforth made major experimental contributions to this beautiful work; she was personally responsible for the synthesis of the labeled mevalonate precursors. George Popják, now at the University of California, Los Angeles, was deeply involved in the biochemical aspects of these studies, in a collaboration which spanned 20 years. Among the many important papers resulting from this collaboration is one dealing with the question of which of the two hydrogens at C-4 in the dihydropyridine ring of NADH (reduced nicotinamide adenine dinucleotide) is transferred to the substrate in reductions involving the coenzyme.

More recently, Cornforth's attention has been focused on compounds bearing a chiral methyl group; that is, R-ĊHDT. The synthesis and especially the enzymatic assay of such compounds are major technical achievements in which Cornforth has had the able collaboration of Professor H. Eggerer and his students in Munich. This problem also has been attacked independently in parallel experiments by D. Arigoni and his co-workers at the Eidgenössische Technische Hochschule (ETH) in Zurich. Although the synthesis of chiral methyl compounds by itself is a most intriguing development, it is the brilliantly imaginative way in which Cornforth has made use of this chiral methyl group to trace the stereochemical consequences of enzyme processes, which has been the consummate achievement. Thus Cornforth has shown that the condensation of acetyl coenzyme A with (*R*)-3-tritio-oxaloacetate in the presence of *R*-citrate synthase gives an α-tritiated citrate from which is generated (*R*)-acetate, ĊHDTCOOH, by cleavage in D_2O with citrate lyase. From this it follows that the enzyme-mediated carbon-carbon cleavage proceeds in a stereospecific manner with inversion. Thus, the enzyme process is inherently stereospecific even though the isotopically normal substrate citric acid and the product acetic acid are themselves achiral.

Cornforth is a very intense, incisive, and intellectual person, as well as a perfect gentleman in his scientific dealings with others. The scientific impact of his work has been carried more by his publications than his lectures. His public exposure has been less than that of others of comparable scientific stature because of his deafness. Cornforth is an excellent tennis player and chess enthusiast. He is reported to plan the downfall of his opponents at the chess board in the same systematic fashion that he plans an assault on the solution of a biochemical problem. He is also a collector and author of limericks, which he sometimes generates at short notice to fit a special occasion.

Vladimir Prelog was born in Sarajevo (now part of Yugoslavia) in 1906, but received his university education at the Technical University in Prague, Czechoslovakia (Dipl. Ing.-Chem., 1928; Dr. Sc. Tech., 1929). After 6 years in the G. J.

Speaking of Science

Applied Math: Too Many Dehydrated Elephants?

Applied mathematicians, like pure mathematicians, are often lured by the formality and structure of the mathematical language. This love of elegance and abstraction can at times be detrimental, according to Mark Kac of Rockefeller University. (Kac has made substantial contributions to the fields of probability theory, statistics, analysis, and number theory.) In a recent series of lectures on probability theory that he gave at the University of Maryland, Kac stressed, as an underlying theme, that applied mathematics is becoming too fraught with formalisms and that this causes the field to become too ingrown.

Many of the most interesting problems in mathematics originated in the other sciences, Kac points out. For example, the meaty problems in probability and statistics came from physics, economics, and theories of games of chance. In order to remain vital, applied mathematics must continually be replenished with such problems. However, Kac believes that too many applied mathematicians deal exclusively with problems that are no longer tied to the real world. And this leads to a lack of vitality in applied mathematics, with the result that more and more is written about less and less.

Applied mathematicians traditionally approach problems arising from other disciplines by cleaning up the problems and rephrasing them in the language of mathematics. Many of these problems subsequently take on a life of their own and even lead to new and useful applications. This happened, for example, to Brownian motion. Once concerned with the motion of small particles, the theory of Brownian motion has been so formalized that it now exists as a mathematical subject unto itself, independent of its origins.

Although there is nothing wrong with the use of mathematical constructs, the tendency of mathematicians to reformulate problems in the most abstract way can lead to rather sterile research, according to Kac. The heart of the matter is that mathematicians often end up creating what Kac calls "dehydrated elephants." He refers to a cartoon, published during World War II in the *Saturday Evening Post*, in which two chemists are looking at a small pile of sand in the midst of formidable laboratory equipment. The caption read, "Nobody really wanted a dehydrated elephant but it is nice to see what can be done."

Of course, many applied mathematicians disagree with Kac's criticisms of their field and express surprise that he thinks applied mathematics is too ingrown. For example, Paul Smith, a statistician at the University of Maryland, denies that applied mathematicians in general, and statisticians in particular, are running out of interesting problems. He believes that many interesting new statistical problems are arising from interactions among statisticians and biologists and other scientists. Moreover, he emphasizes that many challenging problems that arose solely out of the internal structure of statistics remain to be solved. Smith, along with others, believes that it is wrong to condemn people who study pure statistical or other problems in applied mathematics that are divorced from problems that arise in the outside world.

Kac acknowledges that his is a maverick viewpoint. He speculates that the majority of people who study theoretical probability and statistics, as well as other areas of applied mathematics, have too much stake in what they are doing to worry about creating dehydrated elephants. Those who agree with Kac often point out that not only mathematicians but also investigators in other fields such as biology and physics should worry about the nature of their work. However, recognizing a dehydrated elephant when you create one is often easier said than done.—GINA BARI KOLATA