

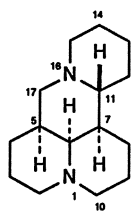
113.1 Introduction

Kushen, Radix *Sophorae flavescens*, is the dry roots of *Sophora flavescens* Ait. (Fabaceae) collected in spring and fall. It is officially listed in the Chinese Pharmacopoeia and is a well-known Chinese herbal medicine used as a diuretic and for the treatment of diarrhea, gastrointestinal hemorrhage, and eczema.

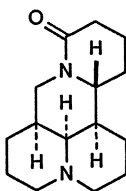
113.2 Chemical Constituents

113.2.1 Chemical Constituents of *Sophora flavescens*

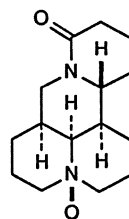
The root of *S. flavescens* is known to contain a number of quinolizidine alkaloids as major constituents. A total alkaloid content of more than 2%, calculated as matrine, is required by the Chinese Pharmacopoeia as a qualitative characteristic for the dry root. Matrine (113-2) [1–4] and oxymatrine (113-3) [1–5] are the main alkaloids in the root of *S. flavescens*. Matrine represents a saturated four-ring system containing two condensed quinolizidine moieties with matridine (113-1) as the basic structure [6].



Matridine (113-1)



Matrine (113-2)



Oxymatrine (113-3)

In addition to matrine and oxymatrine, the isolation of a number of stereoisomers and dehydroanalogs of matrine from the root of *S. flavescens* was reported. These are sophoranol (113-4) [1], sophocarpine (113-5) [2] and 5-episophocarpine (113-6) [7], isomatrine (113-7) [8], and sophocarpine *N*-oxide [9]. 7,8-Dehydrosophoramine (113-8), the compound with the highest degree of unsaturation among the known matridine-type alkaloids, was isolated from the plant [10] and 7,11-dehydromatrine (113-9) was isolated from the fresh flowers [11] of *S. flavescens*.