

### 1. Economic zoology

**Economic Zoology** is a sort of applied **zoology**, which involves the study of animals / living organisms that are of benefit or those that cause harm to humans.

#### 1. Tip's for the safety of bee keepers

Bees can be dangerous; a beekeeper must take several safety precautions when working around a honey bee colony.

- ✓ A hat or veil is commonly used to keep the face and neck protected from stings.
- ✓ Gloves are another popular form of beekeeping protection, although many beekeepers complain that gloves restrict their movement.
- ✓ A hooded suit, typically made from a light colored fabric to help distinguish the beekeeper from the honey bee's natural predators, may also be used.

While working with a honey bee colony, a beekeeper uses a smoker to help calm the bees

- ✓ Smoke is useful in beekeeping because it masks the guard bee's alarm pheromones and encourages the other bees to feed by tricking them into thinking they'll soon need to abandon their hive.
- ✓ The smoke gives the beekeeper enough time to inspect the colony and perform any needed maintenance.
- ✓ I use Pine needles for fuel in my bee smoker.

### 2. Type of fish Feeds

- ✓ Finely ground meals
- ✓ Crumbles
- ✓ Flakes
- ✓ Pellets of various size & density
  - Sinking
  - Floating
  - Slow sinking
- ✓ Microdiet

### 3. Define fungus?2

Fungus are multi-cellular, spore producing organisms that live off **other** organisms, and dead matter, some are parasitic. Fungal spores are commonly found in aquarium water

### 4. Define pullet? 2 “Young, immature female chicken less than 5-6 months of age”

### 5. Bombyx mori Characteristics

- ✓ It cannot fly
- ✓ Caterpillars with no real locomotion
- ✓ Female larger than male
- ✓ Male has big plumose antennae

### 6. Commonly cultured fish name? 5.

## Commonly Cultured Fish species

- Food fish
  - Many species, Catfish, Tilapia, Rainbow trout, Atlantic Salmon, shrimp, Shellfish, Striped Bass, Others
- Ornamental fish
  - Aquaria
  - Backyard ponds
- Bait fish
  - Minnows
  - Shiners
  - Goldfish (carp)
- Natural stock enhancement
  - Salmon
  - Trout
  - Black sea bass
  - Red Drum
  - Many others...

### 7. Technique of lac culture? 3

Lac is a natural resin of animal origin. It is secreted by an insect, known as lac-insect in order to obtain lac, these insects are cultured and the technique is called lac-culture.

### 8. Protein requirements for fish? 3

- ✓ Fish contain 60-93% crude protein, thus, fish diets are higher in protein than birds & animals.
- ✓ Fish appear to be relatively efficient utilizer of protein to energy with 84%.
- ✓ Fish can not synthesize their amino acids & obtain chiefly from the diet & absence affects growth of fish

### 9. Composition of lac.

Lac is a mixture of several substances, of which resin is the main constituent. The approximate percentage of different constituents of lac is given below:

- ✓ Resin – 68 to 90%
- ✓ Dye – 2 to 10%
- ✓ Wax – 5 to 6%
- ✓ Mineral matter – 3 to 7%
- ✓ Albuminous matter – 5 to 10%
- ✓ Water – 2 to 3%

### 10. Spring viremia crops.

#### Cause

- ✓ A viral infection caused by *Rhabdovirus carpio*. **Symptoms**
- ✓ Darkening of skin, pale gills, pop eye, protruding vent, bleeding in gills skin and eyes.
- ✓ Lethargy, abnormal swimming positions, sitting on bottom of the tank.

**Treatment** ✓ No known treatment .

### 11. Guard bees and soldier bees.

**Guard Bees** - protect the entrance of the hive from enemies.

**Soldier bees** - Soldiers hang around near the entrance and attack invaders. They work in concert with entrance guards.

### 12. Plumage.

**Plumage:** Feathers of a bird.

### 13. What is virus?

A virus is a microscopic organism that can only reproduce by inhabiting host cells and using the genetic material in the cells of a host.

### 14. What is hatchery?

The eggs are incubated at the hatchery. They are kept warm, until the chicks start to hatch out of their shells. Chickens hatch at around 20 days and turkeys hatch at around 27 days.

Baby chickens are **called chicks**. Baby turkeys are **called poults**.

