

## 5.DRUG OF ANIMAL ORIGIN

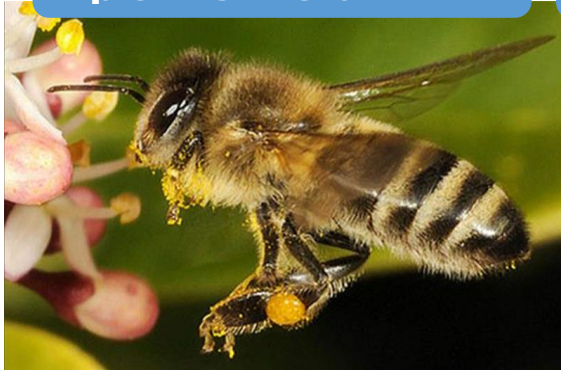
### HONEY

**SYNONYMS:** Madhu, Madh, Mel, Honey (English);

**BIOLOGICAL SOURCE:** Honey is a viscid and sweet secretion stored in the honey comb by various species of bees, such as: *Apis dorsata*, *Apis florea*, *Apis indica*, *Apis mellifica*.

**FAMILY:** *Apidae*

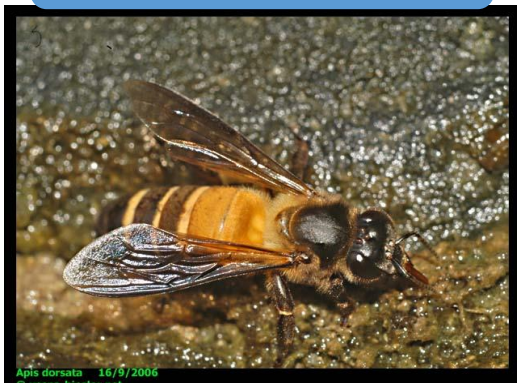
**Apis mellifera**



**Apis melifica**



**Apis dorsata**



**Apis florea**



### GEOGRAPHICAL SOURCE:

Honey is available in abundance in Africa, India, Jamaica, Australia, California, Chili, Great Britain and New Zealand.

### PREPARATION:

- 1) Generally, honey bees are matched with social insects that reside in colonies and produce honey and beeswax.
- 2) Every colony essentially has one '*queen*' or '*mother bee*', under whose command a huge number of '*employees*' exist which could be mostly sterile females and in certain seasons male bees.
- 3) The '*employees*' are entrusted to collect nectar from sweet smelling flowers from far and near that mostly contains aqueous solution of sucrose (i.e. approximately 25% sucrose and 75% water) and pollens.
- 4) Invertase, an enzyme present in the saliva of bees converts the nectar into the invert sugar, which is partly consumed by the bee for its survival and the balance are fully stored into the honey comb.
- 5) With the passage of time, the water gets evaporated thereby producing honey (i.e. approximately 80% invert sugar and 20% water).
- 6) As soon as the cell is filled up completely, the bees seal it with wax to preserve it for off-season utility.
- 7) The honey is collected by removing the wax-seal with the help of a sterilized sharp knife.
- 8) The pure honey is obtained by centrifugation and filtering through a moistened cheese-cloth.

- 9) Invariably, the professional honey collectors smoke away the bees at night, drain-out honey, and warm the separated combs to recover the beeswax.

### DESCRIPTION:

**APPEARANCE:** Pale yellow to reddish brown viscid fluid.

**ODOUR:** Pleasant and characteristic.

**TASTE:** Sweet

**SPECIFIC GRAVITY:** 1.35-1.36

**SPECIFIC ROTATION:** +30 to –150

**TOTAL ASH:** 0.1-0.8%

However, the taste and odour of honey solely depends upon the availability of surrounding flowers from which nectar is collected. On prolonged storage it usually turns opaque and granular due to the crystallization of dextrose and is termed as ‘granular honey’.

### CHEMICAL CONSTITUENTS:

The average composition of honey ranges as follows:

- 1) Moisture 14-24%
- 2) Dextrose 23-36%
- 3) Laevulose (Fructose) 30-47%
- 4) Sucrose 0.4-6%
- 5) Dextrin and Gums 0-7%

- 6) Ash 0.1-0.8%
- 7) Besides, it is found to contain small amounts of essential oil, beeswax, pollen grains, formic acid, acetic acid, succinic acid, maltose, dextrin, colouring pigments, vitamins and an admixture of enzymes e.g. diastase, invertase and inulase.
- 8) Interestingly, the sugar contents in honey varies widely from one country to another as it is exclusively governed by the source of the nectar (availability of fragment flowers in the region) and also the enzymatic activity solely controlling the conversion of nectar into honey.

### SUBSTITUENT /ADULTERANTS:

- Due to the relatively high price of pure honey, it is invariably adulterated either with artificial invert sugar or simply with cane-sugar syrup.
- These adulterants or cheaper substituent not only alter the optical property of honey but also its natural aroma and fragrance.

### USES:

1. It is used as a sweetening agent in confectionaries.
2. Being a demulcent, it helps to relieve dryness and is, therefore, recommended for coughs, colds, sore-throats and constipation.
3. Because of its natural content of easily similar simple sugars, it is globally employed as a good source of nutrient for infants, elderly persons and convalescing patients.



### TESTS FOR IDENTIFYING PURE HONEY:

#### WATER TEST:

Take a tumbler of water. Drop a tablespoon of honey by keeping the spoon slightly higher than the water level. Keep it for around one minute.



#### RESULT:

**PURE HONEY:** Honey would pass through the water like a thread and settle down immediately without mixing. It forms a lump at the bottom.

**IMPURE HONEY:** Part of it gets disintegrated and mixes immediately.

#### FLAME TEST:

Dip the cotton wick of a candle to a bit of honey. Shake off the excess and light the wick with a lighter.

**RESULT:**

**PURE HONEY:** The wick burns.

**IMPURE HONEY:** The water content in the honey prevents it from burning. Crackling sound can be heard.

**ABSORPTION TEST:**

Pour a few drops of honey on a blotting paper.



