Intro to sugar cane spirits

Main choices when making sugar cane spirits
1. use sugar cane juice or molasses?
2. how ferment?
3. still type - pot, retort or column?
4. aged or unaged spirit?
5. spice the spirit?

Rum made wherever cane grown and sugar industry, used to be by-product via molasses, but may now use cane juice and cane syrup too. Here look just at Caribbean rum and Brazilian cachaca, but sugar cane spirits are global category; eg second largest rum brand is from Philippines; India also major sugar cane and molasses producer, used for rum and a base spirit for locally marketed whisky and brandy.

Rum (Caribbean)

Wide range styes
- white, golden, or dark
- can be flavoured and spiced
- distilled in pot or column still
- made from sugar cane juice, syrup, or molasses (most rums)

History
- 17C Caribbean sugar rush
- planters max income by distilling white sugar byproduct, molasses, into rum
- by mid 17C every sugar mill had small distillery
- by 18C rum fashionable in smart British society
- Cuba became important as the site where rum production became industrialised and modernised; first light rum style produced by Don Bacardi
- Cuban light rum style dominated rum in 20C,
- but in Britain … preferred style was dark, rich and heavy navy rums
- rum fortunes fluctuated over time, but huge range of styles means versatile and remains popular

Rum and the Law
- Rum is any spirit produced from molasses or syrup produced in manufacture of cane sugar, or from sugar cane juice itself
- EU
  - must be distilled to < 96% abv, so that the distillate has discernible specific organoleptic characteristics of rum
  - flavouring not permitted
  - caramel may be added to adjust colour
  - min bottling strength 37.5% abv
- US
  - distilled to < 95% abv, so that the distillate has, similar to EU, the
characteristics of rum
- min bottling strength 40% abv

Rum production
- source of fermentable sugars is sugar cane juice - mandatory for rhum agricole; sugar cane syrup; or molasses - which used for most rum production
- fermentation
  - sugar cane juice - ferment proceeds without delay, since prone to oxidation, so supply must be local
  - molasses - high sugar content, must dilute with water for yeast to work, supply can be from anywhere
  - sugar cane syrup - contains all the sugars of cane juice, with most water removed, can contain > 90% sugar, can be stored for later fermentation, again, must be diluted
  - most have own yeast strains to create specific flavour compounds to produce house style
  - fermentation temperature - intense heat in W.Indies means cooling essential, else yeast stops
  - get alcoholic wash 5-10% abv
    - this sugar cane wine is also consumed as is, in Philippines highly regarded as basi, a drink in own right
- distillation
  - each distillate is known as a mark, a light mark is a light rum …..
  - wide range of stills, all copper, used flexibly eg some produce part in column and part in pot
    - column still
      - standard 2 column stills
      - multi-column including * hydroselector and * demethyliser
    - used to create both highly rectified rums, and lower strength more highly flavoured ones eg rhum agricole

* Hydroselector and demethyliser

When produce vodka, some light rum, or base for gin/other flavoured spirits, oft desirable or legally necessary, to further reduce flavour of a spirit - 2 common methods … which rely on fact that volatility of both fusel oils and methanol varies with ethanol concentration …

1. hydroselection
   - removes fusel oils - if highly rectified spirit (HRS) reduced to 20% abv, fusel oils more volatile, how done …
   - in hydroselection column, HRS enters near mid-column, diluted with hot water from above and heated by steam from below.
   - fusel oils become volatile, rise to top of still where collected, water diluted spirit collected at bottom
2. demethyliser - reduces methanol
   - methanol most volatile when alcohol at 96% abv, how done …
   - gently heat HRS in a reboiler (steam injection would dilute the spirit),
heated externally or internally with coils
- methanol able to separate out over many plates rectification plates, then collected at top of still
  - leaves purified HRS ethanol at base of column.
- demethylsinging normal necessity for vodka, since EU regs require an extremely low methanol level in vodka.

