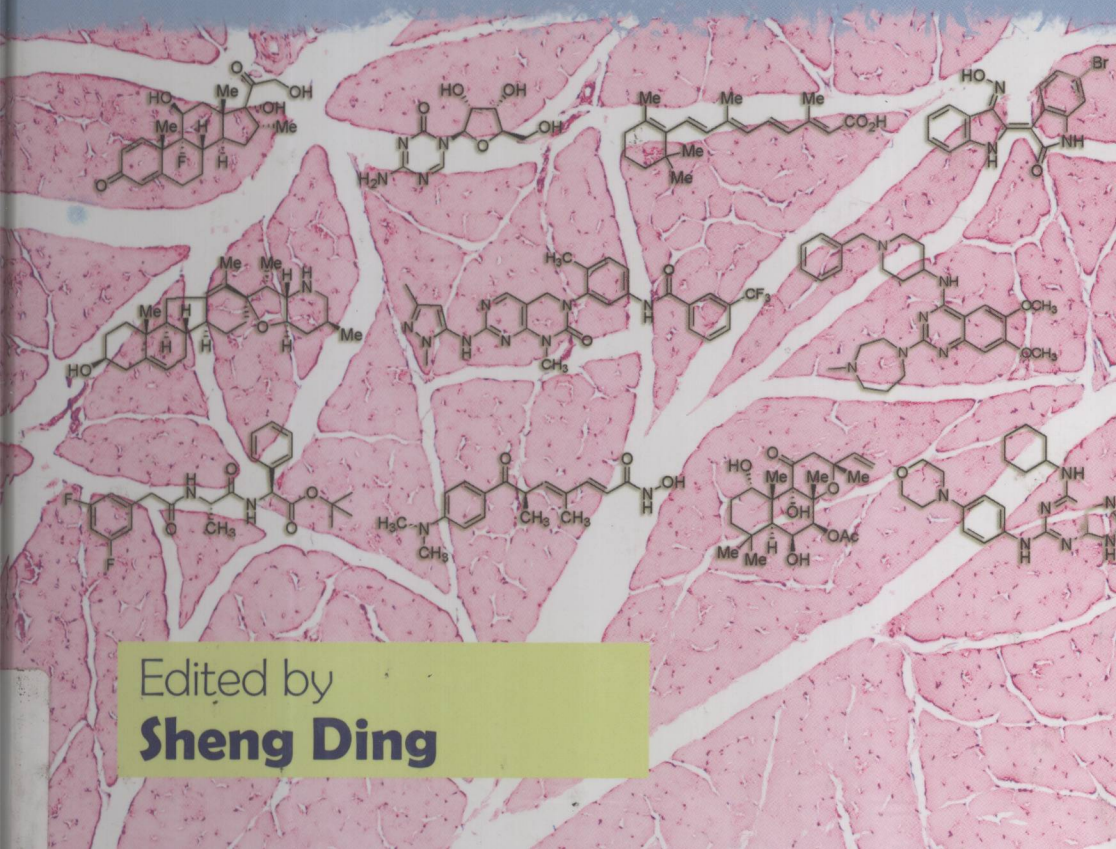


Chemical and Functional  
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**to Stem Cell Biology**  
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Edited by  
**Sheng Ding**

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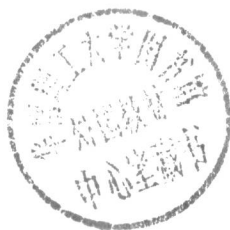
# CHEMICAL AND FUNCTIONAL GENOMIC APPROACHES TO STEM CELL BIOLOGY AND REGENERATIVE MEDICINE

