

**NO ANIMALS
WERE HARMED
DURING THE
MAKING OF THIS
PRESENTATION!**



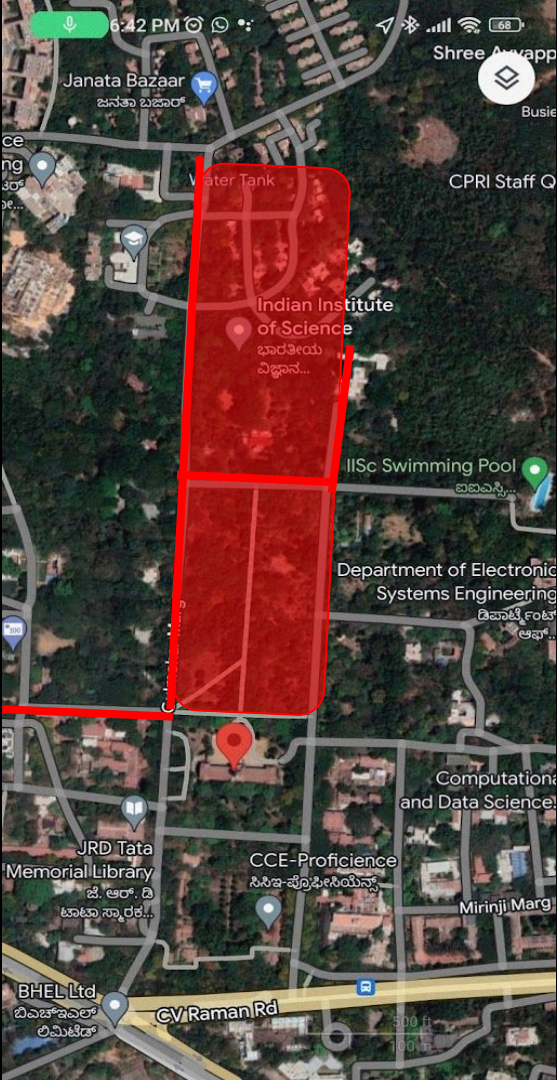
pūrṇapramati
A Center for Integrated Learning

Millipedes



BY

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DETAILS OF THE STUDY AREA

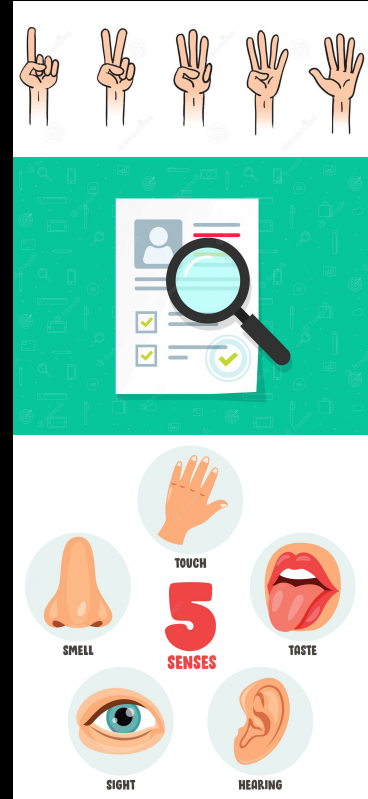
Date	16th - 23rd October, 2022
Duration	1.00 PM - 3.00 PM
Sites	IISc main lawns, Gulmohar marg, Mandhara marg, Tala marg, Amra marg
GPS coordinates	13.0219° N, 77.5671° E
Perimetre	2000m
Area	1,60,000m ²



OBJECTIVES

Utter fascination at sighting Millipedes in IISc spurred our curiosity to -

- ❑ Count the **number of legs** a Millipede has.
- ❑ Know how Millipedes protect themselves (**defence**).
- ❑ Understand which **sense organs** they use the most.
- ❑ Compare our observations with other published articles.