- pot still
  - all shapes and sizes, but all are copper
  - standard double distillation used, but also ..
  - retort system
    - rectifies spirit in a single distillation, producing single mark/distillate
    - mainly used for heavier more aromatic rum
      - comprise 4 sequential interlinked elements, in order - pot still, low wine retort (LWR), high wine retort (HWR), and condenser
      - operation
        - LWR contains water diluted tails of 40% abv and below, from previous still run
        - HWR contains water diluted tails of 40-80% abv, from previous still run
        - pot still heats alcoholic wash, hot vapours pass into body of liquid in LWR
        - the hot vapours boil the LWR liquid, the most volatile elements vapourise, boosting the strength of the vapour which pass into body of liquid in HWR, where process repeated, and alcohol strength of vapour boosted again
        - hot vapours from HWR pass to condenser, where separated into heads, heart and tails.
        - heads discarded, tails split into the two parts to feed the LWR and HWR for the next still run.
  - operational variations
    - some mix low wines with fermented wash, dunder and even some high wines in LWR
    - some use chilled heads on retorts, condensing the vapours as they rise and the fall back into the boiling liquid = reflux
      - can also be achieved by still head design
- if very high ester rum desired, can place dunder or other acidic material in HWR to obtain high ester character

Retort system image, see Gifted Rums http://www.giftedrums.com/RumBasics.html

- Light and heavy marks aka distillates
  - distillers need a wide range of marks to make up blends; marks are much traded between producers. There are two mark styles, light and heavy, which depend on the level of flavour congener - esters, aldehydes and lower (than ethanol) alcohols, which in turn depend on fermentation length. When alcohol concentrated during distillation, congener level reduced, the fewer the congeners the lighter the rum, the more congeners the heavier the rum
  - light marks aka light distillates
    - use cultured yeast, for a shorter, faster fermentation - produces low number congeners
    - designed for light bodied HRS with light aromas and flavours, eg as used by Bacardi
    - best consistency and quality achieved using multi-column stills (as for vodka), but below 96% (EU) or 95% (US)
  - heavy marks aka heavy distillates
    - lots of ways to produce heavier fuller flavoured rums (higher number congeners)
    - use cultured yeast. for a longer slower fermentation - produces more flavour congeners
    - for high ester rums - add dunder (acidic residue left in bottom of still after distillation complete) in later stages of fermentation, raises acidity of fermenting liquid, slowing fermentation to up to 14 days, increases number and volume of acids reacting with alcohols, which promotes very high levels of esters
      - when distill this estery liquid, get heavier more pungent rums, with marked aromas of bananas and nail polish.
      - most use pot stills for high ester rums, as can use dunder
in retorts
- if column stills used for high ester rums, higher level of rectification, must adjust fermentation process to allow for this
- Jamaica is spiritual home of high ester style, also made in Martinique, Guyana and La Reunion
- much high ester rum used to give character to blends

- Maturation
  - rum straight off the still is dry, colourless, at 70-95% abv
  - some rums for local markets are bottled and sold straight of the still, but most rum is aged, which radically changes the spirit's character

  - when Navy rums were a major product, lots matured in UK, not much now; here talk about Caribbean maturation only

  - the range of components needed to make up variety of blends means that marks may undergo different processes ….
  - oak age for some period, most use US ex-bourbon barrels - bourbon utilises new oak only, so rum matured in, at the least, second use barrels
  - rhum agricole, uses ex-cognac barrels of French oak
  - aged rum split stylistically into golden and dark styles, no regulations apply to designation
  - add spices, herbs and other extracts and flavourings to produce a flavoured rum

  - Caribbean climate hot and humid, here it is tropical ageing, three times faster maturation than in Scotland
  - alcohol and water evaporate through the oak at approx same rate, losing total volume of ~6% p.a. (~2% loss in Scotland); with abv remaining almost constant.
  - some top up annually with rum of same age
  - a few have adopted solera blending/ageing systems

  - rum pulled further into oak, so get high levels of oak flavouring at earlier stage, than in Europe
  - so light marks, if oak aged, then for few
- months only
- heavy marks need cask time to develop full character and evolve unripe cane notes into tropical fruit aromas; the heavier the spirit the longer the ageing needed.

