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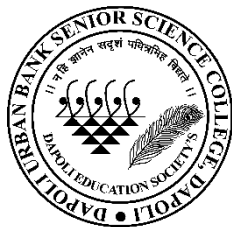
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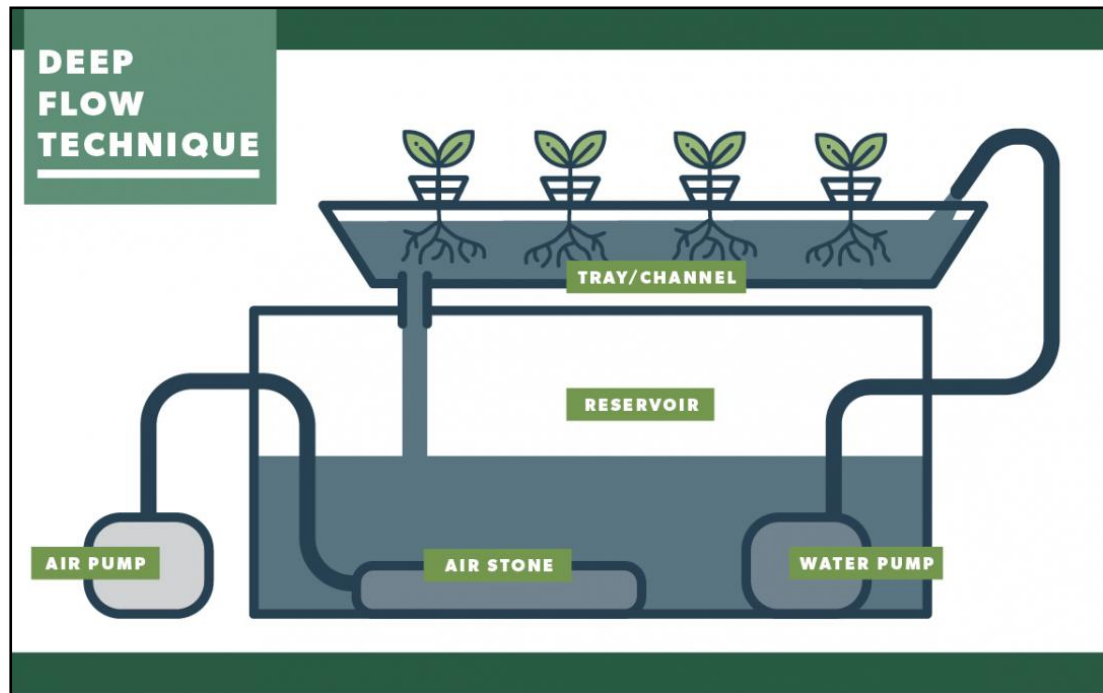
I, Shri Dr. S. P. Jagadale hereby declared that the particulars given above are true to the best of my knowledge and belief.

Sign /-

(Dr. S.P. Jagadale, Principal)

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## How Deep Flow Technique (DFT) Hydroponic Systems Work



The Deep Flow Technique (DFT) is similar to two other hydroponic systems, but it ultimately works in its own way. In this article, you'll learn how DFT hydroponic systems grow crops. In hydroponics, plants are grown with nutrient water instead of soil. Some systems actively deliver the nutrient water to the plant roots to stimulate growth. While other systems work by simply letting the plant roots sit in the nutrient water indefinitely. DFT hydroponic systems do a little of both. Aerated nutrient water from a reservoir is pumped up into one side of a tray. The plants sit on top of the tray with their roots hanging inside. As the water is pumped in, it circulates around, delivering nutrients to the plants' roots. On the opposite end of the tray, a drain brings the used water back down to the reservoir. Because DFT

catches and recycles water like this, it uses very little of it! DFT is similar to both nutrient film technique (NFT) and deep-water culture (DWC) hydroponic systems. NFT systems also use trays and water pumps to deliver nutrients to plant roots. And both systems tend to unevenly distribute nutrients because the water only ever enters the system from one spot. So, they both work best with shorter trays. Otherwise, the plants at the far end of the tray get fewer nutrients. However, NFT and DFT look similar, but there are key differences in how they function. For one thing, the trays in DFT systems are often deeper, because in NFT only a thin "film" of nutrient water passes through at a time. Plus, because it's so little water, the trays are set at an angle in NFT systems, so that the water can reach the other side. DFT systems