**RESULT:**

**PURE HONEY:** No absorption on the blotting paper.

**IMPURE HONEY:** Absorption can be seen.

**CLOTH TEST:**

Pour a few drops of honey on a cloth and then wash it off.

**RESULT:**

**PURE HONEY:** No stain remains.

**IMPURE HONEY:** Stain remains.

# GELATIN

Gelatin is a mixture of reversible gel-forming proteins derived from certain animal tissues, particularly skin and bones with hot water.



## PREPARATION:

- Pretreatments are carried out to make the raw materials ready for the main extraction step and to remove impurities which may have negative effects on physiochemical properties of the final gelatin product.
- The main extraction step, which is usually performed with hot water or dilute acid solutions as a multi-stage extraction to hydrolyze collagen into gelatin.
- The refining and recovering treatments including filtration, clarification, evaporation, sterilization, drying, grinding, and sifting to remove the water

from the gelatin solution, to blend the gelatin extracted, and to obtain dried, blended and ground final product.

### PRETREATMENTS:

- The process converts insoluble collagens into soluble gelatin the solution of which is then purified and concentrated to a solid form.
- If the raw material used in the production of the gelatin is derived from bones, dilute acid solutions are used to remove calcium and other salts.
- Hot water or several solvents may be used in order to reduce the fat content, which should not exceed 1% before the main extraction step.

### HDROLYSIS:

- Collagen hydrolysis is performed by one of three different methods: acid, alkali and enzymatic hydrolysis.
- A. Acid treatment is especially suitable for less fully cross linked materials such as pig skin collagen and normally requires 10 to 48 hours.
  - B. Alkali treatment is suitable for more complex collagen such as the collagen found in bovine hides and requires more time, normally several weeks. The purpose of the alkali treatment is to destroy certain chemical cross linkages still present in collagen.
  - C. Enzymatic hydrolysis of collagen for gelatin extraction is relatively new. However, the treatment time is shorter than that required for alkali treatment, and results in almost complete conversion to the pure product.
- The physical properties of the final gelatin product are better.

### TYPES OF GELATIN:

Two types of gelatin are characterized in the British Pharmacopeia.

**TYPE A:** Type A is obtained by partial acid hydrolysis of animal collagen.

**TYPE B:** Type B by partial alkaline hydrolysis; Mixtures of both types are also permitted.

### CHARACTERS:

- Sheet gelatin prepared as above may be cut into strips or made into a granular powder.
- Gelatin is colourless or pale yellow, is translucent and has little odour or taste.
- It is insoluble in cold water but absorbs a considerable volume of liquid.
- It dissolves on heating and a 2% solution forms a jelly on cooling.
- The gelatinizing power of gelatin is reduced by long boiling.
- The quality of gelatin is largely judged by its 'jelly strength' or 'Bloom strength' which is determined by a Bloom gelometer.
- The BP specifies jelly strength for gelatin which is to be used in the preparation of suppositories and pessaries.

### CONSTITUENTS:

Gelatin consists mainly of the protein glutin and therefore gives the usual tests for proteins.



### TESTS:

1. Gelatin evolves ammonia when heated with soda lime (distinction from agar).
2. With mercuric nitrate solution, it gives a white precipitate that turns brick-red on warming.
3. It gives a precipitate with a solution of trinitrophenol.

### APPLICATIONS:

- 1) Gelatin is used in the preparation of pastilles, pastes, suppositories, pessaries, capsules, pill-coatings and gelatin sponge.
- 2) Specially purified and pyrogen-free gelatins are available for intravenous injection.
- 3) A grade with high 'Bloom strength' is used for making gelatin capsules and for bacteriological culture media.
- 4) It is used profusely in food products *e.g.* fruit jellies.
- 5) In the preparations of pharmaceutical dosage forms *e.g.*, soft-gelatine capsules for Vitamin E, garlic pearls etc.
- 6) Hard-gelatin capsules for chloramphenicol, tetracycline, acetamenophen (paracetamol).
- 7) Gelatin is also employed as a vehicle for some highly specific pharmaceutical injections *e.g.*, Pitkin's menstrum—which comprises of heparin, gelatin, dextrose, acetic acid and water.(anticoagulant therapy)
- 8) Gelatin is also used for the treatment of brittle finger nails, and non-mycotic defects of the nails in humans.



**FORMS OF GELATIN:** Gelatin is normally available in two distinct forms;

**(A) ABSORBABLE GELATIN SPONGE:** It is a sterile, white, tough, and finely porous spongy, water insoluble and absorbable substance.

- Even though it is water-insoluble but it is adequately absorbed in body fluids.
- Nevertheless, it usually takes up to not less than 30 folds its equivalent weight of water.
- It has been observed that 9 g of absorbable gelatin sponge takes up to 405 g (*i.e.* 45 times) of well-agitated oxalated whole blood.

### **USES OF ABSORBABLE GELATIN SPONGE:**

It is used as an effective haemostatic, as a localized anticoagulant, and when placed upon a surgical incision after being duly moistened with sterile NaCl solution, it gets slowly absorbed within a span of 4-6 weeks.

**(B) Absorbable Gelatin Film:** Absorbable gelatin film refers to a light amber coloured, sterile, non-antigenic thin film invariably produced from an especially prepared gelatin-formaldehyde solution by careful drying followed by subsequent sterilization.

# SHELLAC

**Synonyms:** Lacca, Lac.

Shellac is the resinous secretion of the female insect *Laccifer* (Tachardia) *lacca* Kerr.

**Family:** *Coccidae*

The insects usually suck the juice of the tree and secrete 'stick-lac' more or less continuously.

**Geographical Occurrence:**

Lac is produced in India, Thailand and to a lesser extent in China (5% of world production).