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Edited by

**SHENG DING**

*Departments of Chemistry and Cell Biology  
The Scripps Research Institute*



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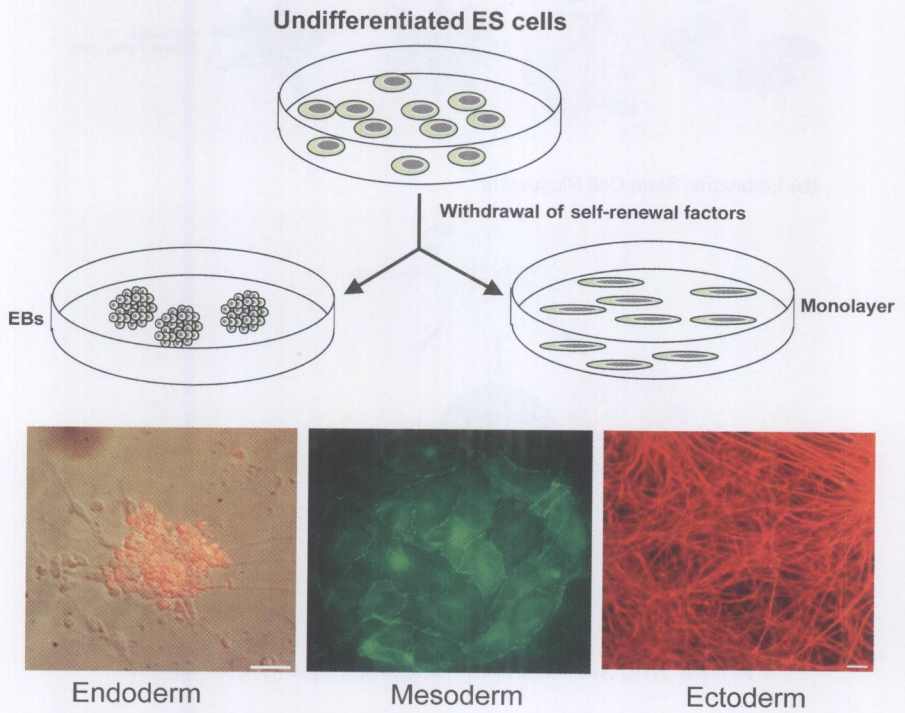
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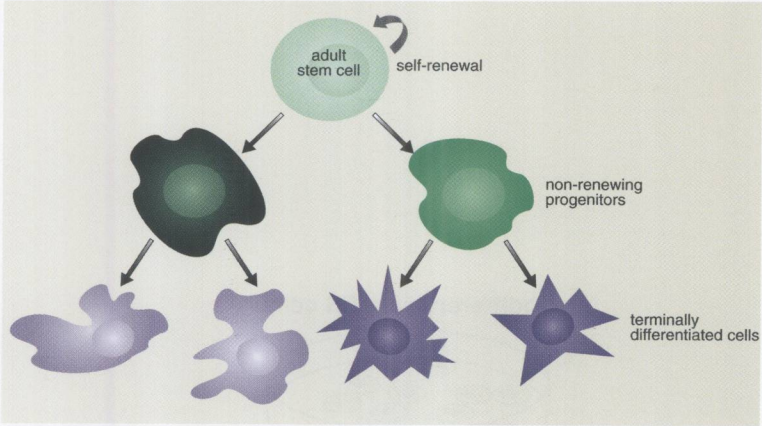
**Jia Zhang**, Genomics Institute of the Novartis Research Foundation, 10675 John Jay Hopkins Drive, San Diego, CA 92121





**FIGURE 1.3** Differentiation potential of ES cells. ES cells can be induced to differentiate into all somatic cell lineages via the formation of three-dimensional EBs or monolayer culture.

(a) Tissue-specific Adult Stem Cell-Multipotent



(b) Embryonic Stem Cell-Pluripotent

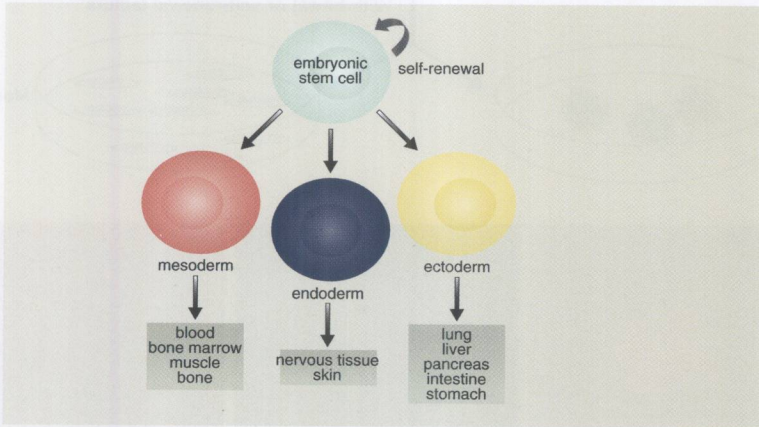


FIGURE 2.1 Adult stem cell lineages. (See text for full caption.)