don't need an angle to work. One concern with an NFT system is how much it relies on the water pump. Because only a tiny bit of water passes through at a time, if the water pump shuts off or breaks, the plants will not receive any nutrient or water and will die. Since DFT systems hold more water at a time, there is enough sitting water in the trays to keep the plants alive, if a problem with the pump occurs. In DWC systems, plants sit on the surface of a deep reservoir of aerated water. In this case, they have a constant supply of the nutrient water and the plants can grow and grow. But if the air pump breaks, the plants will drown. DFT systems also use aerated water to prevent drowning. Additionally, plants in DFT systems usually float on the surface, or just above the water, like in DWC systems. This is accomplished with Styrofoam or a similar material. However, DFT systems aren't nearly as deep, saving space and making it easy to stack the trays for vertical farming. It's the best of both worlds.

As you can probably tell, DFT hydroponic systems are a great choice!

**Reference:-**

[www.puregreensaz.com](http://www.puregreensaz.com)

**Article by**

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## Tracing Lithium's Atomic Signature Could Help Make Ethical Batteries



A way of tracing the origin of lithium could help hold battery producers accountable and ensure that they only use ethical sources for the metal, which is becoming increasingly vital to the global economy.

About 65 per cent of the global supply of lithium is used to produce lithium batteries, which are found in smartphones, laptops and electric vehicles. These lithium batteries have complex supply chains and it isn't always clear whether the element has been sourced ethically. Some lithium mines have been accused of using excess amounts of freshwater and Indigenous Argentinean communities have pushed back against the mining of lithium on their land.

"It's important to know the origin of lithium because, depending on where the lithium comes from, its exploitation can generate environmental or societal problems," says Anne-Marie Desauty at the French Geological Survey. "Water scarcity and human-rights violations are major issues."

Paper trails are easy to fake, says Desauty, so she and her colleagues wanted to determine if lithium's atomic signature could be used to identify its origin. Lithium has two stable isotopes, or atoms of the same element with a different number of neutrons, namely lithium-6 and lithium-7.

Each source of lithium around the world will have slightly different ratios of these isotopes, resulting from differences in the local environment, meaning the ratio can serve as a kind of signature.

The team looked at previous studies of the isotopic ratios of lithium collected from various mines and found that lithium sourced from brine deposits has a very different isotopic signature to lithium sourced from hard rock. This is partly because the heavier isotope – lithium-7 – is more likely to mix with water.

The researchers weren't able to link lithium ion batteries to specific locations as they didn't have accurate reference samples from the mines, but Desauty says it should be possible to

do this in future. “A reference database with comprehensive up-to-date data on available [lithium] products must be developed,” she says.

“We need to know where our lithium is coming from and that it’s coming from sustainable energy,” says Rachael James at the University of Southampton, UK. “Many of these procedures consume vast quantities of energy.”

“I think we can definitely build up a database,” says James. “In terms of mines’ willingness to give out that data, I don’t think it would be a massive deal.”

Journal

**Reference:**

*Nature Communications*, [DOI: 10.1038/s41467-022-31850-y](https://doi.org/10.1038/s41467-022-31850-y)

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## Equity Share Market

The exchange of stocks and shares of corporations takes place in the equity market. An equity market will either trade stocks over the counter or on stock exchanges. A stock market or share market alternatively known as an equity market enables sellers and buyers to transact in equity or shares on the same platform. The equities market in the Indian setting must first be understood clearly, thus that's the first thing that needs to be done. The equity market, often known as the stock market or the share market, is where shares of businesses or other entities are traded. Sellers and buyers can transact in stock or shares on the same platform thanks to the market. Shares are exchanged internationally, either over the counter or on stock exchanges. Several people can buy and sell the same stock or share. So you have a good chance of negotiating a good deal on a transaction on the stock market. A demat account must initially be opened in order to begin online stock trading in India. Open a demat account with these easy steps. Stock exchanges in India are where equities are typically exchanged. The National Stock Exchange (NSE), Bombay Stock Exchange (BSE), and the newest player, the Metropolitan Stock Exchange of India, are the three exchanges where stocks can be exchanged in the Indian stock market (MSE). Acquiring and disposing of shares in publicly traded companies.