TOOLS THAT WE UTILISED



Materials brought from home

1. Scale
2. Ice cream stick
3. Gloves
4. Phone camera
5. Cotton
6. Toothpicks



Materials available on field

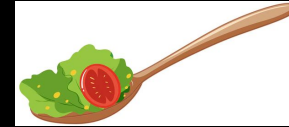
1. Fountain tree flower
2. Green and white leaves
3. Pale pink berry
4. Dry leaves

METHOD OF RESEARCH

We followed **random sampling** to pick four sites in the demarcated area.



- ★ **Observations:** with camera, photos, videos.
- ★ **Measurements:** with ruler.
- ★ **Handling** of dead Millipede: with toothpicks and stick.



Stimuli check:

- ★ Touch
- ★ Gentle prods
- ★ Placing on palms
- ★ Trying to feed it
- ★ Checking if its attracted to flowers.



SCIENTIFIC CLASSIFICATION



Common name	Giant Indian Millipede
Species	<i>Spinotarsus colosseus</i>
Kingdom	Animalia
Phylum	Arthropoda
Subphylum	Myriapoda
Class	Diplopoda
Order	Spirostreptida
Family	Odontopygidae
Genus	<i>Spinotarsus</i>

ORANGE, RED AND BROWN ARE THE MILLIPEDE'S CROWN



Giant Indian Millipede

THE DEFENCE



- ❑ It tucks its head in the centre.
- ❑ It protects its soft undersides.
- ❑ It curls into a spiral.

MILLIPEDES HAVE HIGHLY DEVELOPED SENSORY ORGANS BASED ON TOUCH



Antenna

The two sub-structures in front of the Millipede are **antennae**.

The Antenna are used to scan its surroundings by touch, to send sensory messages regarding touch, pain, temperature, vibrations etc.

How To COUNT THE NUMBER OF LEGS?



COUNT THE NUMBER OF LEGS



- ★ Each black ring has four legs.
- ★ Two on one side, two on the other side.
- ★ number of legs = number of segments \times 4

COUNT THE NUMBER OF BLACK RINGS



52 segments

$$52 \times 4 = 208$$

This millipede
has 208 legs.

A MILLIPEDE MEASURES 9 TO 12 CM

Length of 3 specimens
studied

Millipede 1: 11 cm

Millipede 2: 12cm

Millipede 3: 9cm

Average length: 10.66cm



THE METACHRONAL MOVEMENT OF ITS LEGS





DO MILLIPEDES FEEL PAIN?

After a car crushed the millipede, it started to move.

It had white blood, and a cold-blooded creature.

It is inconclusive about pain response.

More study needs to be done to be able to draw conclusions.

PREFERS SHADE



Millipede liked shade and fragrance that the flower provided.

MILLIPEDES ARE CHOOSY ABOUT FOOD



MILLIPEDES ARE DETRITIVORES

CONSUMERS OF DEAD ORGANIC MATERIAL, MAINLY OF PLANTS



MILLPEDES MATING



INTERACTION OF MILLIPEDES



TOP VIEW OF MILLIPEDE MOVEMENT



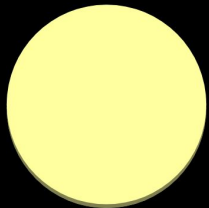
SECRETION OF A YELLOW LIQUID

The Millipede coiled into a spiral, in its defence when put on a gloved hand.

We saw a **lemon yellow** stain on the glove.

This yellow secretion is made up of toxic acids and hydrogen cyanide - referenced from an article [1].

Lemon Yellow





EXCRETION IN MILLIPEDES

- ❖ We observed Millipede faeces.
- ❖ It came out from the spine-like anus.



GROWTH OF LEGS

- ❖ We saw the growth spurt of new legs.
- ❖ Hence concluded, Millipedes add legs as they grow older.