- Blending and finishing
  - all rum is blended at the least from batches within a single distillery, often of differing ages, and may include marks from third party distilleries
  - active inter-producer market in rums for blending
  - many produce own brands, and sell spirit to blenders - blended brands can be made from spirits from many distilleries and islands/countries
    - eg Caribbean Rum Marque - blend of rums from Jamaica and Grenada
  - caramel is used to adjust colouring
    - but in a large enough dose, as with Navy rums, a slightly burnt-treacle flavour is imparted.
  - sweetening not permitted in EU regs (but seen a St Lucian rum sweetened with honey)
  - most rum is diluted with water, at some point prior to bottling to 40-50% abv

- Rum styles
  - white rum
    - based on light marks, but often include some heavier marks for extra character
    - clear and colourless, mostly unaged, if aged in oak like Bacardi, to round out palate, filtered to remove colour
    - light body, except some French island white rums have more body
    - light to medium intensity
    - used as mixers and blend well with fruit flavours
  - golden rum aka amber rum
    - uses more heavier marks in blend
    - colour and flavour from several years oak ageing, caramel may be used for colour adjustment
    - medium body, rich, smooth mellow palate
    - intense and complex
  - dark rum
    - uses still more heavier marks in blend
    - the best from pot still
    - more colour and flavour from extended oak ageing in ex bourbon, whisky or cognac barrels
    - full-bodied, rich, smooth, intense and complex
    - flavours of dried fruit, sweet spice, fig, raisin, clove and cinnamon
good for sipping
- sub-category Navy rum - based on dark rich heavy British Navy rums
  - base on light marks from column still, blended with soft sweet Demerara rum, plus aromatic lift from a little Jamaican pot still Wedderburn
  - navy strength is 57% abv (typical rum 37.5-43% abv)
  - get large dose of caramel, darkens hue and imparts slightly burnt treacle finish
- spiced rum
  - based on white, golden or more commonly dark rum
  - based on golden rum, natural flavourings, caramel for colour, and spices - cinnamon, vanilla, orange peel, aniseed, rosemary and pepper.
  - spices and other materials can be added during distillation, or flavours can be blended later
  - good for sipping
- age dated rum - blended rum with a indication of the youngest rum in he blend eg 5 year old rum, 20yo seen, and extremely rare to see a 30yo, owing to evaporation rates.
- vintage rum - some French island rums are vintage dated, several seen from Martinique, also Venezuelan Diplomatico 2000 vintage seen, and a few from Jamaica

Rum producing countries
  - Caribbean, examples with intrinsic style
    - Guyana (production started in 1650 under the Dutch
      - style is demerara, named after its river
      - provides soft deep base for British navy blends, also sold increasingly under El Dorado brand
    - El Dorado is brand name of Demerara Distillers the last remaining distiller in Guyana, the result, over a long time, of the amalgamation of almost 400 individual estates/distilleries
    - KEY to Demerara rums is the > 20 rum styles produced in 9 different stills, including ancient examples from former Guyanese estates …
      - wooden coffey still, working since 1880; medium-bodied spirit, with mild fruity aroma
      - wooden pot stills, made of tropical hardwood greenheart wood, copper necked, over 250 years old; a source of very heavy bodied, very flavourful and aromatic rums, much valued by blenders
      - four column 18C French Savalle still; pronounced
sweet sugar cane nose, dry, medium body. The modern version is versatile enough to produce 9 marks from very light to heavy bodied rums

- Jamaica
  - rivals Guyana for breadth of style
  - pot still heritage, but column stills important in blends
    - Appleton Distillery is most important user of pot stills
  - **KEY** to Jamaican pots still rum is **long fermentation, and use of dunder - and so use of pot still retort systems;**
    - varying retort content creates new complex favours; output graded by ester concentration …
      i. common cleans, 80-150 esters, delicate and floral
      ii. plummers, 150-200 esters, light tropical fruits
      iii. wedderburn, 200+ esters, fuller deeper fruit, more body and pungency
      iv. continental flavoured, aka high esters, 5-10 day fermentation with dunder and cane waste added, 500-1700 esters; if neat nose burning intensity - acetone, nail polish remover; if heavily diluted with water - concentrated aromas banana and pineapple
  - top Jamaican brands are bled of standard pot still rum with small amounts of the perfumed estery marks, to add complexity.
    - eg Appleton has notes of leather, honey, spice, tobacco and dried fruit

