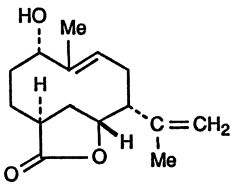
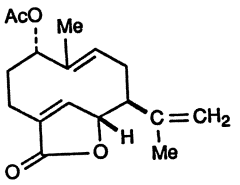
21.2.5.8 *Aristolochia versicolar*

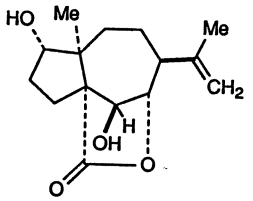
Twelve constituents were obtained from the roots of *A. versicolar*. The identified compounds were: aristolochic acid A and its methyl ester, β-sitosterol and its D-glucoside, stigmastane-3,6-dione, stigmast-4-en-3,6-dione, and stearic acid [44]. Three new sesquiterpene lactones were also determined: versicolactone B (*21-30*), versicolactone C (*21-31*) [45], and yindailactone B (*21-32*) [46].



Versicolactone B (*21-30*)



Versicolactone C (*21-31*)



Yindailactone B (*21-32*)

21.2.5.9 *Aristolochia cinabaria*

Tuberosinone, its *N*-β-D-glucopyranoside, and aristolochic acid A were detected in wild and cultivated *A. cinabaria*. The yield of tuberosinone was 0.4% in both wild and cultivated *A. cinabaria*; yields of aristolochic acid A were 1.1% and 1.3% in wild and cultivated plants, respectively [47].

21.2.5.10 *Aristolochia austrozechuanica*

In the ligroin extract of *A. austrozechuanica* magnoflorine and β-sitosterol were detected by TLC [48].

21.3 Pharmacology

The biological activities of aristolochic acid A have been extensively studied. A number of gram-positive bacteria including *Staphylococcus, Streptococcus, Diplococcus, Bacillus, Sarcina*, and *Mycobacterium* are inhibited by aristolochic acid A at a concentration of 50–200 μg/ml. The concentration of aristolochic acid A needed to inhibit gram-negative bacteria and fungi were higher than 200 μg/ml [49].

Mice infected with *Staphylococcus aureus, Diplococcus pneumoniae*, or *Streptococcus pyogenes* were found to be protected from disease by i.p. administration of aristolochic acid A at a dose of 50 μg/kg. The phagocytic activity of peritoneal macrophages of treated mice was markedly stimulated [50]. Schunack et al. [51] could not prove an antibiotic activity of aristolochic acid A and aristolochic acid II against *Staphylococcus aureus* G-511 and *Escherichia coli* B. Pretreatment of pneumococcus infected mice with both aristolochic acids in a solution of sodium bicarbonate significantly increased the survival rate, but a similar effect to a lesser degree was also noted in control animals pretreated only with sodium bicarbonate solution. A correlation between the dose and effect of aristolochic acids could not be demonstrated.

Some results of studies on the immunostimulating and antitumor activities of aristolochic acid A contradicted each other. A remarkable prolongation of the survival time of mice bearing ascitic sarcoma-37 tumors treated with aristolochic