The two main ways to trade equity shares are the spot/cash market and the futures market. These are the many categories of the Indian equities market. A public financial market where stocks are traded for immediate delivery is known as the spot market or cash market. The shares must be delivered at a later time on the futures market. Investors can take advantage of the Indian equity market by using an equity trading account, a reliable broker like Nirmal Bang, and online equity trading platforms. Stock market equity is referred to in the NSE. The new issues (primary) market and the stock (secondary) market are the two divisions of the securities market. The NSE currently offers the ability to trade more than 1300 securities or stocks.

Investors from across the breadth and length of the globe can trade stocks using the stock exchange's automated screen-based technology.

Trading and investing in India the National Exchange for Automated Trading is the trading name for the NSE (NEAT). Both cash/spot trading and trading in stock derivatives are included in the NSE's equities market. Which three categories of equity are there?

### THE THREE FUNDAMENTAL EQUITY TYPES

- **Common Stock.** A corporation's ownership is represented by common stock.

- **Preferential Shares.** Preferred shares are stock in a firm with a specified dividend and a priority claim over holders of common stock in terms of income.
- **Warrants**

### **Difference between stock and equity**

Stock and equity seldom differ from one another. Shares are usually denoted by these two words. Equity and stock are merely synonyms. Online equity trading platforms are used for trading equity shares.

Equities investing has a number of potential advantages, but like all investments, it also carries risks. Market risks have a direct impact on stock investments. Market forces frequently cause stocks' values to increase or decrease.

As a result, market risk puts investors at danger of losing some or all of their investment

### **Reference -:**

- <https://economictimes.indiatimes.com/markets/stocks>
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*Article by*

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# Wireless Network

A whole new industry has been developed by wireless networking for voice telephony. Adding mobile access to the telephony mix had profound influences on the voice calls market because callers could be connected to individuals, not computers. We are at the height of an equally profound shift in networking for computers.

Wireless telephony has been popular because it allows people to communicate with each other regardless of venue. For Internet access, modern technology aimed at computer networks promise to do the same. Thus far, 802.11 has become the most popular wireless data networking technology.

Computer network refers to devices, such as computers, fax or even printers connected or linked to each other to communicate and share resources. It makes use of transmission media such as wires and cables. For example, in Local Area Networks (LAN), computers are interconnected in a small area such as an office via communication cables. The main reason for connecting several devices on a network is to share resources. For example, an office has one shared printer. It can be connected to all computers within this office on a network to allow each department's usage.

## What's wireless networking?

A wireless network allows devices to remain linked to the

network yet to roam without any cables unattached. Wi-Fi signals are amplified by access points, meaning a computer can be far from a router but still be linked to the network. You connect to that organization's wireless network when you connect to a Wi-Fi hotspot at a cafe or another public location.

The only difference between wireless and wired network is that wired network uses cables to link devices to the Internet or another network, such as laptops or desktop computers. As opposed to a wireless network, a wired network has several drawbacks. The main downside is that a router is tied to your computer. The most popular wired networks use cables attached to an Ethernet port on the network router and the other end to a computer or other system.

## Why wireless?

At this point, digging into a particular technology is getting a little ahead of the story, however. Wireless networks share some significant benefits, regardless of how the protocols are built or what kind of information they bring.

Mobility is the most apparent value of wireless networking. Wireless network users can link to existing networks and are then able to travel freely. In a single call, a mobile phone user will travel miles because the phone links the user via cell towers. Mobile telephony was costly initially. These costs limited its use to highly

mobile professionals such as sales managers and significant executive decision-makers who would need to be reached at a moment's notice regardless of their venue. However, mobile telephony has proved to be a useful service and is now increasingly popular.

### **How wireless networks work**

Wireless Local Area Network (WLAN) serves the same function as a wired one to connect a group of computers. Since “wireless” does not require expensive wiring, the primary advantage is that it is typically simpler, quicker, and cheaper to set up.

By contrast, it can be labor-intensive and costly to build a network by dragging wires over an office's walls and ceilings. But a wireless network can be a cost-effective way to extend or increase it, even though you have a wired network already in place. Wireless networks operate using Radio Frequency (RF) technology, a frequency associated with radio wave propagation within the electromagnetic spectrum. An electromagnetic field is generated when an RF current is supplied to an antenna that can then spread through space.

