Adjuvants are crucial for efficacy of vaccines, especially subunit and recombinant vaccines. Rational vaccine design, including knowledge-based and molecularly defined adjuvants tailored for directing and potentiating specific types of host immune responses towards the antigens included in the vaccine is becoming a reality with our increased understanding of innate and adaptive immune activation. This will allow future vaccines to induce immune reactivity having adequate specificity as well as protective and recallable immune effector mechanisms in appropriate body compartments, including mucosal surfaces. Here we describe these new developments and, when possible, relate new immunological knowledge to the many years of experience with traditional, empirical adjuvants. Finally, some protocols are given for production of emulsion (oil-based) and liposome-based adjuvant/antigen formulations.