Lac Bug



Leaves Resin



Pigment





### Lac tubes created by *Kerria Lacca*

- The various host trees are: *Butea frondosa* Koen. Ex. Roxb. (Family: *Leguminosae*)
- *Butea monosperma* (Lam.) Kuntze; *Aleurites moluccanna* (L.) Willd. (Family: *Euphorbiaceae*)-
- Varnish Tree; *Ficus benjamina* Linn., (Family: *Moraceae*);
- *Zizyphus jujuba* (Lam.) (Family: *Rhamnaceae*).



- However, the *whitest shellac* is produced while the Kusum tree is the host *i.e.*, *Schleichera trijuga* (Willd.) (Family: *Sapindaceae*).

### PREPARATION:

- The resin which is stuck on the smaller twigs and branches is normally scrapped by means of knives.
- The resulting resin is subsequently powdered and extracted either with water or with alkaline solution so as to remove the colouring matter.
- The residual product is dried, melted in narrow bags suspended over a fire.
- The contents of the bags *i.e.*, the molten shellac, are squeezed out mechanically so as to force the liquid shellac through the cloth on to a previously cleaned surface of tiles to obtain the product as flat cakes.
- The product may also be obtained as thin sheets by stretching the semi-cooled product on the tiles with the help of a scraper (or spreader).
- The thin sheets thus obtained get hardened after cooling and are subsequently broken up to obtain the flakes of shellac for the commercial market.

### CHARACTERISTIC FEATURES:

- Shellac is a brittle, yellowish, transparent/translucent sheets or crushed pieces or powder.
- It does not have any specific odour and taste.
- Its MP is 115-120°C.
- Its solubility in alcohol is 85-95% (w/w) (very slowly soluble); in ether 13-15%; in benzene 10-20% and in petroleum ether 2-6%.
- It is sparingly soluble in oil of turpentine.
- It is practically insoluble in water, but soluble in alkaline solutions, in aqueous solution of ethanol-amines and in borax solutions with slightly purple colouration.



## CHEMICAL CONSTITUENTS:

- The major component of shellac is a resin that on being subjected to mild hydrolysis yields a complex mixture of aliphatic and alicyclic hydroxy acids and their polyesters respectively.
- Lac contains about 6% of wax. 6.5% of red water soluble colouring matter, laccaic acid. 70-85% of resin and a few insect remains, vegetable debris etc.
- The major component of the aliphatic fraction is aleuritic acid,
- While the major component of the alicyclic fraction is shellolic acid.
- However, it also contains the isomers of shellolic acid along with small amounts of kerrolic acid and butolic acid.
- The colouring matter is due to the presence of laccaic acid, which is water soluble.

**Table 34.1 Pharmacopoeial types of shellac.**

Type	Preparation	Characters
Wax-containing shellac	From molten seedlac by filtration through bags or by hot solvent extraction. When sufficiently cool the product is stretched into a large sheet and then broken into flakes	Flakes, brownish-orange or yellow. Almost insoluble in water and partly soluble in ether. With alcohol it gives an opalescent solution
Bleached shellac	Seedlac is dissolved in hot soda solution, bleached with hypochlorite or chlorine and precipitated by acid. It is 'pulled' under water into sticks and dried	A cream to brownish-yellow powder. An opalescent solution is given with alcohol
Dewaxed shellac	From seedlac or wax-containing shellac by treatment with a suitable solvent and removal of the wax by filtration	Flakes as wax-containing shellac. With alcohol it gives a clear solution
Bleached dewaxed shellac	Seedlac or wax-containing shellac is treated with hot soda solution and bleached with hypochlorite; the insoluble wax is removed by filtration, the product precipitated from solution with dilute acid, and dried	Appearance as bleached shellac. With alcohol it gives a clear solution

### USES:

- i. It is used chiefly in laquers and varnishes.
- ii. It is also employed in the manufacture of buttons, sealing wax, cements, inks, grinding wheels, photograph records, paper.
- iii. It also finds its use in electrical machines and for stiffening hats.
- iv. Laccic acid A is a direct, DNA-competitive inhibitor of DNA methyltransferase 1.
- v. It is also used for finishing leather.
- vi. It is extensively used for coating tablets and confections.
- vii. In dentistry, shellac from *Laccifer lacca* is used to make dentures and other dental products
- viii. Pharmaceutical applications of shellac: moisture-protective and taste-masking coatings and extended-release matrix tablets.



**I NEVER DREAMED  
ABOUT SUCCESS.  
I WORKED FOR IT.**

*-Estée Lauder*

BILAL MALIK

### Confectionery

Shellac is used to provide protective candy coatings or glazes on candies like M & M's, ensuring the chocolate coated peanuts melt in your mouth and not your hand. It is approved by the FDA as a food safe coating.



### Vinyl records

When the music industry exploded in the 1970's, demand for shellac was twice the amount of supply. This led the industry looking for other suitable materials.

### Hats

Shellac is used to stiffen felt used to make hats.



### Pharmaceutical

Shellac is used to coat enteric pills so that they do not dissolve in the stomach, but in the lower intestine, allowing them to act as a 'time release' medication.



### Food Coatings

Due to its FDA approval, shellac is used to coat apples and other fruits.

### Electrical

Shellac mixed with marble dust is used by lamp manufacturers to glue the metal base to glass incandescent bulbs.



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### Wood finish

Shellac is a beautiful wood finish and has characteristics like no other finish. Although it is the most difficult to apply.



### Everything else

Other uses for shellac are in the manufacture of grinding wheels (it allows the abrasive particles to break off at the low heat generated by the grinding process, thus exposing new, fresh abrasive particles), leather finishing and painting (shellac pigmented with white titanium dioxide is widely used by painters as a stain sealer, wallboard primer, and knot and sap sealer on wood).



## MUSK

Musk is the dried secretion from the preputial follicles of the musk deer

*“moschus moschiferus.”*



### HIMALAYAN MUSK DEER PODS

#### Distribution:

- This small deer is found in Nepal, India, Pakistan, Tibet, China, Siberia and Mongolia.
- The musk-containing sacs are known as 'pods'. They are about 5-7 cm in diameter, weigh up to 30 g and contain about half their weight of musk.