Computers need to be fitted with wireless network adapters to connect to an access point and join a wireless network. These are mostly built right into the device, but if not, by using an add-on adapter attached to an empty expansion slot, USB port, or, in the case of notebooks, a PC card slot, just

about any computer or notebook can be made wireless-capable.

### **Types of wireless networks**

We now know how wireless network works, let's focus our attention to different types of wireless.

#### **1. Wireless Local Area Networks (WLAN)**

WLAN refers to the type of network connecting two or more computers via a wireless distribution method. They have high-frequency radio waves and an AP (access points) to the internet.

They are advantageous to use as it allows users to move around the coverage area, not restricted to a single location. They are also known as Local Area Wireless Network (LAWN).

#### **2. Wireless Wide Area Networks (WWAN)**

WWAN is also known as wireless broadband, it makes use of cell towers. These towers transmit radio signals spanning thousands of miles, in contrast to WLAN that spans a few hundred feet. It comprises three major technologies, Global System for Mobile communications (GSM) and Code Division Multiple Access (CDMA), and the newer WiMAX.

A point to note is that Wide Area Networks do not connect to your individual computers but instead to several Local Area networks.

#### **3. Wireless Metropolitan Area Networks (WMAN)**

MWAN has a coverage range size approximately that of a city. It's smaller as compared to WWAN but

larger than WLAN. It belongs to a single entity such as the government, Internet Service Provider, or cooperation. MWAN restricts access to authorized users or subscriber devices only. An example of a form of WMAN would be \*WiMAX.

### **Benefits of wireless networking**

- It has contributed significantly to the Voice over Internet (VoIP) as calls can now be made easily over this protocol.
- It has enabled mobility, a more significant advantage to its users as servers can be accessed anywhere as long as Access Point access exists.
- They are relatively cheap when compared to wired networks, which involve a lot of expenses when purchasing cables.
- The network can be secure due to data encryption method and current technologies. This allows the sharing of sensitive information.

### **Reference:**

<https://www.section.io/engineering-education/introduction-to-wireless-networking>

*Article by -*

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# Oil Drilling and Environment



Oil and gas drilling has a serious impact on our wildlands and communities. Drilling projects operate around the clock generating pollution, fueling climate change, disrupting wildlife and damaging public lands that were set aside to benefit all people. Oil and gas extraction is a menace to wildlife. Loud noises, human movement and vehicle traffic from drilling operations can disrupt animals' communication, breeding and nesting. Powerlines, wellpads, fences, and roads can also fragment habitats for many species. The pronghorn antelope and mule deer in Wyoming are among the species most impacted. In the winter, some pronghorn travel south from the Grand Teton National Park to the Upper Green River Valley to escape heavy snow. Their journey is one of the longest big game migrations in the country. But recently, animals making this age-old trek have faced a series of obstacles, notably, intense activity in major natural gas fields. The pronghorn have to navigate past enormous well pads and noisy compressor stations to find what forage hasn't been bulldozed. Future energy development farther south could ultimately have major impacts on the abundance of this herd.

## References

<https://www.wilderness.org>

*Article by -*

*Mr. Aniruddha Sutar*

*Department of Environment Science*

# Shigella



## Introduction

*Shigella* are bacteria and causing an infectious disease called Shigellosis. *Shigella* is named after the Japanese microbiologist Kiyoshi Shiga who isolated the first member of the group in 1896 from epidemic dysentery in Japan which was then called *Shigella shiga* and is now called *S. dysenteriae*. Most who are infected with *Shigella* develop diarrhea, fever, and stomach cramps starting a day or two after they are exposed to the bacteria. Shigellosis usually resolves in 5 to 7 days. Some people who are infected may have no symptoms at all, but may still pass the *Shigella* bacteria to others. The spread of these organisms can be stopped by frequent and careful handwashing with soap and taking other hygiene measures because of being a mode of infection feco-oral route. S

*Shigellae* are short, Gram-negative rods measuring about 1-3  $\mu\text{m}$  X 0.5  $\mu\text{m}$ . They are non-motile, non-encapsulated, non-sporing, and non-acid fast. They are aerobes and facultative anaerobes and can grow on ordinary media like nutrient agar. The optimal temperature and pH for growth are 37°C and 7.4 respectively. But they can grow at a temperature range of 10 to 40°C.