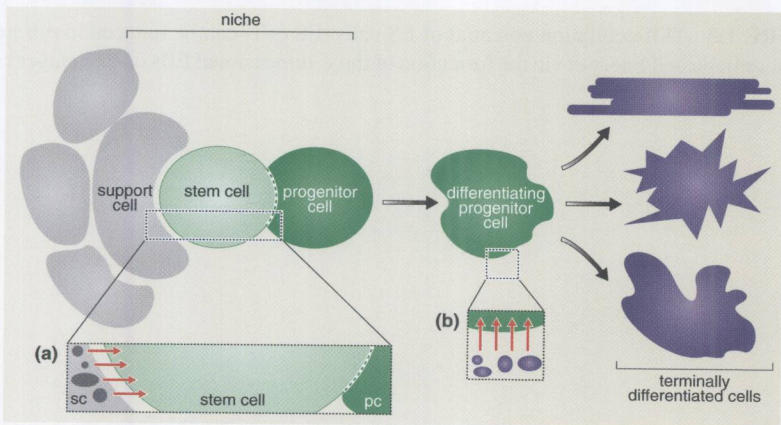
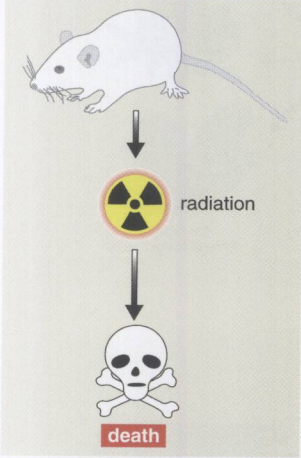


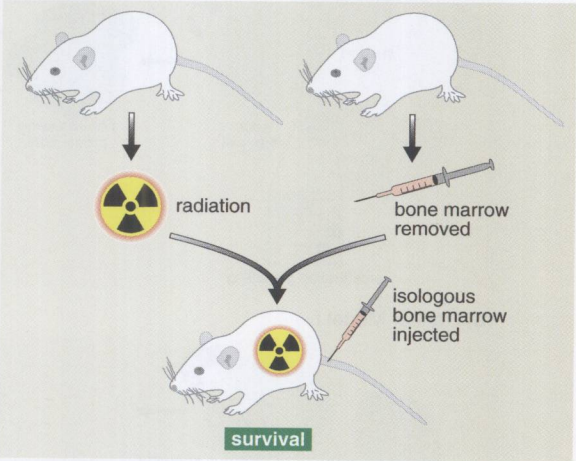
FIGURE 2.2 Adult stem cell niche. Adult stem cells are maintained in a specialized environment known as the *niche*. (See text for full caption.)