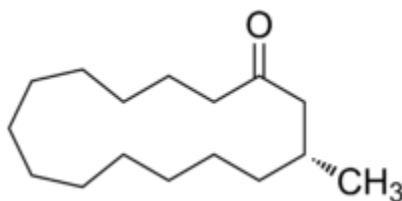
#### PREPARATION:

- I. The musk pod is normally obtained by killing the male deer.

- II. Upon drying, the reddish-brown paste inside the musk pod turns into a black granular material called "musk grain", which is then tinctured with alcohol.
- III. The aroma of the tincture gives a pleasant odour only after it is considerably diluted.

### CHEMICAL CONSTITUENT:

- I. When distilled, musk yields about 1.4% of dark brown volatile oil, the chief odorous constituent of which is muskone or muscone.
- II. This is a cyclic ketone having a closed chain of 15 carbon atoms with one methyl substituent in the 3-position.
- III. Other constituents of musk are steroidal hormones, musco-pyridine and other alkaloids and peptides.



A synthetic compound which differs from muskone only in the absence of a methyl group, is cyclo-penta-decanone. Most other synthetic musk substitutes have little chemical similarity to the natural product.

### USES:

- 1) Musk acts as a fixative and is an important ingredient of many high-class perfumes.



- 2) In animal studies, components of musk reportedly have anti-inflammatory and anti-histaminic activity.
- 3) In one study, musk was used in combination with herbs that appeared to inhibit and delay platelet aggregation.
- 4) Musk has been shown to have a beneficial effect in patients suffering from angina, with a therapeutic effect comparable with that observed with nitroglycerin.
- 5) Compounds derived from the musk deer are highly lipophilic and have been found to bioaccumulate in human fat and milk.
- 6) Although musk is primarily used topically, caution of its use during pregnancy and lactation may be warranted because of a lack of toxicity **data**.

### OTHER SOURCES OF MUSK:

The muskrat (*Ondatra zibethicus*), the only species in genus *Ondatra*, is a medium-sized semi-aquatic rodent native to North America and introduced in parts of Europe, Asia, and South America.



### CIVET:

- This product which resembles musk, is obtained from the perineal follicles of African or Indian civet cats, *viverra* spp. It contains civetone.
- A cyclic ketone closely related to muskone but having a closed chain of 17 carbon atoms.

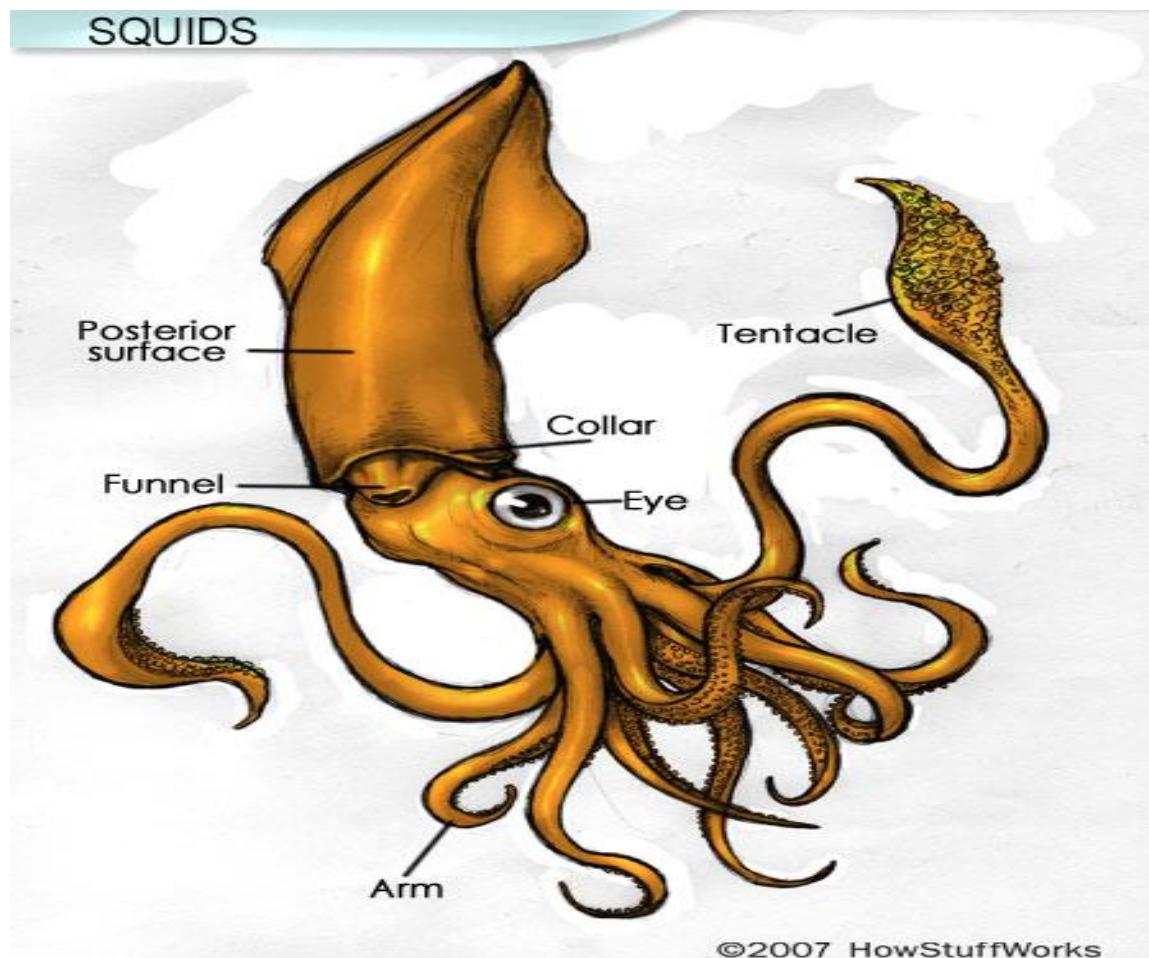


## AMBERGRIS

This very expensive substance used in perfumes is a pathological product found in the intestines of sperm whales or cast by them into the sea. (Phy-seter macrocephalus)

### **FAMILY: Physeteridae**

It is associated with the beaks of squids (small fishes) on which the whales feed. This is essentially the mouth of the squid, and the first stage of the digestive system.