Anus

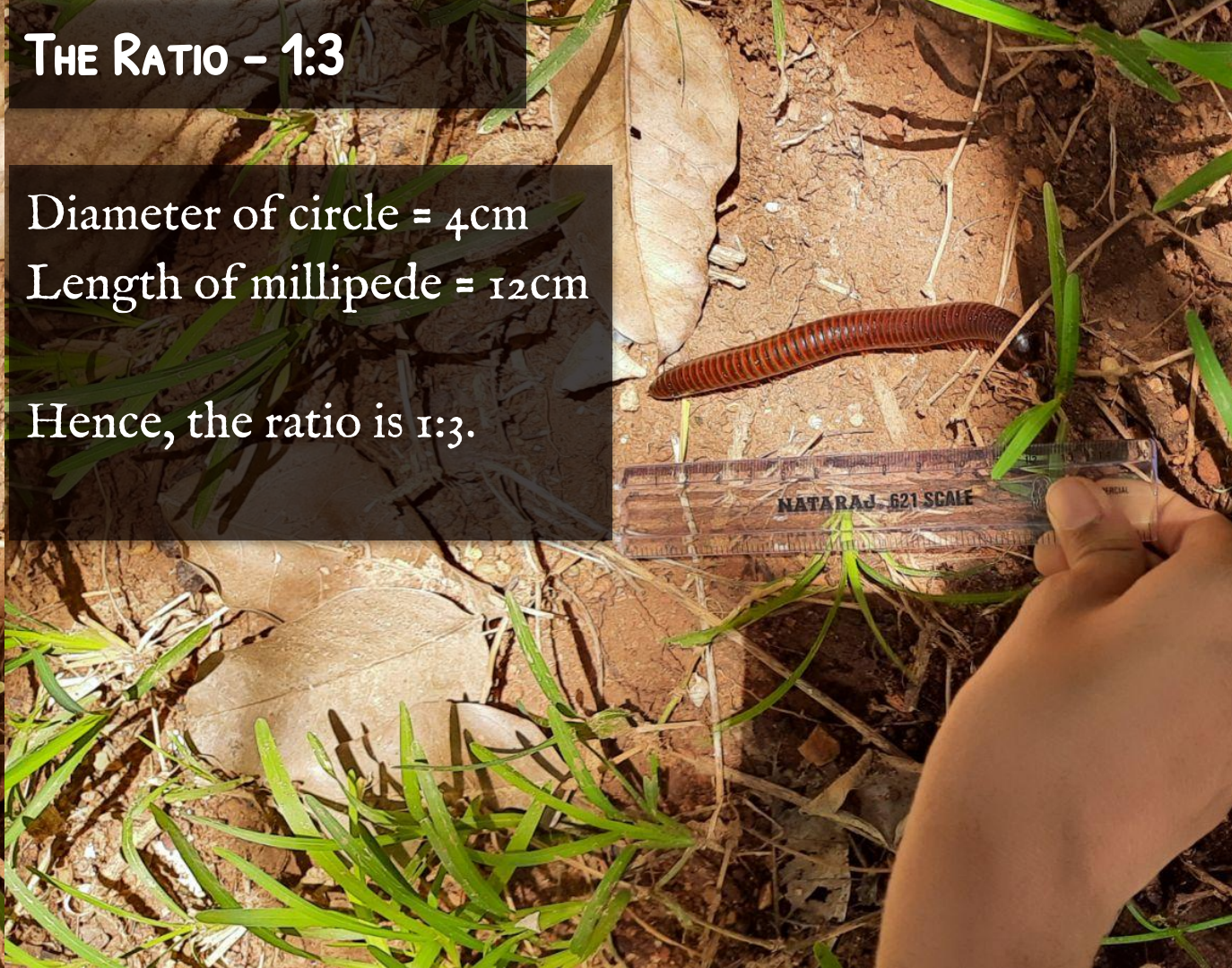
New legs growing

THE RATIO - 1:3

Diameter of circle = 4cm

Length of millipede = 12cm

Hence, the ratio is 1:3.



