

# GEOLOGY 198B

## COLORED GEMSTONES

A - Z

# AGATE



- Cryptocrystalline aggregate of quartz
- Translucent to opaque
- Banded, multicolored
- Lots of named types
  - Ex. Botswana Agate
  - Ex. Mexican Lace Agate
- Good jewelry stone

# AMBER/AMETRINE



- AMBER
  - Organic, Fossilized resin from Baltic or Dominican Republic
  - Soft, sensitive to chemicals
  - Many enhancements and imitations
- AMETRINE
  - Bi-colored variety of quartz from Bolivia
  - Can be cut to separate or blend colors
  - Synthetics are made

# AMETHYST

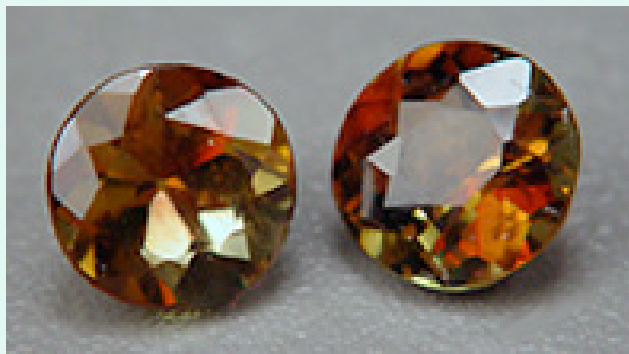


- Purple, single crystal quartz
- Many shades such as:
  - Siberian
  - Rose d' France
- Good jewelry stone
- Brazil, Uruguay & Zambia major sources
- Fashioned in many ways
- Birthstone for February

# AMMOLITE/ANDALUSITE



- AMMOLITE:
  - Fossilized ammonite shell
  - Iridescent
  - Stabilized for durability
- ANDALUSITE
  - Pleochroic
  - Lesser known jewelry stone
  - $H = 7.5$
  - Brazil is major source



# APATITE



- APATITE
  - Delicate gem: H = 5, cleavable, heat sensitive
  - Phosphate mineral (same as is in your teeth)
  - Yellow, green and blue green
  - Cat's eyes

# AQUAMARINE



- BLUE GREEN TO BLUE BERYL
- H = 7.5 Good jewelry stone
- Colors from pale to medium dark
- Transparent to opaque
- Fashioned many ways
- Brazil is major source, Africa, for darker stones
- Generally heated
- March Birthstone

# AXINITE/AZURITE



- AXINITE
  - Rare collector stone
  - $H = 7$ ,  $RI = 1.68$ , would be good jewelry stone if common
  - Mexico is major source



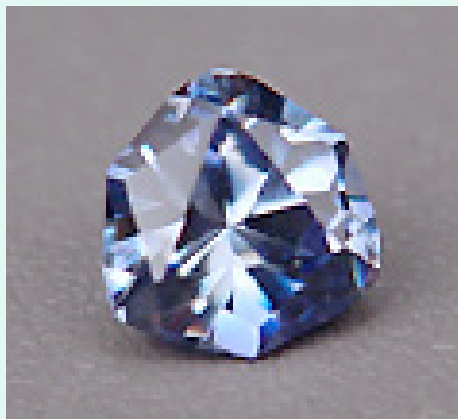
- AZURITE
  - Very soft  $H = 3.5$
  - Useable in jewelry if “silicated”
  - Color from copper



# BARITE/BENITOITE



- BARITE
  - Fragile collector stone, (not rare)
  - $H = 3$
  - Cleavable



- BENITOITE
  - Rare collector stone, (not excessively fragile)
  - One mine site, California
  - High dispersion

# BRAZILIANITE/CALCITE



- BRAZILIANITE
  - Fragile collector gem
  - Major source is Brazil
  - Idiochromatic- yellow
- CALCITE
  - Common as component of limestones, marbles
  - Fragile collector gem in single crystal form
  - $BR = .172$
  - Extreme facet doubling
  - Used in dichroscopes

# CHALCEDONY



- Cryptocrystalline aggregate of quartz
- Single color, translucent
  - Several named forms: Holly and other Blue Chalcedonies, Chrysoprase, Gem Silica, Carnelian
- Excellent jewelry stone

# CHRYSOBERYL



- Durable and brilliant jewelry stone, H = 8.5
- Most common in yellow shades
- Cat's eyes highly valued
- Color change variety is Alexandrite
- Sri Lanka is today's main source, some from Africa
- Rare bright green form colored by Vanadium

# CITRINE



- Yellow to orange variety of single crystal quartz
- Usually heated amethyst
- Good jewelry stone  
H = 7
- Major source is Brazil
- Alternate November Birthstone

# CORAL



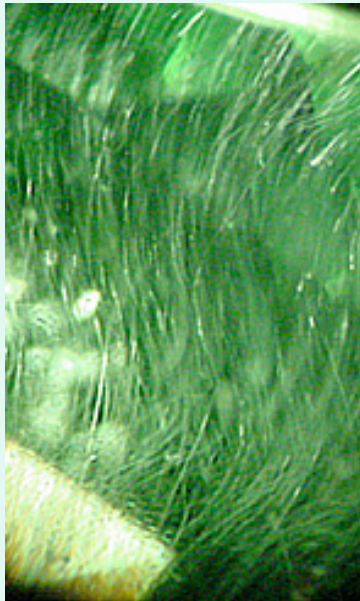
- Two types both organic:
  - Calcareous or stony coral
    - Calcium carbonate
    - White, pink, red
    - Often dyed or simulated
  - Proteinaceous coral
    - Made of hair-like protein
    - Heat sensitive
    - Black, gold, blue
    - Sometimes bleached

# CUPRITE/DANBURITE



- Cuprite
  - Rare and fragile collector stone
  - Dense SG = 6.0
  - Semi-metallic luster
- Danburite
  - Lesser known gem, but good jewelry stone H = 7, tough
  - Colorless, yellow and rarely pink
  - Many sources

# DEMANTOID GARNET



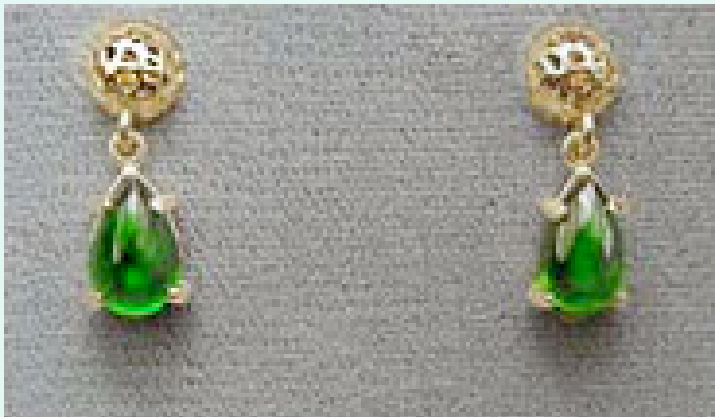
- Most valuable form of garnet, especially if Russian origin
- Green to yellow green color
- High dispersion and luster
- Horsetail inclusions diagnostic of Russian source, increase value



# DIASPORE/DIOPSIDE



- Diaspore
  - Rare color change variety from Turkey
  - Light pink-tan to light teal green
  - Reasonably durable
- Diopside
  - Chrome green type is popular as simulant of Tsavorite, but more delicate
  - Cat's eye variety occurs



# EMERALD

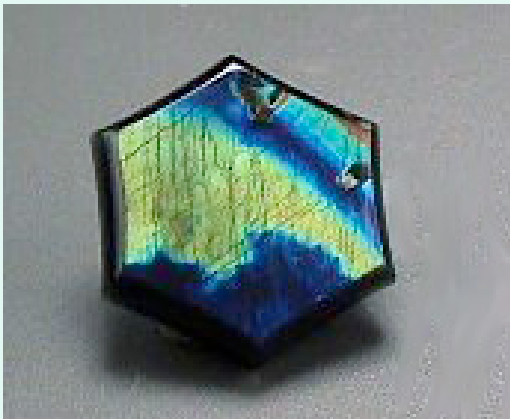


- Chromium or Vanadium containing beryl of medium or darker color (lighter = green beryl)
- Virtually always oiled
- Gentle-care gem
- Major sources are Colombia, Zambia and Brazil
- May Birthstone

# FELDSPAR-1



- Amazonite
  - Microcline
  - Colored by lead
  - $H = 6$
- Labradorite
  - Plagioclase
  - Directional shiller
  - Spectrolite has vivid colors



# FELDSPAR-2



- Moonstone
  - Orthoclase
  - Shows adularescence
  - Near transparent to opaque
  - Blue and “true” rainbow most valuable



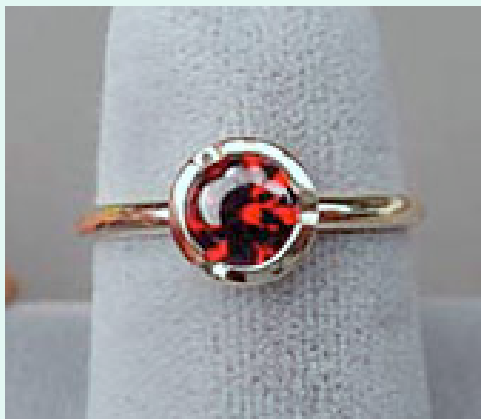
- Sunstone
  - Oligoclase
  - Shows aventurescence
  - Transparent material from Oregon, with and without “shiller”
  - Translucent and opaque from Tanzania and India

# FLUORITE/FOSSIL ORGANISMS



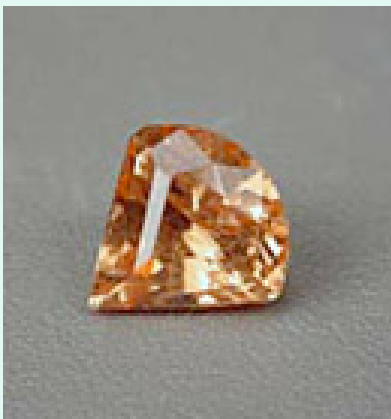
- Fluorite
  - Soft and cleavable
  - Many colors
  - Widely distributed
- Fossil Organisms
  - Animals, plants, microbes
  - Many processes of fossilization
    - Petrification
    - Impressions
    - Casts

# GARNET (ALMANDITE/PYROPE)



- Traditional garnet varieties
- Medium dark to dark red with brownish tones
- Can be very dark
- Historically important
- Good jewelry stone
- Birthstone for January (all forms)

# GOLDEN BERYL/GROSSULAR GARNET



- Golden Beryl (Heliodor)
  - Often irradiated Goshenite
  - Good jewelry stone
- Grossular Garnet
  - Colorless, yellow, orange and light green
    - Colorless is rare “leucogarnet” collector stone
    - Orangey Hessonite has “treacle” inclusions that are diagnostic

# GASPEITE/GLASS(NATURAL)



- Gaspeite
  - Iron and Nickel carbonate mineral
  - Unique color popular in “Southwestern” jewelry
  - Sources: Canada, Australia
- Natural Glass
  - Several types
    - Moldavite & other tektites
    - Libyan Desert Glass
    - Obsidian
  - Bubbles and swirl inclusions



# HAUYNITE/HEMIMORPHITE

- Hauynite
  - Ultra-rare collectors stone
  - Constituent mineral of lapis lazuli
- Hemimorphite
  - Zinc containing mineral
  - Fluoresces bright orange
  - Similar in appearance and sometimes confused with Smithsonite



# IOLITE



- Extremely pleochroic gem
- Good jewelry stone  
H = 7
- Frequently too light or too dark
- Major sources: Sri Lanka, India, Madagascar

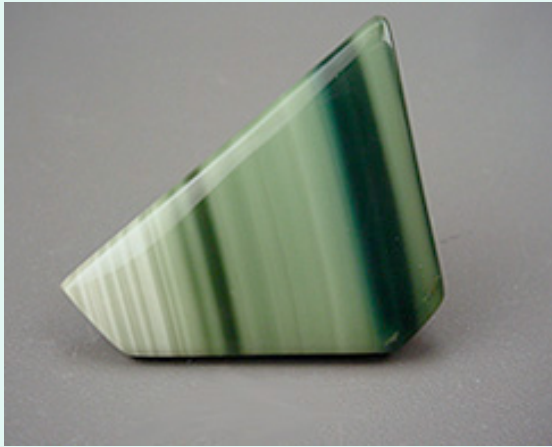


# JADE



- Jadeite
  - More valuable type
  - More saturated colors, greater translucency possible
- Nephrite
  - Wider range of colors
  - Less expensive
- Both are frequently bleached, dyed and/or stabilized
- Both are exceptionally tough aggregates

# JASPER



- Cryptocrystalline quartz aggregate
- Opaque solid color or patterned
- Many named types
  - Imperial, Biggs, Bloodstone, Mookaite, Plum Blossom
- Excellent jewelry stone

