Lasker awards honour fruit fly researchers

This year's Albert Lasker medical research awards highlight the remarkable progress made in recent years in basic and medical genetics. The US awards, among the most prestigious for medical and biomedical research, were first made by the Albert and Mary Lasker Foundation in 1944.

This year's basic medical research prize was awarded to Edward B. Lewis of the California Institute of Technology in Pasadena, USA, Christiane Nüsslein-Volhard of the Max-Planck Institute for Developmental Biology in Tübingen, Germany. Both Lewis and Nüsslein-Volhard work on understanding animal development using genetic approaches and both use the fruit fly Drosophila melanogaster in their studies. The clinical medical research prize was awarded to Yuet Wai Kan of the University of California at San-Francisco for contributions to the development of DNA analysis for diagnosis of genetic disorders.

Lewis's work, for over 40 years, has concentrated on understanding the role of the bithorax gene complex in segmental specification. Insects are thought to have evolved from segmented annelids (like the earthworm), and, in the process, developed mechanisms that allow one segment to differentiate structures different from the next (see Figure 1 for an outline). The development and identity of segmental structures in the fruit fly are under the control of two gene complexes (Figure 2,a), the Antennapedia complex (ANT-C) and the bithorax complex (BX-C).

Lewis's work did not begin as an effort to understand animal development. Trained as a classical geneticist under A. H. Sturtevant (who was himself a student of T. H. Morgan, the founder of Drosophila genetics), Lewis's early experiments were aimed at understanding the nature of the gene. The classical view is that if two mutations are in the same gene they will 'fail to complement each other'. In other words, if mutations $a^1$ and $a^2$ were in the same gene then flies of the genotype $a^1/a^2$ would be mutant and $a^1$ and $a^2$ fail to complement each other and are alleles. If the mutations were in different genes then $a^1/a^2$ flies would be normal; the mutations are said to complement each other. This is still a useful functional definition, but Lewis showed that sometimes things are different. His study of BX-C showed that while many different mutants in this genetic region behaved as if they were in the same gene and failed to complement each other, other mutant combinations behaved as if they were in different genes and complemented each other. This pattern of complementation was complex and mutants in the locus showed different phenotypes depending on whether the mutations were in cis (on the same chromosome) or in trans (on different homologous chromosomes) combination with each other. Lewis's work, done long before recombinant DNA technology allowed us to understand these phenomena at the molecular level, showed for the first time that the gene was complex and defined the term pseudoallelism. These experiments on the nature of gene organization are themselves revolutionary and deserving of the highest recognition.

Lewis has, however, carried his experiments much further. He showed that mutations in BX-C had very specific effects on the body plan of the fly. In general, loss-of-function alleles at the