

# Larkspur (Delphinium species)



# Identifying larkspurs- note spur on the flowers



# Delphinium (Larkspurs)

- Diverse group
- Divided into three categories:
  - tall (*barbeyi*, *occidentale*)
  - low (*nuttallianum*, *andersonii*, *bicolor*)
  - plains (*geyeri*)
- Cause \$6-10 million in losses annually



# Various Larkspur Types



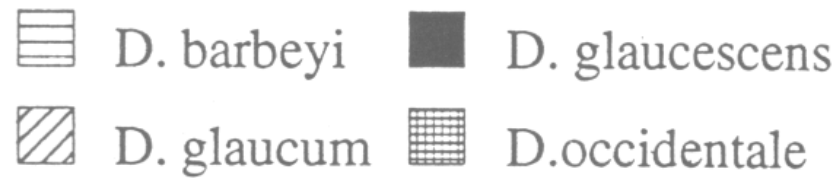
- Tall larkspurs - grow 3-6 ft. tall
- Low larkspurs - few fine stems and grow 8-24 in. tall
- Plains larkspur - intermediate type that reaches 24-36 in. tall

# Tall larkspurs

- Tall larkspurs: found in mountain habitat in the western U.S. - generally moist sites - 6,000 to 10,000 feet elevation
- Tall larkspur sites typically snow-covered during winter
- Tall larkspurs grow in forb-dominated sites; very nutritious forage and high carrying capacity



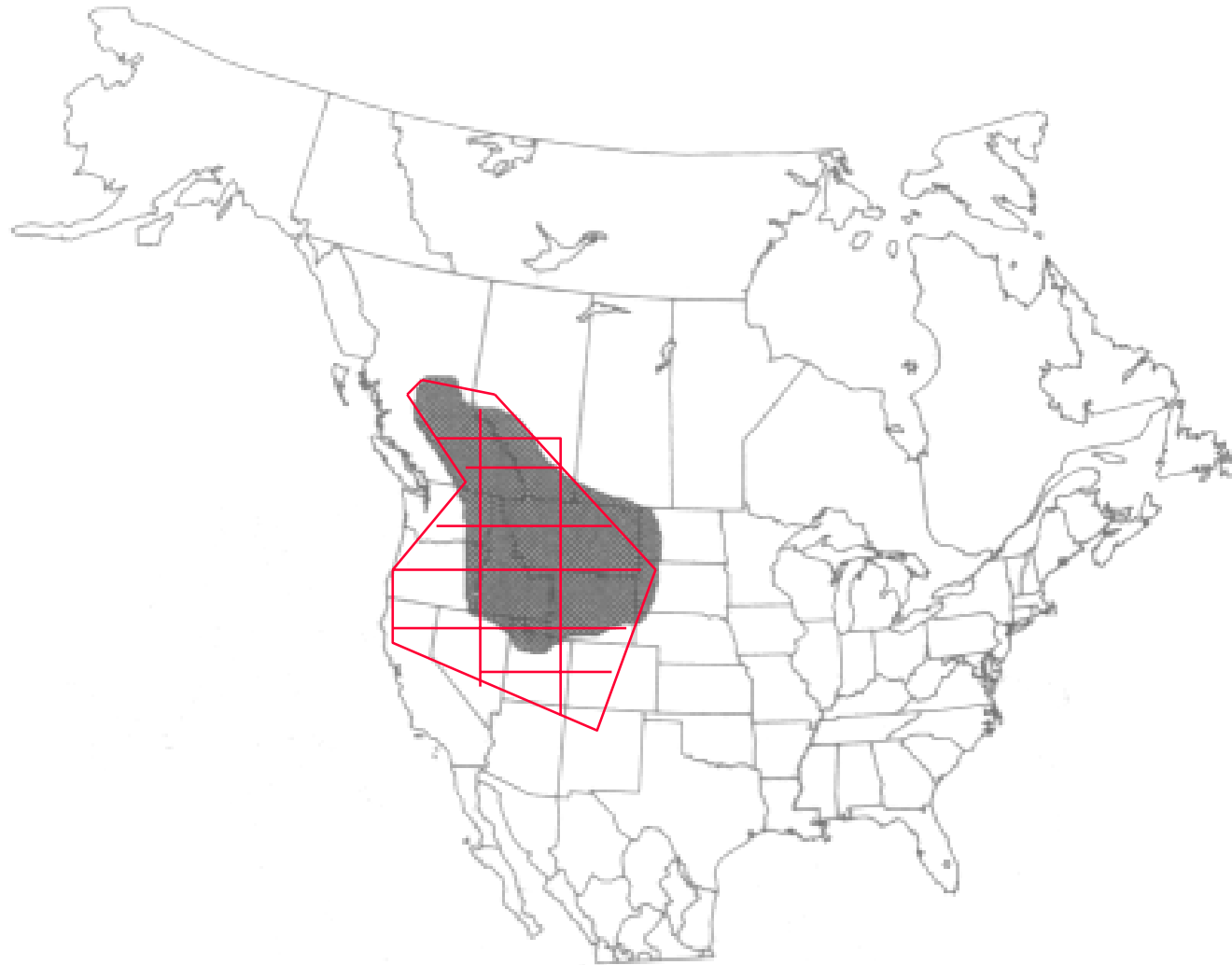
# Tall larkspur distribution



# Low Larkspurs



- Grow early in spring on foothill and mountain ranges with adequate spring moisture - 3,000 to 9,000 ft. elevation
- Depending on moisture and temps, may persist for 6 weeks or so
- Density influenced by spring moisture; lower density usually means fewer losses