# KORNERUPINE/KUNZITE



- Kornerupine

Rare collector stone, mostly  
olive green to brown

African stones teal to  
lavender

Tough enough for some  
jewelry use

## Kunzite

Pink spodumene

Cleavable so gentle wear  
needed

Moderate fading due to  
light



# KYANITE/LARIMAR



- Kyanite
  - Rare material in gem quality
  - Noted for directional hardness  $H = 5 \text{ \& } 7$

- Larimar
  - Gem blue variety of mineral pectolite
  - Found only in Dominican Republic



# LAPIS LAZULI



- A rock, not a single mineral
- Ancient gem
- Often contains white calcite and/or golden pyrite inclusions
- Highest grade from Afghanistan
- “Denim” Lapis from Chile
- Simulants exist

# MALACHITE/MAWSITSIT



- Malachite
  - Soft copper mineral
  - Idiochromatic green due to copper content
  - Characteristic banded appearance
- Mawsitsit
  - Burmese jade containing rock
  - Single location
  - Excellent jewelry stone



# MORGANITE/MYRICKITE



- Morganite
  - Light pink beryl
  - Usually heated
  - Excellent jewelry stone
- Myrickite
  - Name for rare type of chalcedony inter-grown with mercury sulfide mineral, cinnabar
  - White to brown or grey with red/orange
  - One major locale, in California

# OPAL



- Amorphous hydrated silica gel
- Many varieties
  - Precious with color play
  - Common without
- Many locales
  - Australia, Mexico, Brazil, Peru, Nigeria, USA
- Fragile gem, H = 6
  - Fragility related to water content
  - Assembled stones and stabilization possible, synthetics & imitations, too
- October Birthstone

# PEARL



- Pearls today are cultured, natural rare
- Saltwater and Freshwater types
- Bead and tissue nucleation processes
- Different body colors and surface iridescence (orient)
- Many enhancements, bleaching, dyeing, irradiation
- Simulants (“faux” still popular)

# PERIDOT



- Gem grade olivine
- Idiochromatic, colored by iron
- Relatively good jewelry stone  $H = 6.5$  not fragile
- Major locales
  - Arizona, Pakistan, China, Norway, historically Egypt
- Birthstone for August

# PETALITE/PIETERSITE

- Petalite



- Colorless fragile collector gem

- Fairly common mineral but not in transparent form

- Pietersite

- Brecciated tiger's eye quartz

- Brown, blue-grey, chatoyance with brown, red or black matrix

- Major source: Namibia

- Minor source: China



# QUARTZES



- Numerous varieties: rose, smoky, milky, girasol, star, cat's eye, dendritic, rutilated, etc.
- All make good jewelry stones
- Some highly collectable
- Few enhancements
  - Rose and smokey can be irradiated

# RHODONITE/RHODOCROSITE



- Rhodonite
  - Characteristic pink and black color,
  - Rare transparent form, nearly impossible to cut



- Rhodocrosite
  - Pink and white translucent to opaque material is common
  - Transparent material rare and delicate
  - Major sources: Argentina and Montana

# RUBY



- Red, chromium containing variety of medium to dark red, corundum
  - No agreed upon line between ruby and pink sapphire
- The most valuable jewelry stone
  - Best stones (Burmese) are very slightly purplish to pure spectral vivid red, with visible fluorescence
- Enhancements, synthetics and simulants on market
- Good-excellent jewelry stone
- Birthstone for July



# SAPPHIRE



- Titanium and Iron containing corundum
- Various sources and shades of blue: Ceylon, Australian, Burmese, Kashmir
- Numerous enhancements, synthetics and simulants
- Superb jewelry stone
- Most popular colored stone
- Birthstone for September

# SAPPHIRE-FANCY



- Any color corundum except blue or red
  - Pure  $\text{Al}_2\text{O}_3$  is white sapphire
  - Various chromophores for colors: golden, pink, purple, green, padparashah
- Many sources
- Superb jewelry stone
- May be enhanced, synthetic or simulated

# SCAPOLITE/SERPENTINE



- Scapolite
  - Colorless, yellow and light purple are natural
  - Dark purple from irradiation
  - Cat's eyes occur
- Serpentine
  - Magnesium containing aggregate silicate
  - $H = 5$
  - Historical jade simulant