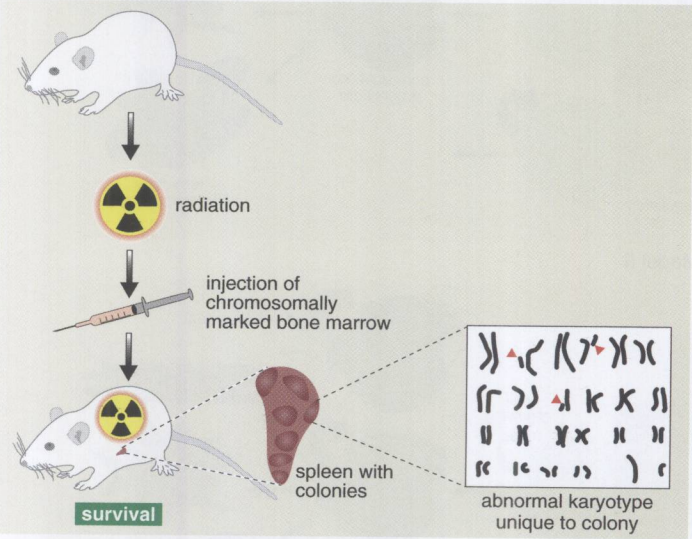
(a) Control



Experiment 1

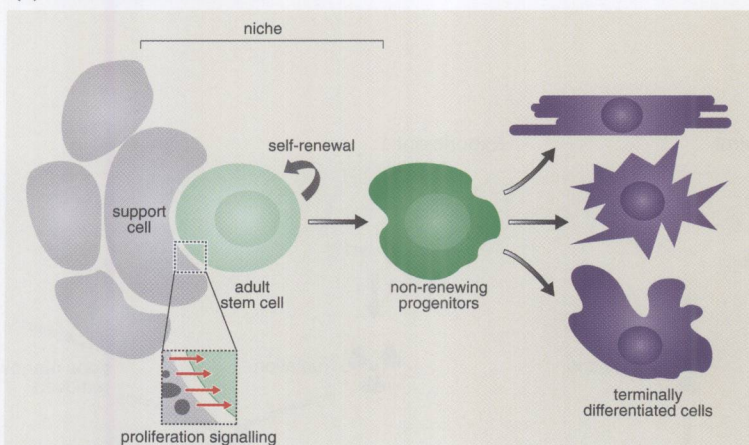


(b) Experiment 2

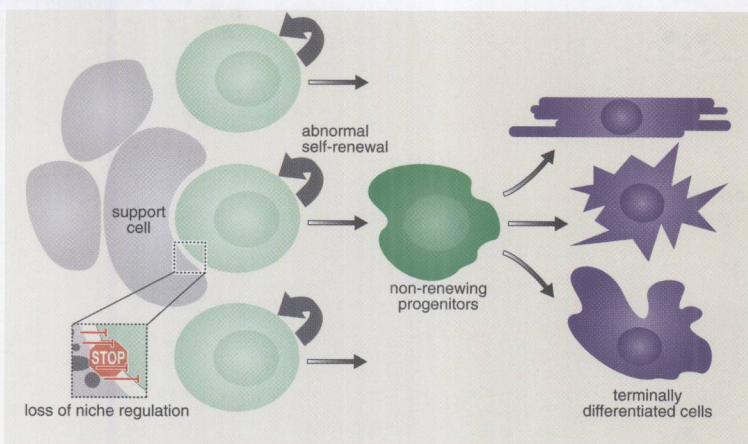


**FIGURE 2.3** Discovery of the hematopoietic stem cell. (See text for full caption.)

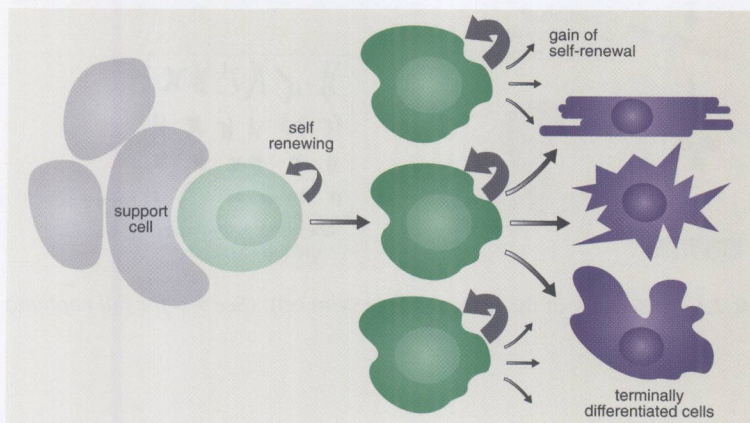
**(a) Normal Adult Stem Cell**



**(b) Cancer Model I**

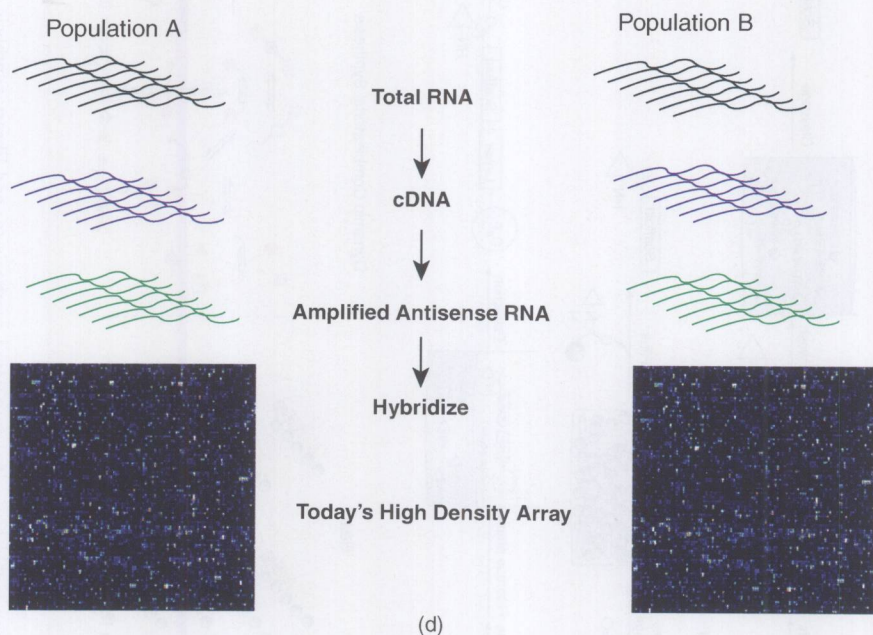


**(c) Cancer Model II**



**FIGURE 2.4** Cancer stem cell. Two major theories of the cancer stem cell arise from the common theme of aberrant self-renewal. (See text for full caption.)