### 15. Oligotrophic & eutrophic.

#### Oligotrophic

- ✓ Excellent water quality
- ✓ Very Clear
- ✓ Used in display aquaria
- ✓ Most frequently used for breeding purposes
- ✓ Some species are kept in these conditions all of their lives, while others for a period of time

#### Eutrophic

Exist for the grow out of the most tolerant species that show vigorous growth under moderately deteriorated water quality conditions

- ✓ Dissolved oxygen levels- economic optimum level
- ✓ Ammonia & Nitrite – less than 2mg-N/L
- ✓ Water quality – marginal

Species evolved under similar natural conditions prosper in these conditions

### 16. What is difference between intensive and extensive aquaculture.

**Extensive Aquaculture:** Minimal control, lower density • E.g., ponds, prevalent in third world countries

**Intensive Aquaculture:** Highly controlled, high density, RAS, raceways, confined • E.g. industrialized .

### 17. What is fish health.

- Health or well being important for
- feeding
- Growth
- Reproduction
- Diseased fish results in poor growth and ends up in losses
  - Further when diseased fish is sent to consumer, it changes
  - Texture
  - Appearance
  - Taste

### 18. Abdominal capacity of a hen is measured and expressed

Abdominal capacity of a hen is measured and expressed by ones fingers width.

Normal- 3 fingers width by 4 fingers width

### 19. Stages of insects

The Life cycle of lac insect takes about **six** months and consists of stages:

- 1) EGG
- 2) NYMPH
- 3) INSTARS
- 4) PUPA

5) ADULT

## 20. Whirling disease

*Myxobolus cerebralis*

- Caused by protozoan Skull

deformation from

## 21. How we Determine water quality

Testing Water Quality **Water quality parameters often tested are:**

- a) Dissolved oxygen e) Nitrite/Nitrate
- b) Water temperature f) Alkalinity/Hardness
- c) pH g) Salinity
- d) Total Ammonia Nitrogen

## 22. Mineral Requirements of Fish

- Fish have the ability to absorb a number of minerals directly from water ➤ reducing mineral requirements in the diet.
- Fish require all macro-and micro-elements required by other animals for enzymes & cofactors.
- Fish in soft water (low mineral content) require additional supplements in diet.

## 23. Bee sting reaction.

**Normal Reaction**

- ► Pain
- ► Wheal (swelling) develops at puncture site
- ► Redness develops around wheal
- ► Swelling
  - a little at site
  - a lot at site (large local)
- ► Itching

**Allergic Reaction**

- ► widespread, rapid swelling
- ► itching of body
- ► disorientation feeling
- ► stomach upset
- ► Loss of consciousness

## 24. Define swarming 2

Lac larvae begin to wander in search of suitable center to fix them. This mass movement of larvae from female cell to the new off-shoots of host plant, is termed as “swarming”.

**Lifecycle of lac insect**

Swarming occurs after the emergence of nymph and it may continue for 5 weeks.

## 25. Use of Lac:

- Lac has been used for the welfare of human beings from the great olden days
- No doubt the development of many synthetic products have made its importance to a little lesser degree, but still it can be included in the list of necessary articles.
- Lac is used in making toys, bracelets, sealing wax, gramophone records etc.
- It is also used in making grinding stones, for filling ornaments, for manufacturing of varnishes and paints, for silvering the back of mirror, for encasing cable wires etc.,
- Waste materials produced during the process of stick lac is used for dyeing purpose. Nail polish is a good example of the by-product of lac.

## 26. artificial and natural infection.

**Natural infection.**

When infection from one plant to other occurs by natural movements of insect, it is called natural infection. This may be due to overcrowding of insect population and nonavailability of tender shoots on a particular tree.

**Artificial infection** takes places through the agencies other than those of nature. Prior to about two weeks of hatching, lac bearing sticks are cut to the size of six inches. They are called “**Brood lac**”.

