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PHOTOTAXIS RESPONSE OF SOME ZOOPLANKTON

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ABSTRACT

The impact of light on movement response of some zooplanktons was observed with a light experiment spanning different wavelengths of lights pertaining to VIBGYOR, UV, Laser, White and Dark. Certain zooplanktons exhibited positive phototaxis to Red light (gastropod and medusa larvaes), Laser light (nauplii and brachiolaria larvaes), Yellow light (bipinnaria larvae), Blue, Orange, White and in absence of light (a species of cladoceran). Zooplanktons were found to be absent (in surface water) under UV, Violet, Indigo and Green light sources. Results of this study imply that for behavioural (phototaxis) studies and collection of zooplanktons, this method could be employed.

KEYWORDS: Light, phototaxis, zooplankton.

INTRODUCTION

Light is the major factor whereby the upward and downward movement (diurnal migration pattern) of zooplankton are triggered by different wavelengths of lights[1]. Studies on phototaxis response of various zooplankton to the light wavelengths have been delineated that wavelengths of red and yellow lights are a sign for abundance of zooplankton[1], while some wavelengths of lights are pertained as a lure referring positive phototaxis response[2], or as repeller referring negative phototaxis response[3]. Colour vision in marine invertebrates is not well known and also it is found to be absent in marine invertebrate groups, except for stomatopod crustaceans[4].

Thus, a simple experiment was carried out to discern phototaxis response of different wavelengths of light on some zooplanktons.

MATERIALS & METHODS

The light experiment illustration comprises of PVC pipes of 110 mm dia and 30 cm height, covering their top ends with lids with15 volt Philips colour light bulbs. The distance from surface water to light source was maintained at 16 cm. The various light sources used in this study were VIBGYOR colours (15w), UV, Laser (4w), white light and Dark (Fig. 1).

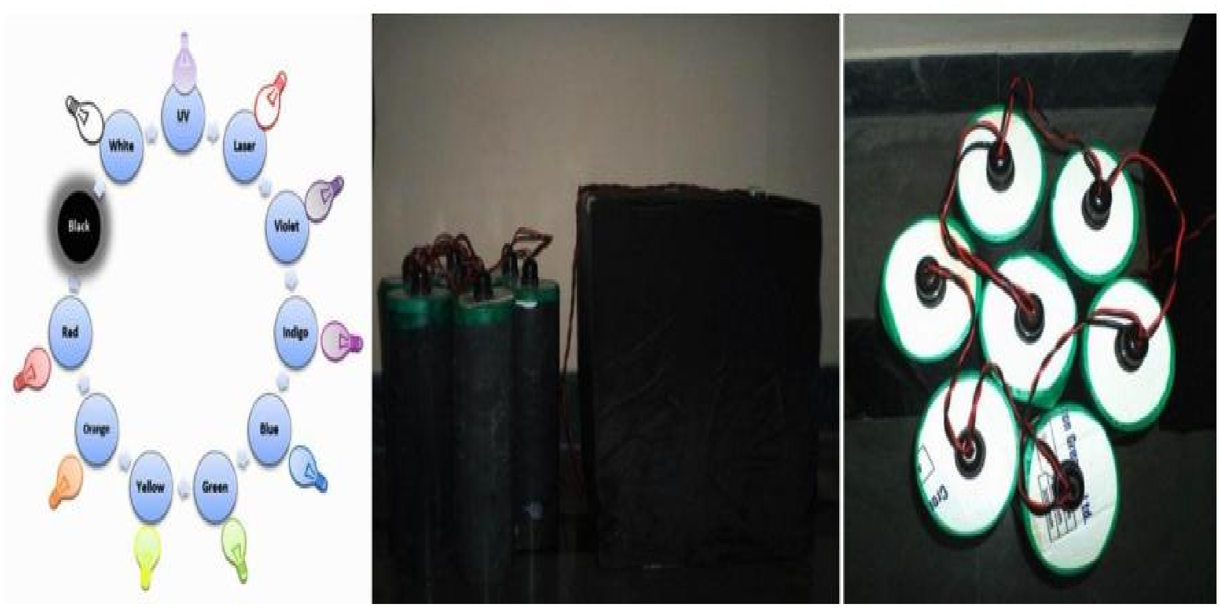

FIGURE 1: Delineating the light experiment with VIBGYOR colours, UV, Laser, White and Dark (left); lateral view of light model (middle); top view (right).

1000 ml of seawater sample was collected during night time from a depth of 0.5 meter in Junglighat jetty area, Lat 11^{0}39’25’’N; Long 92^{0}43’30.05’’E (Fig 2). Sample comprised with different zooplankton (nauplii larvae, brachiolaria larvae, gastropod larvae, medusa larvae, bipinnaria larvae and cladoceran species) was transferred into 1000 ml glass beaker and then it was exposed to UV light, Laser light, VIBGYOR (Violet, Indigo, Blue, Green, Yellow, Orange and Red), White and in the darkness (placed in a dark room) respectively. Sample was exposed for 30 minutes to each light source, without any external light effect on the sample. Soon after exposure time, randomly 1 ml of surface water was collected carefully and observed under the microscope. The observed samples were then fixed in 5% formalin and once again observed for reconfirmation of earlier observations.