**FIGURE 3.1** Differential gene expression technology progression. (See text for full caption.)

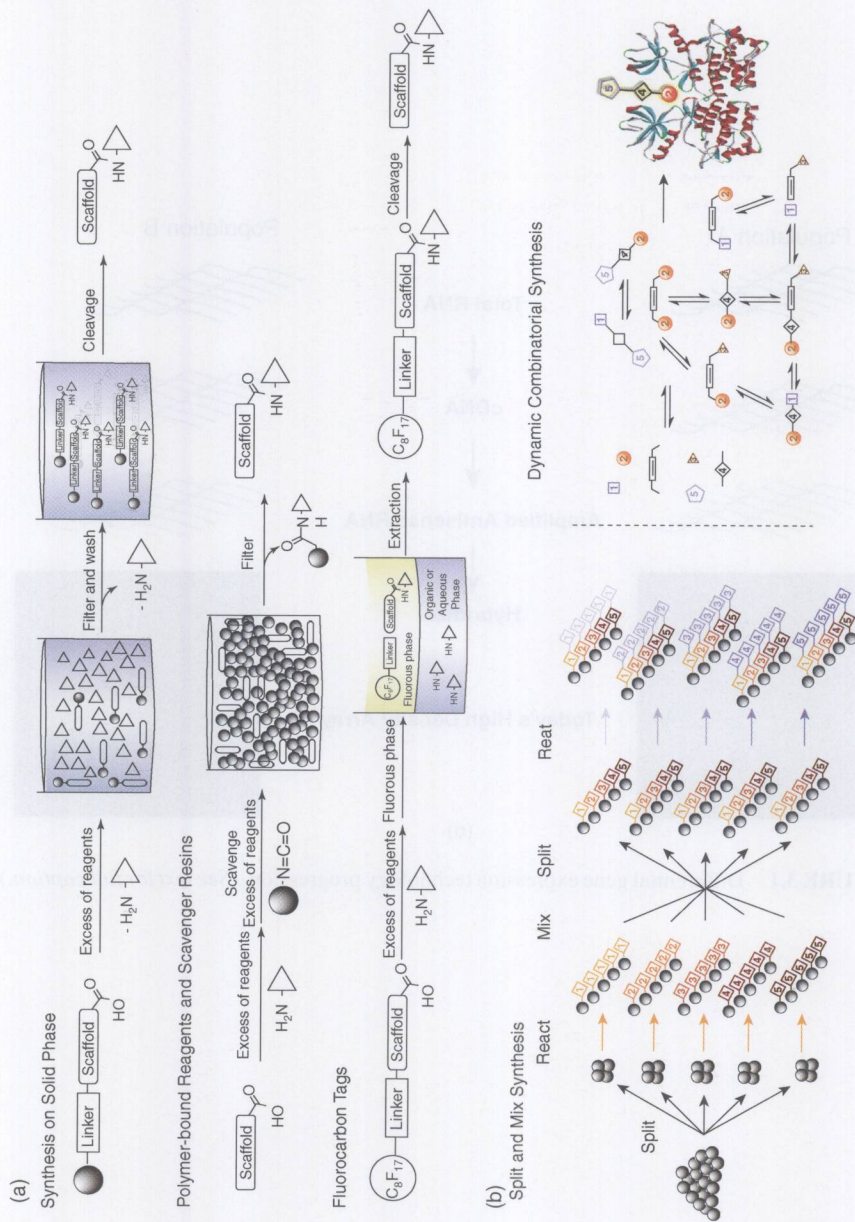
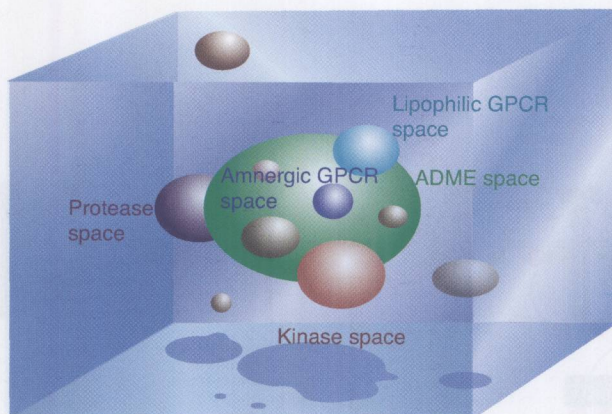
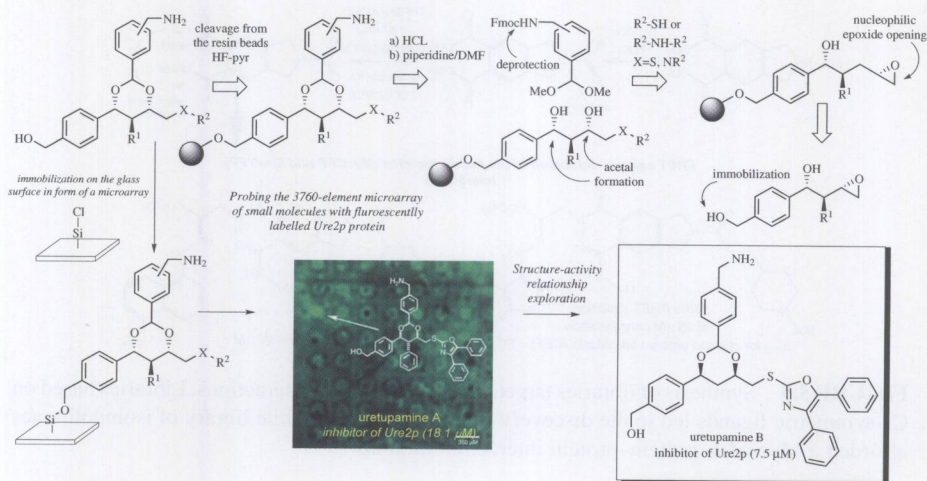