*Delphinium bicolor*

**Nuttallianum = nelson larkspur**



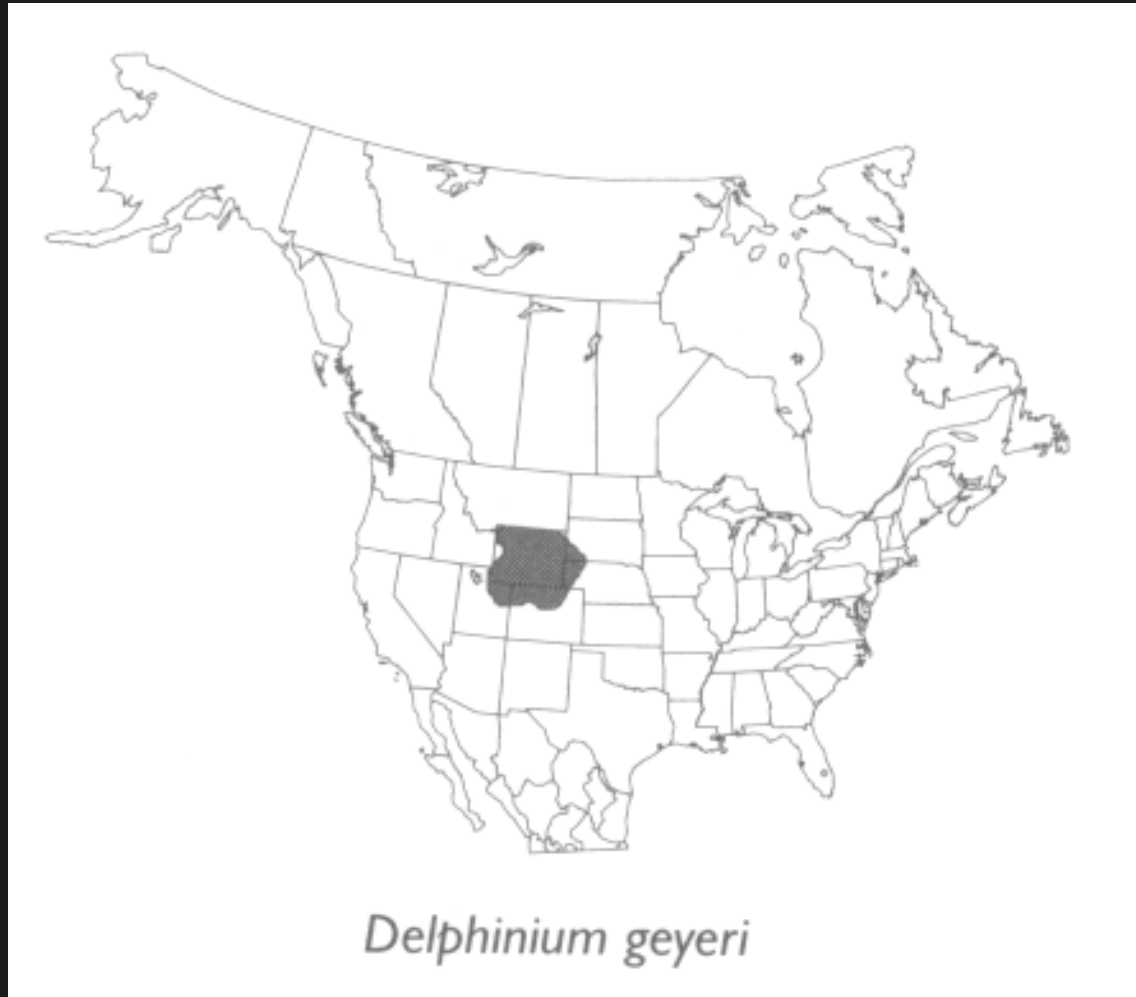


*Delphinium andersonii*



*Delphinium bicolor*

# Distribution of plains larkspur



Larkspurs are among the first plants to emerge in spring



# How does tall larkspur grow?

- Old growth dies back in fall
- During winter new buds from root crown can grow under snow
- New stems may penetrate over 6 inches of snow to reach sunlight



# How does tall larkspur grow?



- New emergent stems are among first plants to come up from under melting spring snow