## A. Habitat and Transmission

*Shigella* species are found only in the human intestinal tract. Carriers of pathogenic strains can excrete the organism up to two weeks after infection and occasionally for longer periods. They are killed by drying and are transmitted by the fecal-oral route. The highest incidence of Shigellosis occurs in areas of poor sanitation and where water supplies are polluted. Factors Contributing Spread-Spread is always from a human resource and generally involves one of the five Fs i.e. food, fingers, feces, flies, and fomites. This is in contrast to salmonellae, which are often spread to humans from infected animals.

Transmission-feco-oral transmission is the main path of *Shigella* infection. Other modes of transmission include ingestion of contaminated food or water, contact with infected objects, or sexual contact. Outbreaks of *Shigella* infection are common in places where sanitation is poor.

## B. Symptoms

Signs and symptoms of *Shigella* infection usually begin a day or two after contact with *Shigella*. But it may take up to a week to develop. Signs and symptoms may include:

- Diarrhea (often containing blood or mucus)

- Stomach pain or cramps
- Fever
- Nausea or vomiting

Symptoms generally last for about five to seven days. In some cases, symptoms may last longer. Some people have no symptoms after they've been infected with *Shigella*. However, their feces may still be contagious up to a few weeks.

### C. Causes

Infection occurs when you accidentally swallow *Shigella* bacteria. This can happen when you:

**a. Touch your mouth.** Direct person-to-person contact is the most common way the disease is spread. For example, if you don't wash your hands well after changing the diaper of a child who has *Shigella* infection, you may become infected yourself.

**b. Eat contaminated food.** Infected people who handle food can spread the bacteria to people who eat the food. Food can also become infected with *Shigella* bacteria if it grows in a field that contains sewage.

**c. Swallow contaminated water.** Water may become infected with *Shigella* bacteria either from sewage or from a person with *Shigella* infection swimming in it.

### d. Prevention

Although researchers continue to work to develop a *Shigella* vaccine, nothing is available yet. To prevent the spread of *Shigella*: Wash hands with soap and water for at least 20 seconds frequently

- Watch small children when they wash their hands.
- Throw away soiled diapers properly.
- Disinfect diaper-changing areas after use.
- Don't prepare food for others if you have diarrhea
- Keep children with diarrhea home from child care, play groups or school
- Avoid swallowing water from ponds, lakes or untreated pools

- Avoid sexual activity with anyone who has diarrhea or who recently recovered from diarrhea
- Don't go swimming until you have fully recovered.

### D. Treatment

Contact your healthcare provider if you or one of your family members have bloody diarrhea or severe stomach cramping or tenderness, especially if you also have fever or feel very sick. Tell your healthcare provider if you have other medical conditions or a weakened immune system, such as from HIV infection or chemotherapy treatment, because you may be more likely to become severely ill.

### References:

- <https://www.cdc.gov/shigella/diagnosis/treatment.html>
- <https://universe84a.com/collection/shigella/>
- <https://www.mayoclinic.org/diseases-conditions/shigella/symptoms-causes/syc-20377529>.

*Article by :*

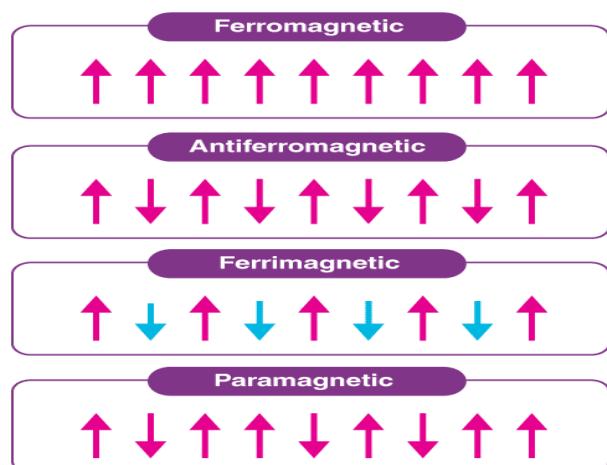
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# Ferromagnetism

We know that magnetism deals with the interaction of moving charges. The characteristic of the combined electromagnetic force is magnetism. There are five types of magnetism; they are Diamagnetism, Paramagnetism, Ferromagnetism, Anti-ferromagnetism and Ferrimagnetism. In this article let us discuss ferromagnetism in detail.