FIGURE 5.1 Enabling technologies for automated synthesis (a) and library synthesis (b).

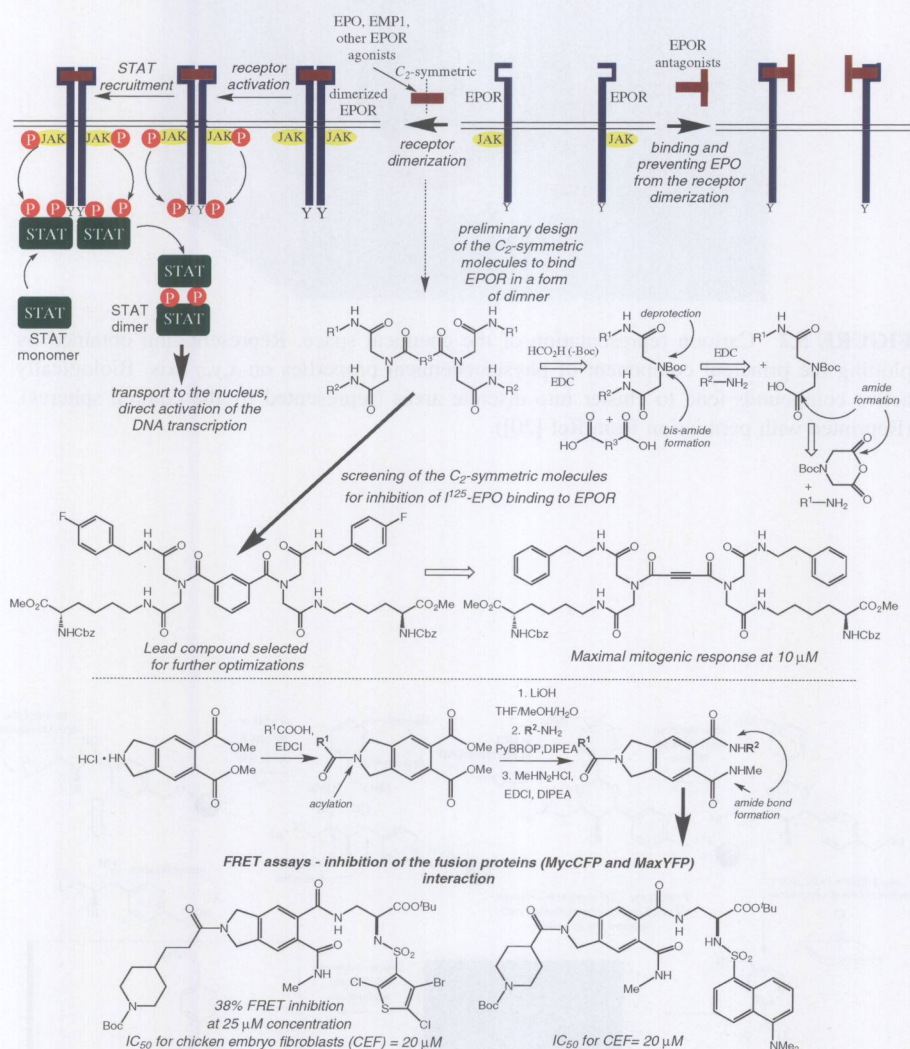


**FIGURE 5.2** Cartoon representation of the chemical space. Representation obtained by plotting the principal component of physicochemical properties on  $x,y,z$  axis. Biologically active compounds tend to cluster into discrete areas (represented by the colored spheres). (Reprinted with permission from Ref [20]).