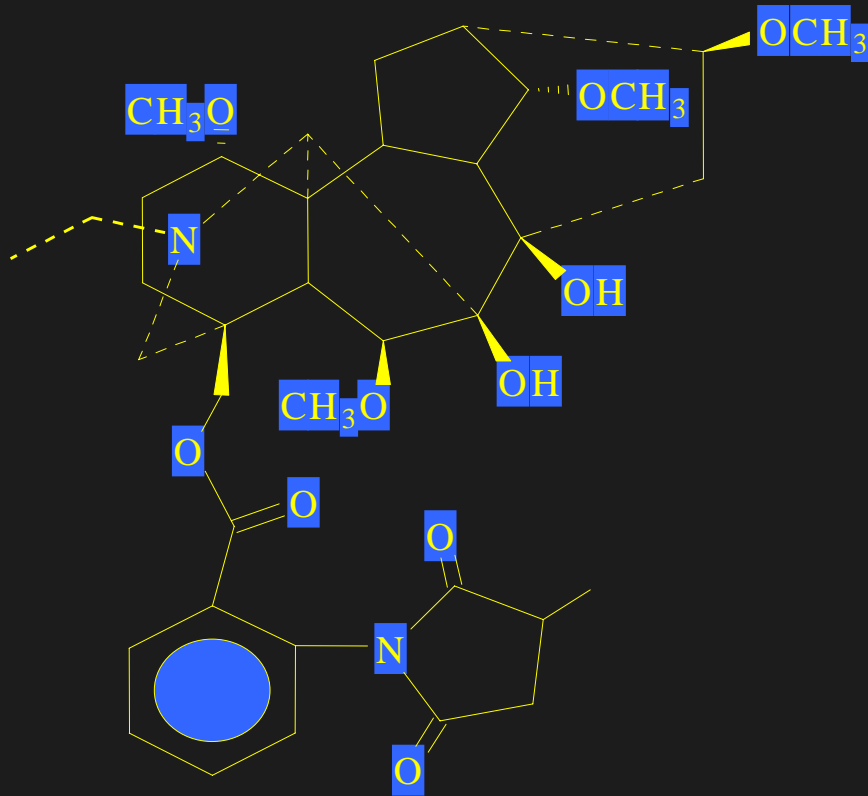


# How does tall larkspur grow?

- Tall larkspurs emerge in some times dense patches from receding snow banks



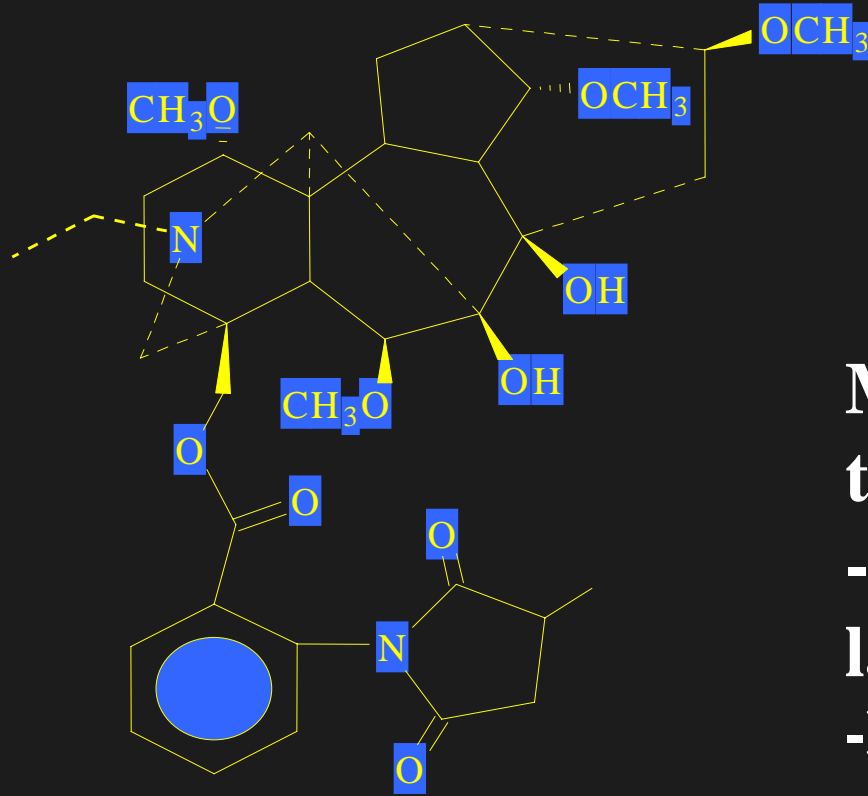
# Dominant toxic alkaloid in larkspurs



**Methyllaconitine**

- There are numerous diterpenoid alkaloids in larkspurs (> 20)
- Ester function at C18 is v. important for toxicity
- Deltaline most common alkaloid in tall larkspurs but not v. toxic
- Methyllaconitine = MLA

