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**Short note**

# First generic record of aero–terrestrial algae: *Apatococcus lobatus* (Chodat) J. B. Petersen for algal flora of Nepal

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Aero–terrestrial green microalgae grow as epiphytic or as epilethic on natural surfaces such as tree bark, soil and rock (Ettl & Gärtner, 1995). This organism also causes developmental attachment, in cities, on artificial surfaces such as tiles, concrete, building facades and other artificial surfaces causing incrustations (Tomaselli *et al*., 2000). Aero–terrestrial habitats are characterized by a wide range of temperature and availability of solar radiation and water. Algae growth occurs with the availability of moisture from the deposition of dust between the erosion of metal and the passage of time by chemical erosion, and the presence is driven by rain and atmospheric moisture (Das & