CC/NUMBER 35
SEPTEMBER 1,1980

This Week's Citation Classic

White M J D. *Animal cytology and evolution.*
Cambridge: Cambridge University Press, 1945. 375 p.
[University of Melbourne, Melbourne, Australia]

This book deals with karyotype evolution, the evolution of meiotic mechanisms and, more generally, with that of cytogenetic systems as a whole. There are chapters on hybrid sterility, on sex chromosome mechanisms and on natural parthenogenesis. [The *SCI*® indicates that this book has been cited over 675 times since 1961.]

Michael J.D. White
Department of Population Biology
Research School of Biological Sciences
Australian National University
Canberra City, ACT 2601
Australia

August 6, 1979

"I wrote this book three times — first in England during the war years 1941-1944, then in Texas in 1952-1953, and once again in Australia in 1970-1972. Each edition is really a separate book although certain themes run through all of them. Basic is the concept of biological evolution as a succession of cytogenetic events — changes in chromosomes and in chromosomal mechanisms. The decade of the 1940s was one in which a group of biologists believed that they had achieved a final unified evolutionary theory — the 'Neo-Darwinian synthesis' of palaeontology. In the first edition of the book I stressed the tremendous diversity of genetic systems and (without attacking the authors of the 'synthetic theory,' most of whom were my personal friends) warned against oversimplification of the evolutionary picture. Patterns of evolution are not determined solely by extrinsic factors but also by the internal architecture of the cytogenetic system, which varies greatly from group to group. The 'principle of homologous change' is put forward, for the first time, as a major factor in karyotype evolution —one chromosome after another undergoing the same type of structural change in a particular phyletic line.

"In the second edition the interpretation of the diversity of cytogenetic systems is extended much further.[1] My own intellectual development had been enriched by research on the highly anomalous cytogenetic systems of the gall midges, by work on the chromosomal polymorphisms of the Trimerotropine grasshoppers of the western US, and by close contact with the group of *Drosophila* workers at the University of Texas. New work carried out in laboratories all over the world in the years 1945-1953 is integrated into the second edition. The 'principle of homologous change' is interpreted in terms of chromosomal architecture and cell mechanics. The importance of evolutionary changes in the total amount of DNA in the karyotype is clearly stated. I think the second edition is a more mature and more fully scientific book than the first. Where it is weak, in retrospect, is that there is little discussion of cytogenetic mechanisms of speciation, which is still regarded far too much as simply the outcome of genetic polymorphisms existing everywhere in natural populations.

"In the third edition the whole argument is expanded and deepened.[2] New chapters are added, in particular one on 'Chromosomal rearrangements and speciation.' The 'principle of homologous change' is renamed 'karyotypic orthoselection,' a term which interprets as well as defines it. Between the second and third editions I had developed a major research program on karyotype evolution and speciation in the wingless Australian grasshoppers of the subfamily Morabinae — which led to the formulation of the so-called *staispatric* model of chromosomal speciation.

"As a blend of cytogenetics and evolutionary theory, *Animal Cytology and Evolution* has probably failed to appeal to 'pure' cytogeneticists and 'pure' evolutionists alike. But times are changing as interrelationships develop between formerly isolated biological disciplines. Perhaps *Animal Cytology and Evolution* has helped to bring about this change."

1. **White M J D.** *Animal cytology and evolution.* Cambridge: Cambridge University Press, 1954. 454 p.
2. ..... *Animal cytology and evolution.* Cambridge: Cambridge University Press, 1973. 961 p.