### EXPLANATION:

Ambergris is an excretion from the Sperm Whale. It is found floating on the oceans or collected from the shores of many countries around the world.

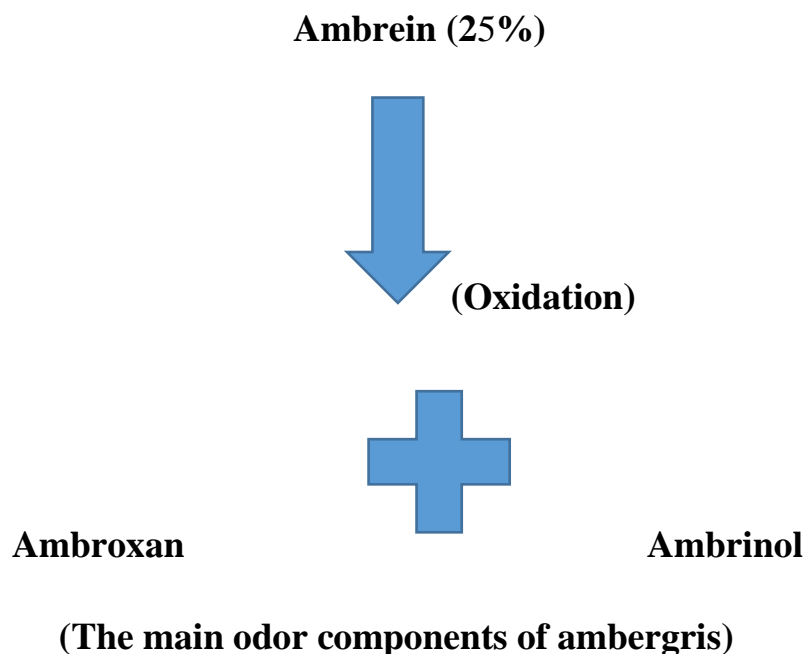
Ambergris is formed in the intestines of the sperm whale but is usually passed in the fecal matter. It is speculated that an ambergris mass too large to be passed through the intestines is expelled via the mouth, leading to the belief that ambergris is primarily coming from whale vomit. Even today, much of the life and times of the sperm whale remains a mystery as they live and feed in the deepest depths of the ocean.

### PHYSICAL PROPERTIES:

- 1) Ambergris is found in lumps of various shapes and sizes, usually weighing from 15 g -50 kg sometimes more.
- 2) When initially expelled by or removed from the whale, the fatty precursor of ambergris is pale white in colour (sometimes streaked with black), soft, with a strong fecal smell.
- 3) Following months to years of photodegradation and oxidation in the ocean, this precursor gradually hardens, developing a dark grey or black colour, a crusty and waxy texture, and a peculiar odour.
- 4) In this developed condition, ambergris has a specific gravity ranging from 0.780 to 0.926.
- 5) It melts at about 62 °C to a fatty, yellow resinous liquid.
- 6) It is volatile at 100 °C (212 °F) and converts into a white vapours.
- 7) It is soluble in ether, and in volatile and fixed oils.

Chemically, ambergris contains alkaloids, acids and white crystals of a terpene known as ambrein can be separated from ambergris by heating raw ambergris in alcohol, then allowing the resulting solution to cool.





**USES:**

- 1) Each piece of ambergris is unique. It is also an evolutionary material and as time passes it develops a true perfume of its own. It has a fragrant musk-like odour but its main value lies in the fact that it has a subtle effect on fine perfumes and gives them great tenacity or persistence of odour.
- 2) This substance has also been used historically as a flavoring for food and is considered an aphrodisiac in some cultures.
- 3) During the Middle Ages, Europeans used ambergris as a medication for headaches, colds, epilepsy etc.

**DR HAROON KHAN ASSOCIATE PROFESSOR**

**BILAL MALIK**



## COD LIVER OIL

Cod liver oil is a fixed oil which is obtained from the fresh liver of the cod.

**ZOOLOGICAL NAME:** *Gadus morrhua*

**Gadus** is from Greek word “Gados” means cod fish.

**FAMILY:** Gadidae

**GEOGRAPHICAL SOURCES:**

Iceland, Britain, Germany, Norway and Denmark etc



### **COLLECTION:**

There are two processes for the collection or extraction of cod liver oil.

#### **A. ROTTING PROCESS:**

It is an old process used in the ancient time.

1. In this process the fish were cleaned on the shipboard.
2. The livers of the fish were separated and then packed in barrels, where through the process of rotting the tissue disintegrated.
3. The oil rose to the top of barrels where it was collected. While the edible portion of the fish was salted to preserve it.

#### **B. STEAMING PROCESS:**

1. In this case the cod fish are caught and brought to fish house within few hours.
2. Their livers are removed and gall bladders are separated from the liver.
3. The livers are taken in closed kettles and steamed up.
4. The oil rises to the top where it is collected.
5. The air above the oil is separated by carbon dioxide in order to prevent oxidation.

### **PREPARATION:**

1. The oil is strained and filtered into tin lined container.
2. It is chilled at a temperature below  $5^{\circ}\text{C}$ . During chilling process the stearin is solidified and removed.

3. The lighter oil decanted and filtered.
4. Finally the oil adjusted to definite vitamin content by admixture.
5. The liver marc is re-steamed and pressed to get the oil which is used for technical purpose i.e. as lubricant.

### **REFINING:**

The quality and flavor of the cod liver oil is improved by refining process. It includes the following steps;

1. **REMOVAL OF IMPURITIES:** The oil is heated to 77 C° and different reagents are added to remove the impurities and to dissolve the remaining of liver tissues.
2. **DRYING:** For drying purpose vacuum tower is used. It evaporates remaining water, as a result clear and bright oil is obtained.
3. **WINTERIZATION:** The oil is chilled up to 0C° as a result stearin become solid. The solid stearin is removed by filtration.
4. **DEODORIZATION:** The fishy odour is due to aldehydic and ketonic components. The odour is removed by treating the oil with 1% flavouring agent and then steamed.