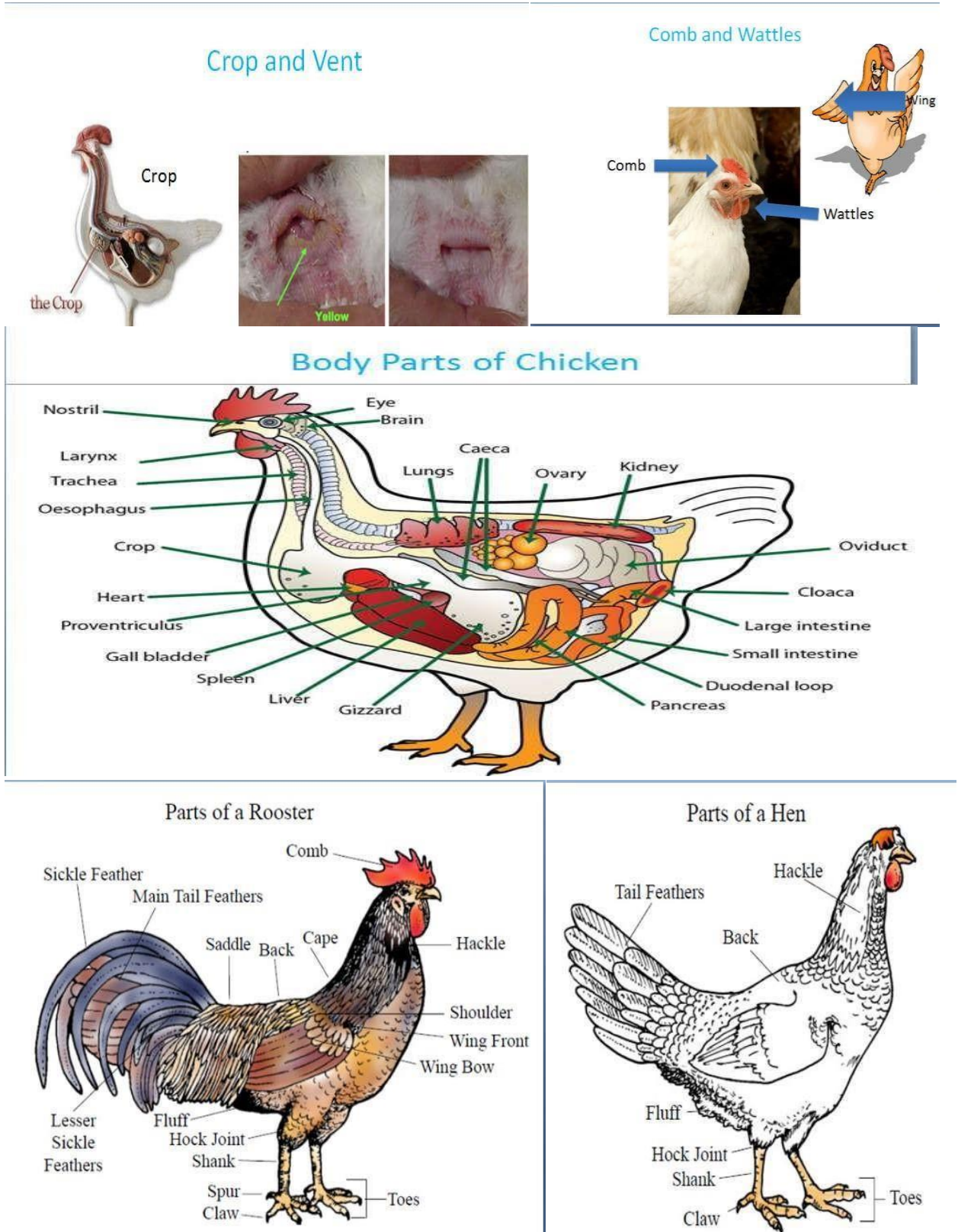
## 27. Types of aquarium system.

## 28. Culture of Effluent tank.

- High concentrations of suspended o and dissolved solids
- High ammonia levels and high concentration of CO<sub>2</sub>
- Low levels of dissolved oxygen
- Application of Recirculation system
- Brood stock maturation
- Nursing and Larval rearing systems
- Nutrition and health research systems
- Short-term holding systems
- Ornamental and display tanks
- High density grow-out of food fish

29.

## Name Different parts of chicken 5



### 30. Broiler/Flyer:

Chickens grown for meat production

### 31. Species cultured in ponds

- Rohu *Labeo rohita*
- Morakhi *Cirrhinus mrigala*
- Catla/Thaila *Catla catla*
- Grass carp *Ctenopharyngodon idella*
- Silver carp *Hypophthalmichthys molitrix*
- Big head carp *Aristichthys nobilis*
- Common carp *Cyprinus carpio* ➤ Tilapia *Oreochromis niloticus*

### 32. Functions of fat:

- 1-Providing energy
- 2-Cushions for vital organs
- 3-Energy reserves
- 4-Insulators & lubricants
- 5-Transports of fat-soluble vitamins

### 33. White Spot Disease itch.

#### Causes

Protozoan parasite either free swimming in the water or carried in with new fish or plants. Fish under stress from bad water conditions are more susceptible. **Symptoms**

- The fish's skin and fins are covered in tiny white spots. A badly

affected fish may make rapid gill movements.