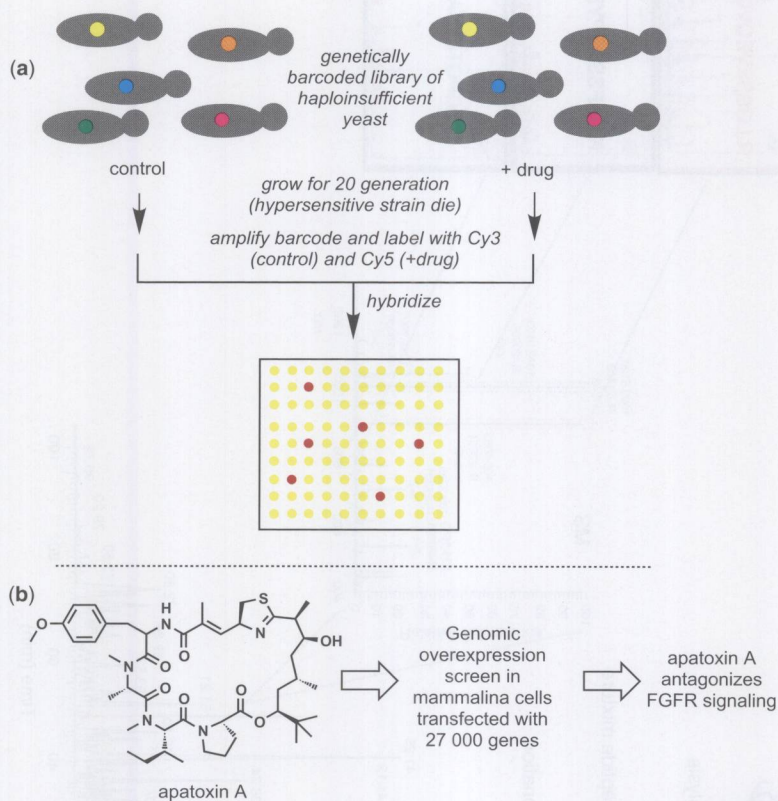


**FIGURE 5.6** Synthesis and microarraying of a 1,3-dioxane library. Discovery of a selective Ure2p (transcription factor) modulator.