### **STANDARDIZATION:**

- 1) The oils are adjusted to a definite vitamin contents.
- 2) One gram of cod liver oil contains not less than 225 µg of vitamin D.
- 3) Its acid value should exceed 1.2; however iodine value is comparatively high.
- 4) If the oils are not accordance with the above values then they are adjusted by admixture.

### **STORAGE:**

The oil is stored in cool places. The small amount of antioxidant is added to prevent oxidation.

### **CHARACTERISTICS:**

1. Cod liver is a thin oily liquid having a slightly fishy odour and taste.
2. It is very pale yellow in colour.
3. It is freely soluble in organic solvents such as ether, chloroform, carbon disulphide and ethyl acetate while insoluble in water.

### **CONSTITUENTS:**

Cod liver oil contains:

**VITAMIN A:** It is also called growth promoting or antxerophthalmic vitamin.

**VITAMIN D:** It is also antirachitic vitamin. Cod liver oil contains the active form of vitamin D i.e. Vit D<sub>3</sub> (Cholecalciferol).

**GLYCERYL ESTER OF SATURATED FATTY ACID:** It is about 15%, which includes myristic acid, palmitic acid and stearic acid etc.

**GLYCERYL ESTERS OF UNSATURATED FATTY ACIDS:** it is found about 85%, it includes oleic acid, linoleic acid, gadoleic acid and palmitoleic acid etc.

### **THERAPEUTIC USES:**

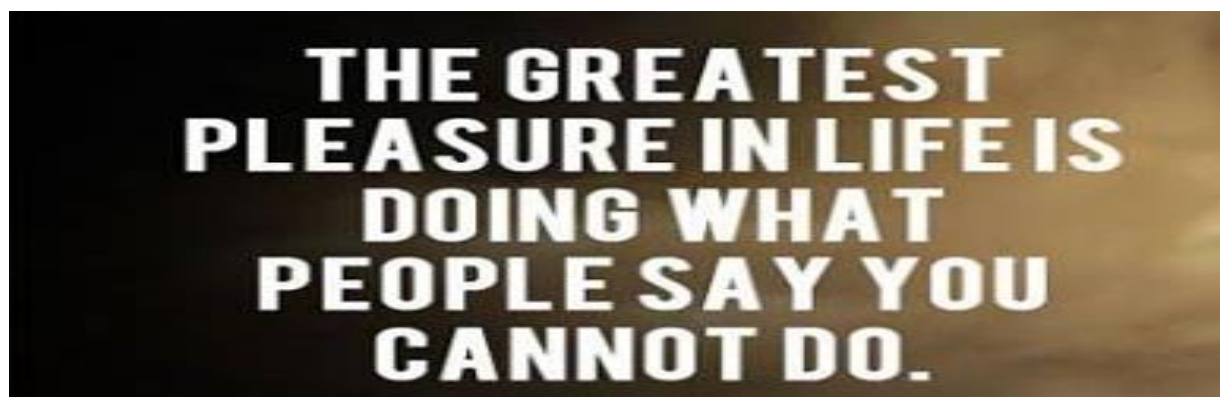
1. Cod liver is the natural source of Vit. A and D.



2. Vitamin A acts as anti-xerophthalmic agent. Xerophthamia is a disease of eye in which the conjunctiva of the eye becomes extreme dry.
3. Due to Vitamin A content cod liver oil is used as flesh builder (muscle formation) and as growth promoter in children.
4. Vitamin D is used as anti-ricketic agent. Rickets is a disease of babies i.e. it developed in the age of six months to two years when the weight bearing bones are bended (become curved) due to the deficiency of vitamin D.
5. Cod liver is used for reducing blood cholesterol level, because it contains 85% unsaturated fatty acids.
6. A sterile solution of saturated fatty acids is added in NaOH solution, which is given in the form injection (sodium morrhuate injection), against a disease known as varicose veins (when the veins become fully dilated and the walls are unable to stop the reverse flow of blood).

### DOSE:

Its usual dose is 5ml, which contains 1170  $\mu\text{g}$  of Vit. A and 9.7  $\mu\text{g}$  of Vit D.



## CANTHARIDIN

**Synonym:** Cantharides Camphor

### **Biological Sources:**

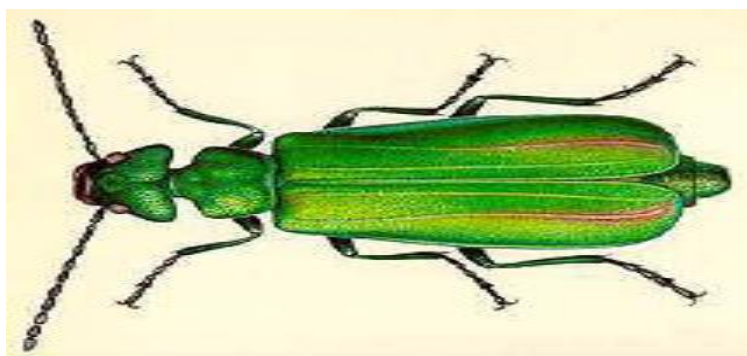
It is the active vesicating principle of cantharides and other insects, in notorious ‘Spanish Fly’ aphrodisiac, which essentially comprise of the dried insects (Beetles) *Lytta (Cantharis) vesicatoria*.

**FAMILY:** *Meloidae*. It has been found that the soft parts of the insect are the chief seat of cantharidin.

### **GEOGRAPHICAL SOURCES:**

Southern Europe, Southern Russia, Spain and Italy

### **DESCRIPTION:**



The beetles are about 12-20 mm long and 3-6 mm wide, shining green or bronze-green; sub globular in shape with trapezoid head, small eyes, filiform antennae and folded wings.