### 34. Define Catching

- Once the birds reach their required weight they are transported to the processing plant.
- Trained staff called 'catchers' catch the birds and put them in special containers called modules.
- Catching is carried out quietly and with care to avoid unnecessary stress and to prevent injury to the birds

### 35. Difference between queen and drone bee.

#### The Queen

- The queen is the only sexually developed female in the hive.
- She is the largest bee in the colony.
- A productive queen can lay 2,000 eggs in a single day.

#### The Drone

- Drones are stout male bees with large eyes and no stingers.
- Drones do not collect food or pollen from flowers.
- Their sole purpose is to mate with the queen.
- They die upon mating.
- If the colony is short on food, drones are often kicked out of the hive.

### 36. Factors affecting the requirements of protein

- a) More Waste Limited Digestion
- b) About 36% of feed is excreted as organic waste
- c) Live fish biomass = 5x more waste than human
- d) Why?
  - i. Limited digestion
  - ii. Large fraction of feed remain undigested & is excreted.

### 37. Advantage and disadvantage of Hand feeding method

- Feed is distributed by hand, shovels, or other non-automated means.
- Most common method.
- Used for feeds not suited for automated systems.
- Meat scraps are hand fed.

#### Advantages:

1-Operator can note feeding behavior & gauge the feed required  
2-Operator can ensure that feed is dispersed over wide area.

#### Disadvantages:

- 1-high labor cost
- 2-increased handling of the feed.

### 38. What is raceway 2

Raceways are considered flow through systems. Being simple to construct they are some of the oldest designs in aquaculture. Water sources for raceway aquaculture operations are usually streams, springs, reservoirs or deep wells.

### 39. Apiary.

The place where a beekeeper keeps his bees is called an apiary or a bee yard.

### 40. Difference between demand and anger feeder.

#### a. Demand feeders

- Allow fish to bump a rod and release feed when they are hungry.
- Used in raceways.
- Fish must be trained how to use them.

Fish can obtain food on demand by depressing a trigger.

- *Auger feeding*
- Similar to systems used by swine and itry farmers.
- Feed stored in large tanks
- Moved by augers that drop feed in pond
- Common in tanks and raceways

### 41. Importance of lac

with increasing universal environment awareness, the importance of lac has assumed special relevance in the present age, being *a)* An eco-friendly *b)* Biodegradable *c)* Self-sustaining natural material

Since lac insects are cultured on host trees which are growing primarily in wasteland areas, promotion of lac and its culture can help in eco-system development as well as reasonably high economic returns. It is a source of *livelihood* of tribal and poor inhabiting forest and subforest areas.

### 42. Inoculation:

The method by which the lac insects are introduced to the new lac host plant is known as **inoculation**.

### 43. Ari lac and Phunki lac

Lac can be scraped from the twigs before or after the emergence of larvae. If it is used for manufacturing before the emergence of larvae, the type of lac produced is called as “**Ari lac**” and

if it is used for manufacturing purpose after swarming of larvae has occurred, the lac is said to be “**Phunki lac**”.



## 44. Fat soluble and vitamins

**Table 3. Vitamins and some of their major functions as established in fish.**

<b>Fat-soluble vitamins</b>	<b>Function</b>
vitamin A, retinol	epithelial tissue maintenance, vision
vitamin D, cholecalciferol	bone calcification, parathyroid hormone
vitamin E, tocopherol	biological antioxidant
vitamin K	blood clotting
<b>Water-soluble vitamins</b>	
thiamin, B <sub>1</sub>	carbohydrate metabolism
riboflavin, B <sub>2</sub>	hydrogen transfer
pyridoxine, B <sub>6</sub>	protein metabolism
pantothenic acid	lipid & carbohydrate metabolism
niacin	hydrogen transfer
biotin	carboxylation & decarboxylation
choline	lipotropic factor, component of cell membranes
folic acid	single-carbon metabolism
cyanocobalamin, B <sub>12</sub>	red blood cell formation
ascorbic acid, vitamin C	blood clotting, collagen synthesis
inositol	component of cell membranes

## 45. Guard bee and soldier bee.

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### Cause

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### Symptoms

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Lethargy, abnormal swimming positions, sitting on bottom of the tank.