A MILLIPEDE EXOSKELETON

- This is a **naturally dead** specimen.
- The innards had been eaten by germs.
- The white blood had begun to turn grey.
- The legs and the exoskeleton remained.



SUMMARY

Creature	Giant Indian Millipede
Coloration	Orange Legs, Red-and-Brown Stripes
Exoskeleton texture	Soft, Moist, Smooth, Pulpy
Most dependent sense organ	Antennae
Most used sense	Touch
Number of legs in 1 adult	208
Defence mechanism	Exoskeleton, Coiling, Toxin
Length	9-12 cm

VERIFIED OBSERVATIONS ABOUT MILLPEDES

- ❑ They are mostly dependent on their **antennae**.
- ❑ Each **black ring has four legs** each.
- ❑ They have **white coloured blood**.
- ❑ They are **cold-blooded**.
- ❑ The **mating** of millipedes.
- ❑ They produce a yellow-coloured **toxin**.
- ❑ They **add legs** as they grow older.

IMPORTANT AND VERIFIED OBSERVATIONS

- ❑ When Millipedes walk, four legs on the left side and four legs on the right side move in a Metachronal motion.
- ❑ They only consume dead and decaying organisms like dead moss, and avoid green leaves or ripe berries, hence are *Detritivores*.

THE ECOLOGICAL IMPORTANCE:

MILLIPEDES CONTRIBUTE TO
THE BREAKDOWN OF PLANT
DETRITUS.

NEW OBSERVATIONS!

- ❑ Only adult Millipedes were found on the surface.
- ❑ Young millipedes may be found in burrows.
- ❑ Only legs and exoskeleton remained in a naturally dead specimen.
- ❑ They are attracted by fragrant flowers when they are kept 5cm away.
- ❑ Interaction of Millipedes with other Millipedes (other than mating).

NEW OBSERVATIONS!

- ❑ The ratio of the diameter and length of millipede is 1:3.
- ❑ When their head was present, but when their body was damaged, they were alive!
- ❑ When the head was absent, and the body was intact, they were dead.
- ❑ Therefore, Millipede's head is the most vital organ of their body.

FURTHER GOALS

We want to continue this knowledge quest by researching about,

- ❑ The Millipede's burrow.
- ❑ Counting the legs of more adult Millipedes.
- ❑ The genders of the Millipedes.
- ❑ Diet and sleep patterns of Millipedes.
- ❑ Ratio of diameter to length of more Millipede specimens.
- ❑ Average distance travelled by a Millipede in an hour.

MILLPEDE BURROW



(where the young ones
might be present)

REFERENCES

- ❑ <https://www.mountsinai.org/health-library/poison/millipede-toxin> to research on Millipede toxin (the yellow liquid)
- ❑ <https://www.millibase.org/aphia.php?p=taxdetails&id=947268> for finding out about the scientific classification
- ❑ <https://www.orkin.com/pests/millipedes/what-do-millipedes-eat> for knowing what Millipedes consume
- ❑ <https://www.youtube.com/watch?v=mVL1qOTDakE> to verify that the millipedes were mating
- ❑ <https://www.sciencedirect.com/science/article/pii/S0042698919301725> for researching about millipede eyesight
- ❑ <https://uwm.edu/field-station/millipede/> for knowing if millipedes are cold-blooded.

ACKNOWLEDGEMENTS

We are very grateful to ...

- ★ **Vidya S Murthy** for some of the photography, videography and guidance.
- ★ **Raghuram anna** for invaluable feedback.
- ★ **Vrijulal anna** for points on how to improve and make it formal.
- ★ **IISc** for providing a chance for **finding out something by yourself**, instead of browsing. It was an unforgettable time.

THE TEAM

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Shreya Sandur

Meenakshee Shyam



We enjoyed
learning about
Millipedes a lot.
We hope you did
too.

Thank you!