### **COLLECTION AND PREPARATION:**

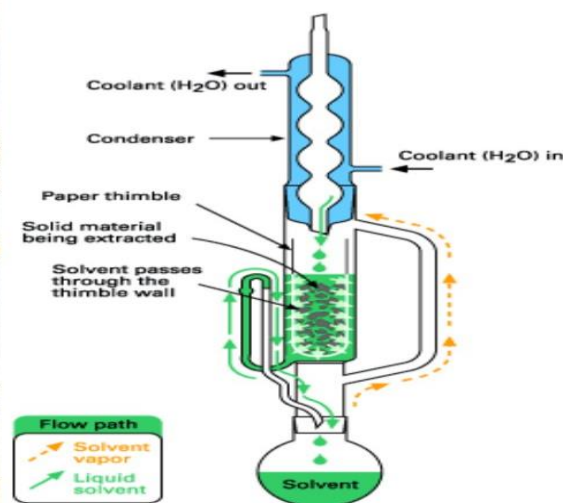
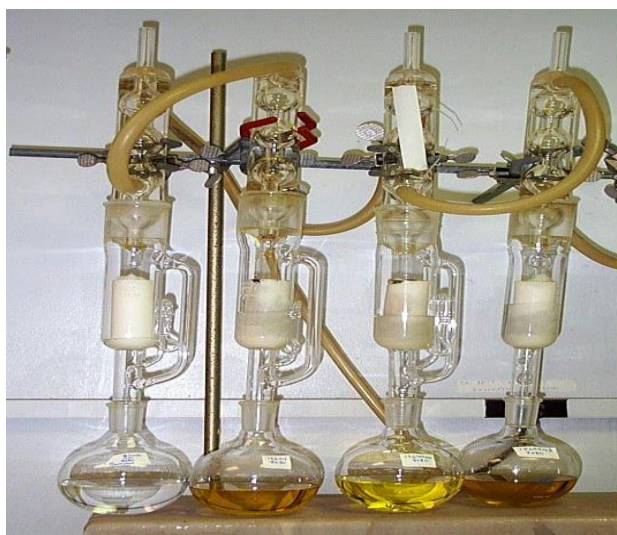
- 1) The insects live on trees such as olive, privet and elder.

- 2) Collection is made in June and July on early morning, large cloths are spread under the trees which are vigorously shaken or beaten with long poles.
- 3) The beetles are collected on sieves, and are exposed to poisonous vapours such as acetic acid, chloroform, ammonia, carbon disulphide, or fumes from stove to kill them.
- 4) They finely dried at temperature not over 40°C.

### ISOLATION:

The various steps involved in the isolation of cantharidin are:

1. The dried insects are collected and powdered. It is now treated with an acid whereby the cantharidin gets liberated in the form of its corresponding salts.
2. The resulting product is subjected to extraction, of both cantharidin and fat by the help of ethyl acetate in a Soxhlet apparatus.



3. The solvent is removed carefully under reduced pressure and the crude cantharidin crystallizes out.

4. The fat may be removed by the help of petroleum ether, in which cantharidin is only negligibly soluble.
5. Ultimately, the crude defatted cantharidin is dissolved in a minimum quantity of hot ethanol and allowed to cool when cantharidin crystallizes out in its purest form.

### **CHARACTERISTIC FEATURES:**

1. Cantharidin is obtained as orthorhombic plates or as scales having mp 218°C.
2. It sublimes at 110 °C (12 mm Hg, 3-5 mm distances).
3. It is practically insoluble in cold water and somewhat soluble in hot water. 1g dissolves in 40 ml acetone; 65 ml chloroform; 560 ml ether; 150 ml ethyl acetate; and soluble in oils.

### **IDENTIFICATION TESTS:**

**FORMALDEHYDE TEST:** Add to a few crystals of cantharidin in 1-2 drop of dilute formaldehyde solution mixed with H<sub>2</sub>SO<sub>4</sub>, the development of a brown to black colouration on warming identifies it.

**OLIVE OIL TEST:** A solution of cantharidin in olive oil is vesicant to the skin (*i.e.*, sensitive upto an extent of 0.14 mg).