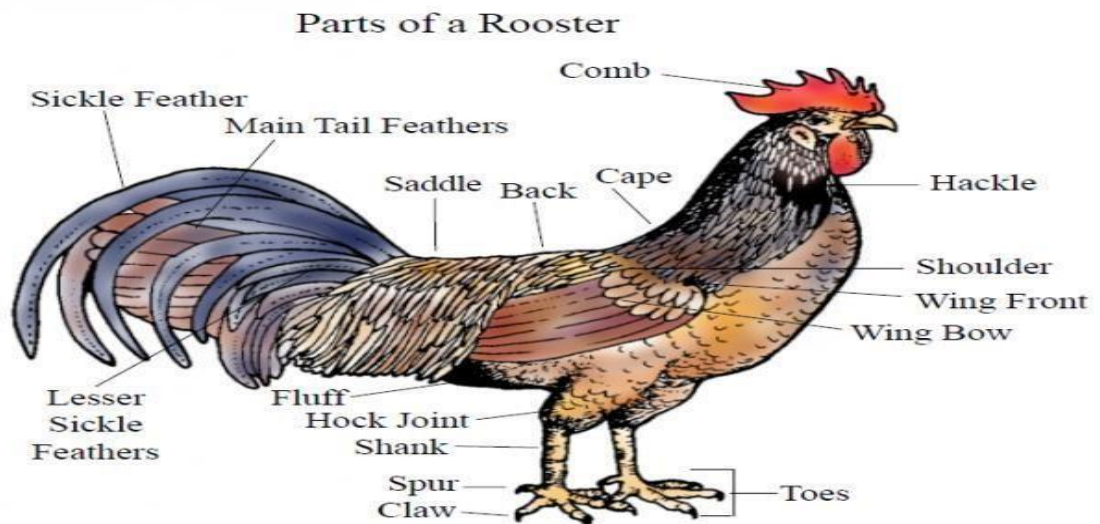
### Treatment

- No known treatment .

## 47. Aquaculture Journals

- Journal of the World Aquaculture Society
- North American Journal of Aquaculture (PFC)
- Aquaculture
- Journal of Applied Aquaculture
- Aquaculture Nutrition
- Aquaculture Research
- Journal of Aquatic Animal Health
- Transaction of the American Fisheries Society

**48. Roster body parts.**



#### 49. Types of Aquaculture Systems

1. Pond Fish Culture
2. Raceway Culture
3. Cage Fish Culture
4. Recirculating Water Fish Culture

#### 50. Mesotrophic

Describes the bulk of high-density production systems where risk and economics must be carefully balanced to achieve profitability

#### 51. Define fat?

“Fat-soluble compounds occurring in plant & animal tissues”

Consist of fats, phospholipid, sterols, fatty acids etc. Excessive dietary lipid = nutritional disease e.g., fatty liver or visceral fat Fish can utilize energy of fat by 84% efficiency

#### 52. What is lac?

Lac is the only known commercial resin of animal origin. It is the hardened resin secreted by tiny lac insects belonging to a **bug family**. To produce **1 kg** of lac resin, around **300,000** insects lose their life. The lac insect yields:

- ✓ Resin
- ✓ Lac dye
- ✓ Lac wax

#### 53. Propolizing –

The walls of the hive will be covered with a thin coating of propolis, a resinous substance obtained from plants. In combination with enzymes added by the worker this will have antibacterial and antifungal properties. Propolis is also used to close off excessive ventilation and entrances.

#### 54. What are the causes of fish disease?

- ✓ Bad water quality
- ✓ Inappropriate diet
- ✓ Temperature (too high or too low)
- ✓ Stress
- ✓ Bullying(mistreatment, oppression)
- ✓ Viral diseases
- ✓ Fungal infections
- ✓ Bacterial infections
- ✓ Parasites
- ✓ Parasitic conditions: What is a parasite?
- ✓ A parasite is an organism that lives off another often to the detriment of the hosts health.
- ✓ Parasites can be internal (endo-parasites) or External (ecto-parasites).

**They can be:**

- ✓ Protozoan (single celled)
- ✓ Nematodes/ cestodes / trematodes (worms)
- ✓ Crustacean (e.g. louse)

**55. What are Bacteria?**

Bacteria are microscopic single celled organisms that can reproduce rapidly.

They are naturally present in aquarium water. **Pseudomonas fluorescens**

**56. Apiculture:** technical term for [beekeeping](#).

beekeeping, especially on a commercial scale for the sale of honey.

**57. Aeration and Oxygenation**

- Oxygen first limiting factor in recirculation fish culture system
- O<sub>2</sub> is consumed by fish and bacteria inhabiting bio filter
- In fish tank O<sub>2</sub> should not be less than 5 ppm and in outgoing bio filter water not less than 2 ppm
- When these levels drop below these concentrations aeration becomes necessary
- Induction air into water is called aeration while induction of pure oxygen is oxygenation
- For stocking density up to 45kg/m<sup>3</sup> aeration is enough but for higher stocking densities oxygenation is must

58.

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