# SILLIMANITE/SINHALITE



- Sillimanite
  - Opaque to transparent forms
  - Cat's eyes valued
  - Rare, but good jewelry stone



- Sinhalite
  - Until 1952 thought to be brown peridot
  - Major source is Sri Lanka (Sinhala = sanskrit)
  - Rare collector's stone, tough enough for some jewelry applications

# SMITHSONITE/SODALITE



- Smithsonite
  - Soft carbonate mineral
  - Collector stone
  - Often botryoidal, sometimes chatoyant or drusy
- Sodalite
  - Soft,  $H = 5$ , silicate mineral
  - A constituent of lapis
  - A simulant of lapis
  - Idiochromatic in blue shades



# SPESSARTITE/SPHALERITE



- Spessartite
  - High RI garnet
  - Orange to brownish or reddish
  - Pure orange “Mandarin” from Namibia most valuable



- Sphalerite
  - Zinc containing mineral
  - Very fragile  $H = 3.5$  perfect cleavage
  - Diamond-like RI and dispersion
  - Red, orange, yellow and green

# SPINEL



- Historically important ruby and sapphire simulant
- Beautiful, underappreciated gem in its own right (IMHO)
- Durable and bright gem, excellent for jewelry
- Comes in most colors except white and green
- Synthetics widely used

# SPHENE/SUGILITE



- Sphene (Titanite)
  - Soft and somewhat fragile
  - High RI and very high dispersion
  - Pleochroic with high BR
- “Sugilite”
  - Purple rock with varying amounts of sugilite mineral and chalcedony
  - Most valuable material is translucent
  - Single location, S. Africa



# TAAFFEITE/TANZANITE

- Taaffeite (tar-fite)



- One of the rarest gems on Earth
- Mistaken for spinel, until Gemologist Count Taaffe found it to be DR
- $H = 8$

- Tanzanite



- Heated zoisite, highly pleochroic
- One locale, supply diminishing
- Too soft and fragile for daily use rings, but gentle use OK
- Newly adopted Birthstone for December

# TOPAZ



- Hard but fragile gem, careful use in jewelry
- Pure mineral is white
- Blue topaz is result of irradiation, then heating, of white
  - Alternate Birthstone for December
- Precious topaz ranges from light yellow through peach and apricot shades to the deep orangey red of “Imperial”
  - True Birthstone for November

# TOURMALINE



- Complex borosilicate mineral group: major source = Brazil
  - Many species and varieties: achroite, indicolite, rubellite, dravite, watermelon, Liddacoatite, elbite, schorl
- Good jewelry characteristics,  $H = 7.5$  not extremely fragile
- Comes in every color from white through black in various grades
- Name from “turмали” = rainbow

# TSAVORITE/TURQUOISE



- Tsavorite
  - Variety name for medium dark to dark green transparent grossular garnet
  - Found only in two locales in Africa
  - Relatively good jewelry stone, but not for daily wear rings
- Turquoise: December Birthstone
  - Blue to green copper phosphate mineral
  - Sensitive to chemicals, sometimes stabilized or waxed. Simulants exist.
  - With or without black to brown matrix
  - Many sources, but highest quality historically from Persia, today from Arizona



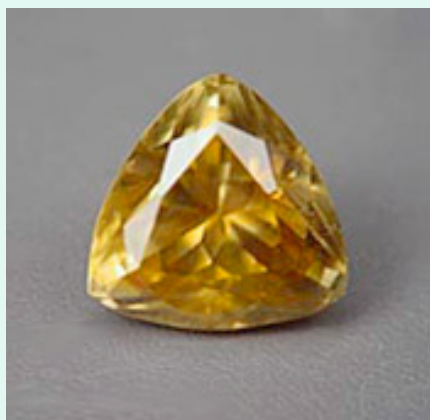
# VARISCITE/VESUVIANITE



- Variscite
  - Soft hydrous aluminum phosphate
  - Colored by chromium or iron
  - Sources: Utah and Nevada
- Vesuvianite (idocrase)
  - Silicate mineral
  - Named for type locale Mt. Vesuvius
  - Many colors
  - $H = 6.5$



# ZIRCON



- Historically important, good jewelry stone
- $H = 7.5$ , High RI
- Heated stones: blues and whites, mostly, can be brittle
- Comes in or heats to a variety of colors
- Blue is December Birthstone
- Reputation unfairly tarnished by association with synthetic CZ

**THAT'S ALL FOLKS!**