- French Antilles - Guadeloupe, Martinique, and La Reunion (Indian Ocean island)
  - produce style called *rhum agricole*, which can be made anywhere, made from sugar cane juice, which is fermented directly
    - generally short ferment, though some extend to add complexity, wash of 4.5-9% abv
    - column distilled to low strength ~65-75% abv, high level congeners, 350-400 esters, giving pronounced character and flavour
    - sub-styles
      - *rhum blanc*, colourless, unaged actually < 3 months of age, most sold as this, pungent and vegetal, with aromas cane, green leaf, apple, grass, unripe banana, anise, violet, with slightly oily texture
      - if aged use French oak, new and ex-cognac and US oak, barrels, larger oak vats used for *ambre* style to impart less oxidation
- **eleve sous bois**, aka *paille* (straw)
- *ambre*, >12 months in oak
- *vieux*, >36 months in oak
- *vintage*

- alternative style is *rhum industriel*, made from molasses
  - seems a disparaging term, also inaccurate, since rhums industriels from La Reunion are elegantly soft
  - AOC Martinique produces high ester high pungency rum, mostly used in patisserie and tobacco flavouring

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### Cachaca (Brazilian rum)

**Production**

- 3rd largest global spirit *category or type* (US), after Korean soju/Japanese shochu, and vodka, at about 1.5bn litres (2007), ~1% exported, mainly to Germany
  - 5 brands produce 95% spirit volume
  - 40,000 total producers, across all Brazil
  - majority consumed locally

- Cachaca, aka Brazilian rum, made from sugar cane juice, as with rhum agricole from former French Caribbean and Indian Ocean colonies
- Brazilian jurisdiction classifies cachaca as cane brandy
- Brazil wants cachaca to be internationally recognised as a separate spirits category to rum, but as made from sugar cane juice some jurisdictions auto-classify as rum

- **US have agreed, by 4/2013 (but not in TTB regulatory document as of 10/2015) that cachaca be classified as a specific type of rum (rather than what Brazil really wanted, which was a cachaca *class* in own right), and to export to US must be at least 40% abv**

**Fermentation**

- cultured, own, or wild yeasts
- stainless steel fermenters, some of wood
- ~25 hour ferment

**Distillation uses range of stills**

- small producers mainly use copper pot stills, single and *linked* (WSET text)?
  - what is a linked still? cannot mean double distilled as cannot achieve 38° abv in one pot still distillation run
  - distill to lower strength, with vegetal character
- large producers use continuous column stills, high strength spirit, style close
to light rums

• final spirit must be 38-48% abv

Styles
• *unaged*, aka *white or silver*, most cachaca is unaged
• *gold*, short aged in native wood or small US or ex-whisky oak barrels, up to 3 years seen

• most smooth rawness of new spirit, once diluted, with sugar
  - labelled *cachaca* - up to 6g/l sugar permitted
  - labelled *sweetened cachaca* - 6-30g/l sugar

• caramel can be used to correct colour

• classic Brazilian cachaca drink uses unaged spirit in a *caipirinha* = cachaca, lime and sugar
• *gold* style is consumed neat

**US Alcohol, Tobacco and Trade Bureau, identity of spirits …**

• Relevant top level = **Category** = distilled spirits, which is divided into **classes**
  - **Classes** = eg whisky; rum; tequila; mezcal; brandy; gin; neutral spirits or alcohol; ......; each divided into **specific types**
  - **Specific types** = eg straight bourbon whisky is a specific type of the whisky class; vodka is a specific type of the neutral spirits or alcohol class; **cachaca** is a specific type of the rum class (recognised as distinctive product of Brazil); ...