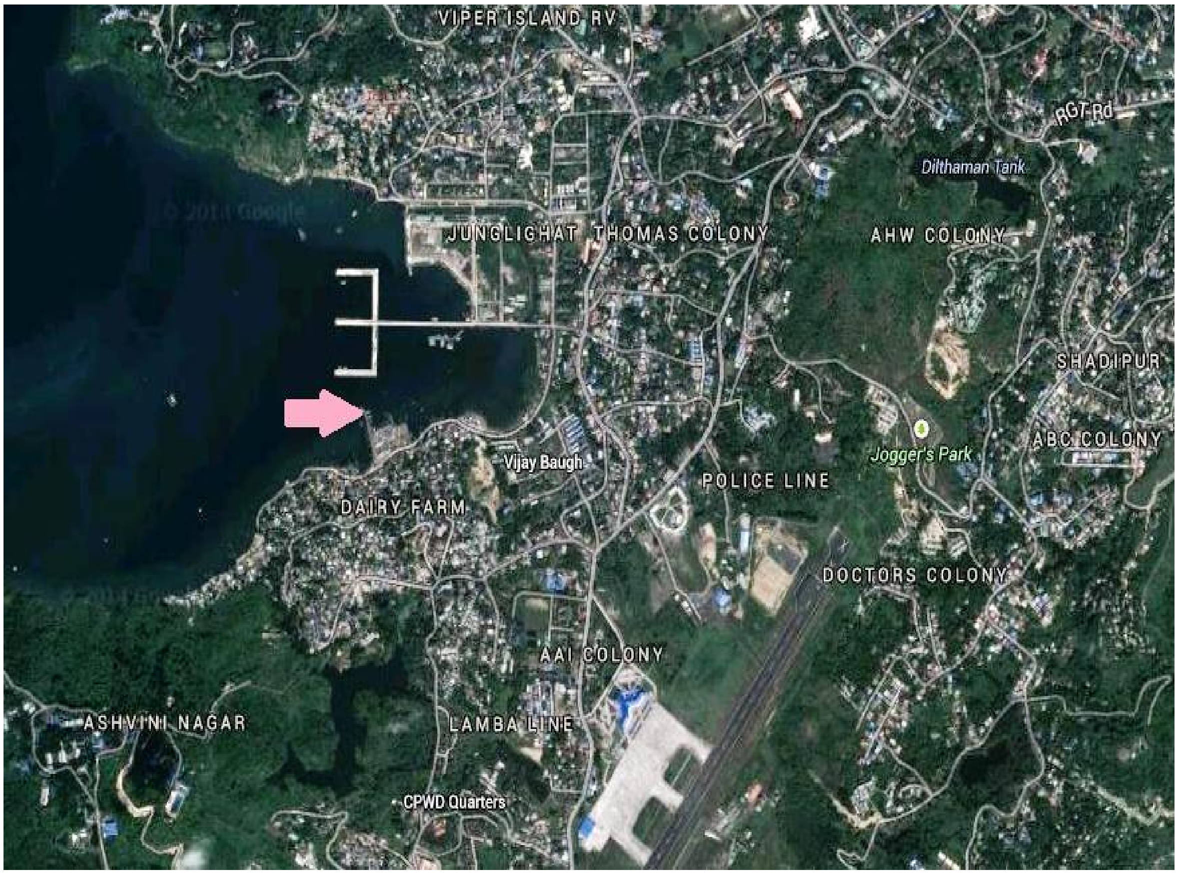

FIGURE 2. Arrow mark showing the station Junglighat jetty area (image taken from Google maps).

RESULTS

It was noticed that under UV, Violet, Indigo and Green lights zooplanktons tend to move away from the surface to the bottom region to avoid these lights. Whereas, positive phototaxis response was observed under Red light (gastropod and medusa larvaes), Laser light (nauplii and brachiolaria larvaes), Yellow light (bipinnaria larvae), Orange, White, Blue and in the dark (cladoceran species).

DISCUSSION

Colour vision in certain zooplanktons provides the information to imagine how zooplanktons are able to distinguish light wavelengths. Recently a study delineated that hungry animal’s response quickly to light, while diapausing animals avoid light, and also found that red and yellow lights are indicators for the abundance of zooplankton[1]. While other lights like menace UV light deduced to cause stress on zooplanktons pertaining some cladoceran species which obviate UV light[3], and the same phenomenon was also observed in the present study. A weak blue light pertained to act as a lure for certain crustaceans[2], and the same effect was also found in this study by noticing a cladoceran species. Laser light is an important light beam source in laser optical plankton counter (LOPC) that is used to detect shape profiles of different planktons[5], conversely the effect of laser light on zooplanktons movement is not well known. In this study, in the presence of laser light nauplii and brachiolaria larvaes were noticed. However, colour vision whereby positive and negative phototaxis responses controlled is still unknown to other zooplanktons like gastropod larvae, medusa larvae and bipinnaria larvae, that whether these zooplanktons show positive phototaxis due to hungriness or other chemical compound signals activated by any particular wavelength of light. Markert *et al*. (1961)[6] recorded that in a light source as an attractant may yield a particular sex of polychaetes. We postulate that these zooplanktons may probably have light sensitive pigments or compounds which make them sensitive to light wavelengths. Substantially a study suggested that coincident of these movements perhaps due to possible existence of endogenous rhythms[7]. Therefore, further detailed studies are required to understand the range of effect of different wavelengths of lights on different zooplanktons. While, this experiment has been applied to study the impact of light on luminous bacteria[8], and similarly it is also be implied for other fields such as entomology to understand their behavioural patterns.

ACKNOWLEDGEMENTS

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