### **USES:**

1. It is mostly used as a vesicant.
2. It is also employed as a rubefacient and counterirritant in veterinary practice.

## **SPERMACEI**

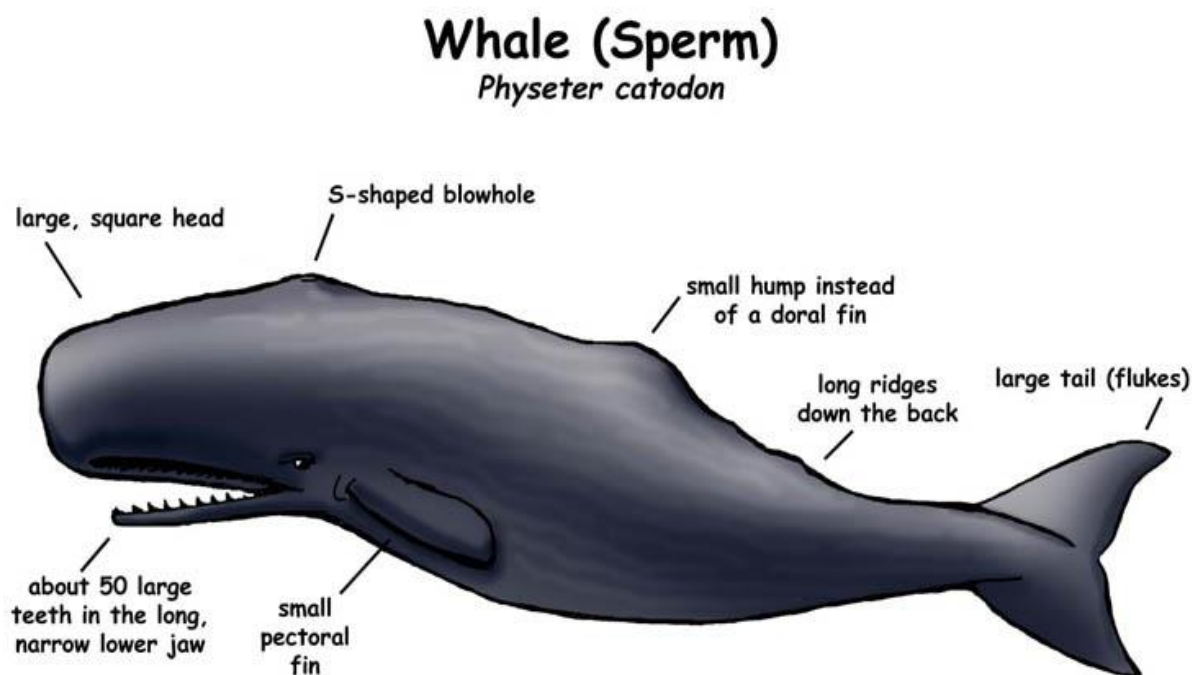


Spermaceti is a solid waxy substance which is obtained from the head of the sperm whale, sperm whale have a huge head i.e. up to one third the length of the body, in which a light oily fat i.e. spermaceti is found.

The zoological name of the sperm whale is *Physeter macrocephalus*.

It belongs to family *Physeteridae*.

Two theories for the spermaceti organ's biological function suggest it either controls buoyancy, or acts as a focusing apparatus for the whale's sense of echolocation.



- ⊙ *Physeter* from Greek word meaning spouting of the whale (pushing the water through the hole in head at certain height)
- ⊙ *Macrocephalus* from Greek word meaning large head.

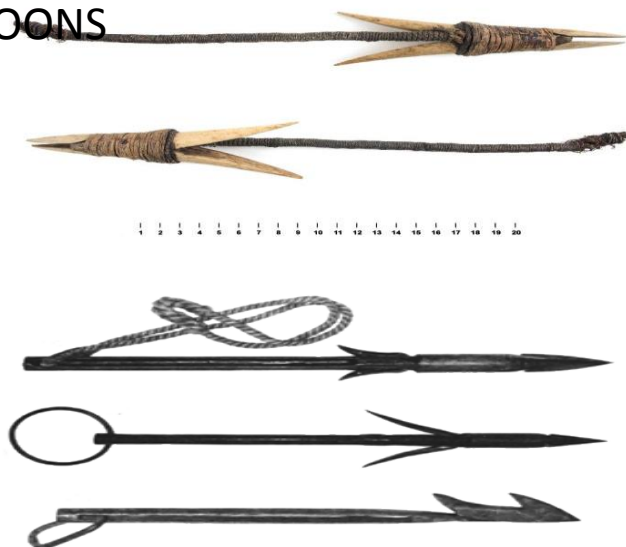
### HABITAT

Sperm whales occur in all oceans mainly Pacific and Indian oceans. It is not found in Arctic Ocean.

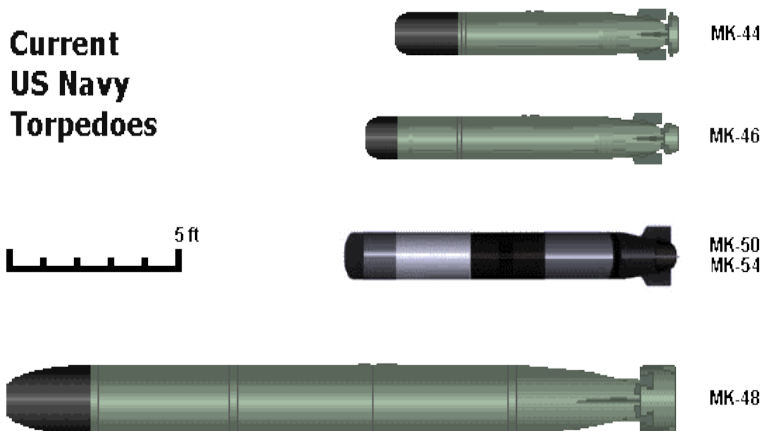
### **COLLECTION:**

1. There is a cavity in the head of sperm whale which contains the oily liquid known as sperm oil.
2. The sperm whale is killed with torpedo (cigar like) harpoons (a stick having sharp head carrying weapons).
3. The cavity is opened and the oil is collected by pumping into barrels.
4. A single whale can yield from 10 to 12 barrels of oils.

### **HARPOONS**



### Current US Navy Torpedoes



### PREPARATION:

1. This oil is mixed oil i.e. in crude form.
2. It is solidified into 10-12% soft wax, when exposed to air.
3. This wax is separated by straining i.e. separated by passing through a piece of cloth or wire net.
4. It is now in crude form.
5. In order to purify the wax, it is pressed and washed with weak boiling alkali (NaOH).
6. The remaining oil react with NaOH to form soap, while the purified wax is cooled and converted into solid form known as spermaceti.
7. Finally cakes are made from this solid form.

### DESCRIPTION:

1. Spermaceti is translucent substance having pearly luster (silver white colour), having soft touch and soothing effects.

2. It has faint odour (which may cause unconsciousness).
3. It is free from rancidity.
4. It has specific gravity about 0.94 and melting point 44-52C°.
5. Soluble in boiling alcohol, ether chloroform, fixed and volatile oils while insoluble in water and cold alcohol.

### CONSTITUENTS:

1. Spermaceti consists of mixture of several constituents such as
2. Cetin or cetyl palmitate
3. Cetyl mristate
4. Cetyl laurate
5. Cetyl stearate

All these are alkyl esters of fatty acids and are found about 85%.

### USES:

1. Ingredient in cosmetics
2. Leather working
3. Lubricants
4. Making of candles
5. Dressing of fabrics
6. Pharmaceutical excipient (in ointments)
7. N.B. Nowadays spermaceti has been replaced by cetyl ester wax also known as synthetic spermaceti. It is a mixture of esters of saturated fatty alcohols and saturated fatty acids.