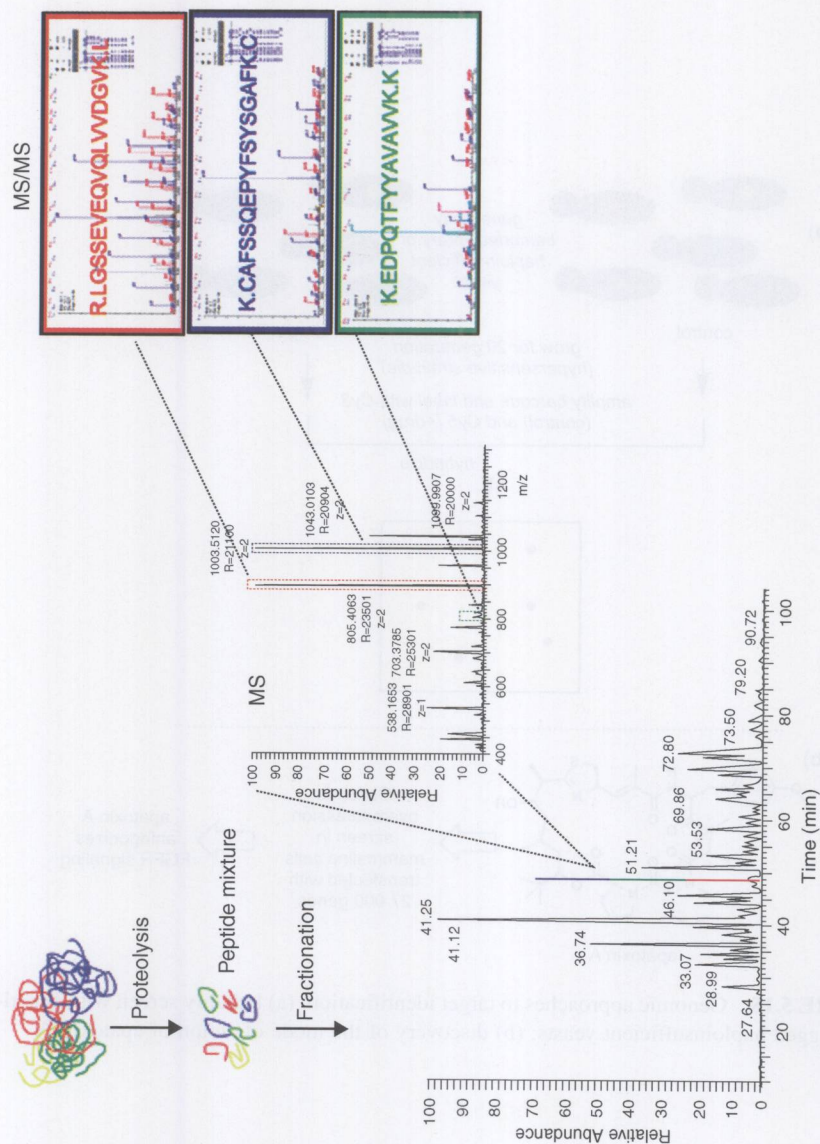




**FIGURE 5.9** Synthesis of libraries targeting protein-protein interactions. Libraries based on  $C_2$ -symmetric ligands led to the discovery of an EPO agonist while library of isoindolinones afforded a Myc-Max protein-protein interaction inhibitor.

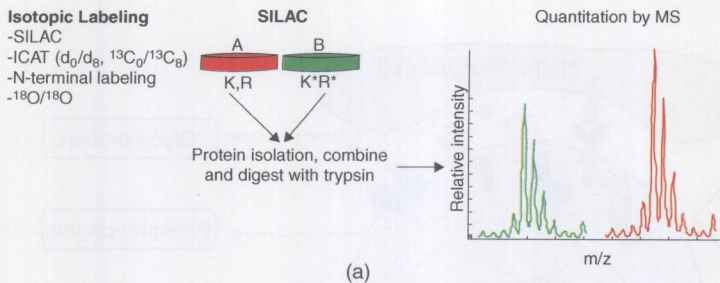


**FIGURE 5.15** Genomic approaches to target identification: (a) lethality screen with genetically tagged haploinsufficient yeasts; (b) discovery of the mode of action of apatoxin A.

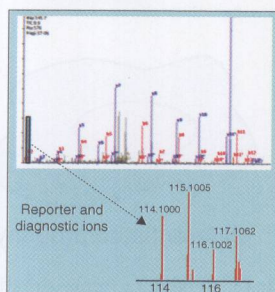
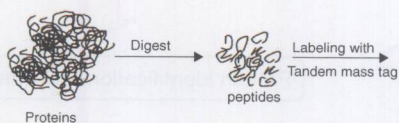
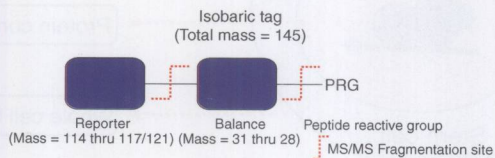


**FIGURE 6.1** Analysis of peptide mixtures by online reverse-phase LC/MS/MS. (See text for full caption.)

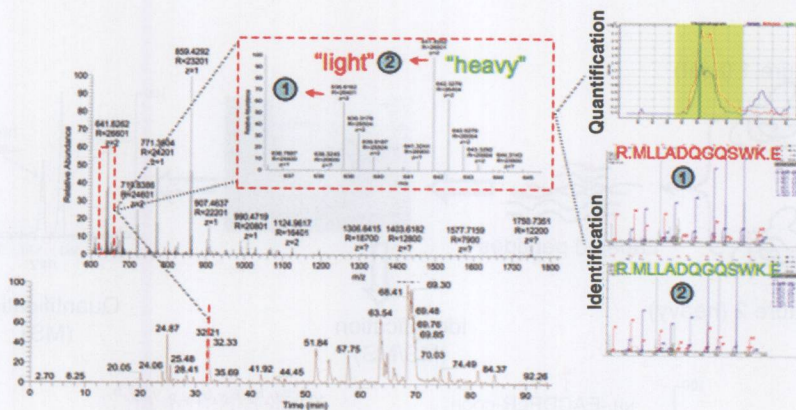




(a)



(b)



(c)

**FIGURE 6.2** (a) Quantitation using isotopic labeling. (b) Quantitation using tandem mass tags. (c) Quantitation using chemical labeling strategies. (See text for full caption.)