# Dominant toxic alkaloid in larkspurs



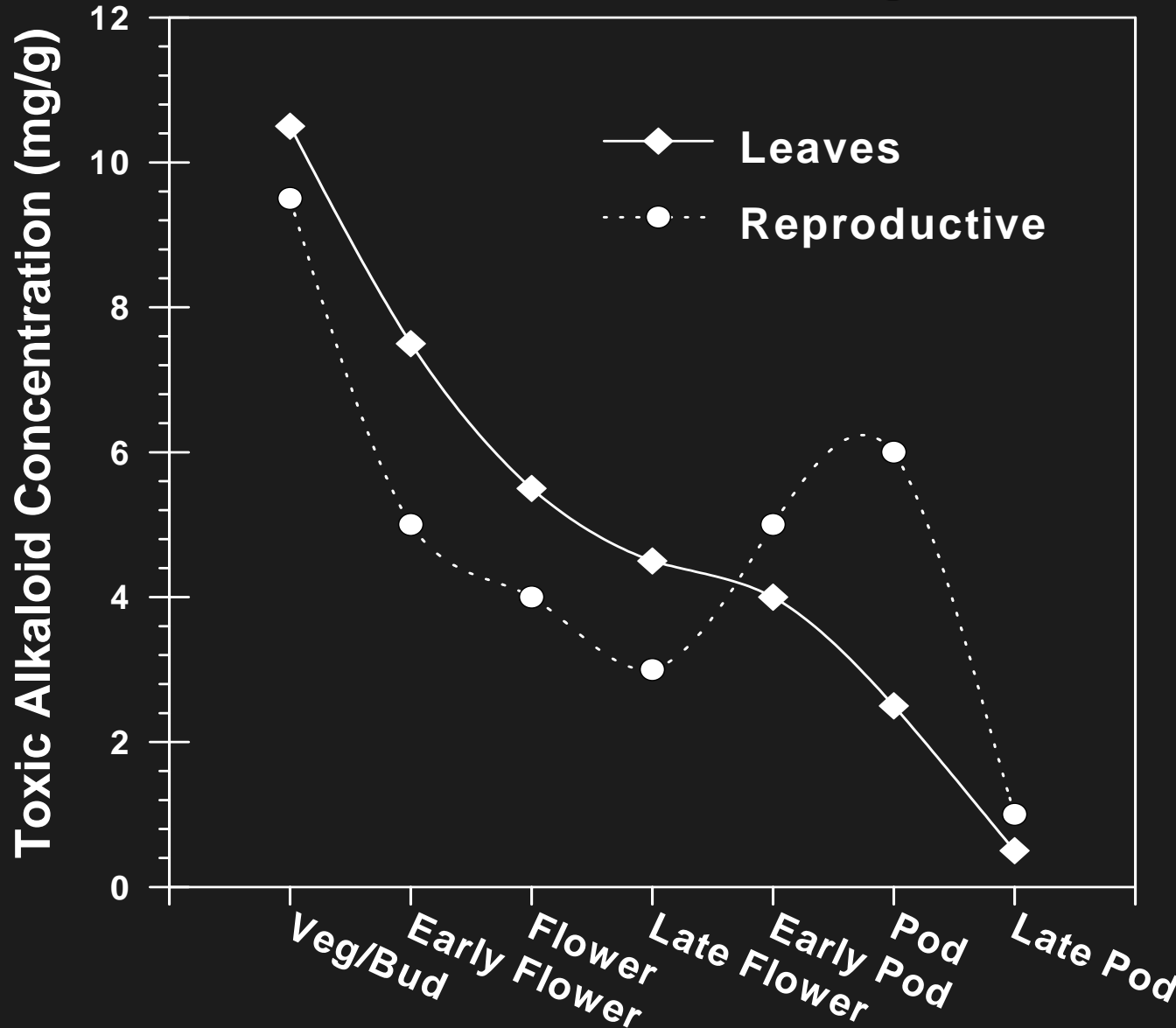
**MLA is most common toxic alkaloid**

**- found in tall and low larkspurs**

**-LD 50 is about 4.5 mg/kg in mice (I.V. injection)**

**Methyllycaconitine**

# Seasonal Change in Toxicity

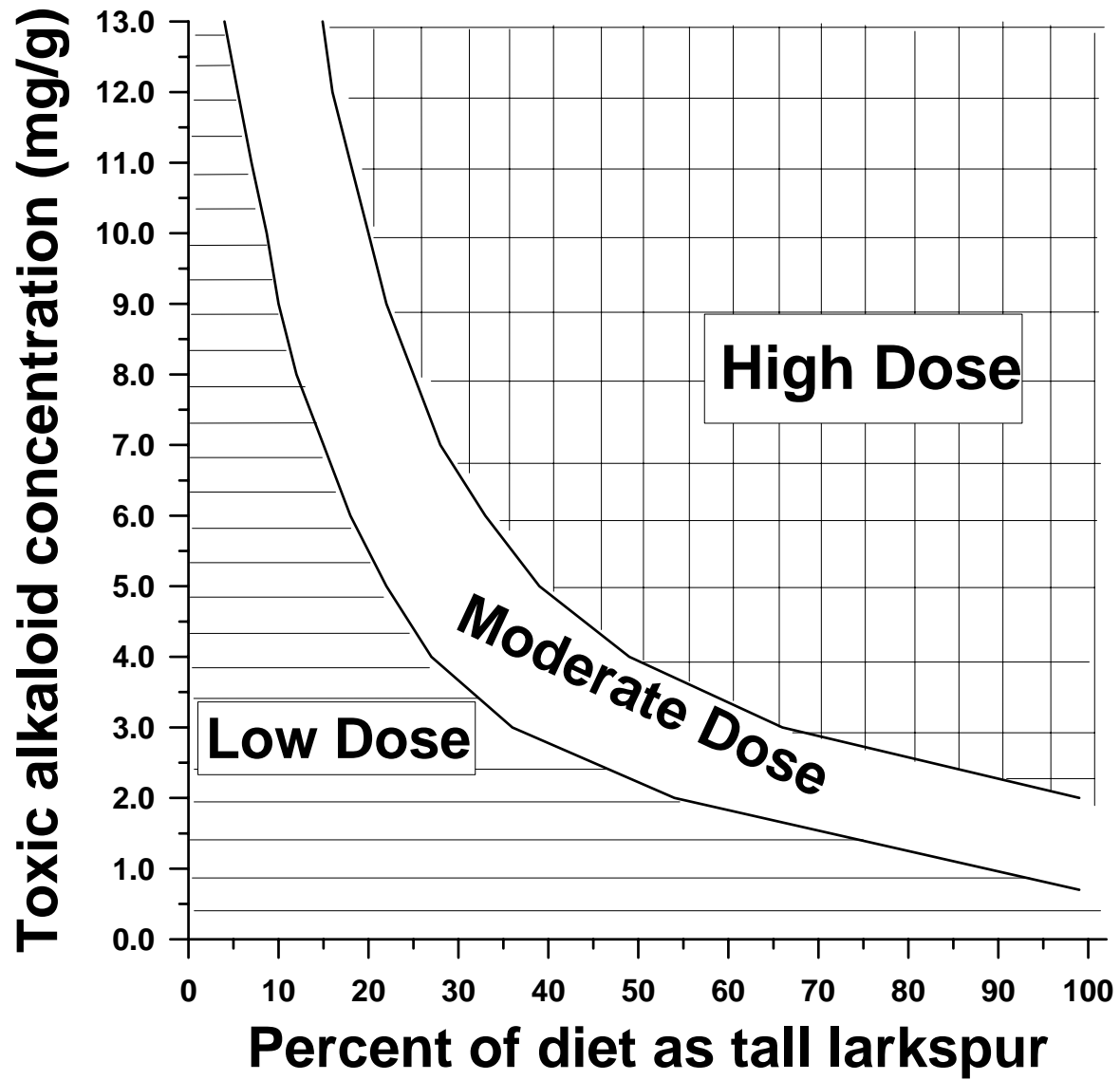


< 3 mg/g - low  
3-6 mg/g - moderate  
> 6 mg/g - high

# Key aspects of ingestion and toxicity

- First, amount of larkspur eaten
- Second, rate of ingestion
- Third, toxicity of larkspur
- Fourth, how many consecutive days larkspur is eaten in substantial quantities







# When and how much larkspur do cows eat?



- Cattle eat little or no larkspur before larkspur elongates flowering racemes
- After flowering, if cattle eat larkspur, then consumption usually increases greatly during late flower and pod stages
- Traditional grazing mgt: put cows into larkspur (poison) pastures after larkspur flowers.