## What is Ferromagnetism?

Ferromagnetism is a physical phenomenon (long-range ordering), in which certain materials like iron



strongly attract each other. Ferromagnets occur in rare earth materials and gadolinium. It is one of the common phenomena that is encountered in life that is responsible for magnetism in magnets.

One of the vital requirements of ferromagnetic material is that ions and atoms should possess permanent magnetic moments. Some ions and atoms consist of the permanent magnetic moment that may be considered as a dipole that comprises a north pole separated from a south pole.

Some degree of dipole alignment can be witnessed if there existed a large atomic magnetic moment. This type of magnetic arrangement can be found in some elements such as iron, cobalt, nickel, and their alloys.

Spontaneous Magnetization (Curie Temperature In K)	Ferromagnetic Materials
69	EuO
292	Gd
88	Dy
1043	Fe
1400	Co
587	MnSb
318	MnAs
627	Ni

## What is ferromagnetic material?

Beneath is a table that states ferromagnetic materials and compounds that exhibit spontaneous magnetization. Haussler alloy is a ferromagnetic metal alloy wherein its constitutions itself is not ferromagnetic whereas stainless steel is a non-magnetic alloy that is completely comprised of ferromagnetic materials. Non-crystalline ferromagnetic materials are made by expeditious cooling of the liquid. They possess very low hysteresis loss, high electrical resistivity, low coercively, and high permeability

## What is Antiferromagnetic?

Some antiferromagnetic includes ferrous oxide, nickel oxide, chromium, and manganese fluoride. In antiferromagnetic, the forces between the adjacent atomic dipoles tend to

possess signs opposite to that of ferromagnetism. Beneath is a table that provides a *Neel temperature of the antiferromagnetic substance*.

### **What causes Ferromagnetism?**

Ferromagnetism is caused in ferromagnets and the ferromagnets need to have net angular momentum which is obtained either through the orbital component of the spin component.

### **What are the Applications of Ferromagnetism?**

- The applications of a ferromagnetic substance are comprehensive. The hysteresis curve plays a vital role and it's of great importance.
- Ferromagnetism has its applications in transformers, electromagnets, and magnetic tape recording.

*Article by:*

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# Pistol shrimp (Alpheus Randalli)

<b>Kingdom</b>	:	Animalia
<b>Phylum</b>	:	Arthropoda
<b>Subphylum</b>	:	Crustacea
<b>Class</b>	:	Malacostraca
<b>Order</b>	:	Decapoda
<b>Family</b>	:	Alpheidae
<b>Genus</b>	:	Alpheus
<b>Species</b>	:	Randalli



## Information:

Pistol shrimp, also known as snapping shrimp. They are a crustacean and belongs to family Alpheidae. Their two front claws are different sizes, with one being notably larger than the other. There are hundreds of species found all over the world, but most species are found in reefs and seagrass beds in temperate and tropical regions. They're not very big, only reaching a few inches in size, but their large claws can grow to half its body length.

This large claw holds the pistol shrimp's superpower. When a pistol shrimp senses prey is nearby, it will open the top part of its big claw, allowing some water to enter a small chamber in the crook of the claw. Then, when it clamps down, the pressure from a small plunger on the top claw forces the water out of the chamber. This happens so fast that it creates bubbles. And not just any bubbles: these bubbles can speed out at 60 miles per hour, fast enough to stun or kill the prey! When the bubbles pop, it makes a "snap" sound that gives these shrimp their name.

The bubbles are loud. The snap of one recently-discovered species of pistol shrimp called *Synalpheus pinkfloydi* (named after something else that is also loud and very cool: Pink Floyd) can reach 210 decibels. That is louder than an actual gunshot, which is around 140 – 175 decibels. You can hear them for yourself by sticking your head below the water on a reef and listening for the "snap snap snap."

The pistol shrimp's mighty snap comes in handy for more than just lunch. Its powerful claw can deter predators or other competitors looking to take over the shrimp's burrow.

## Reference:

<https://oceanconservancy.org/blog/2020/09/10/pistol-shrimp/>

*Article by  
Mr. Sujit Ramesh Temkar  
Department Zoology*

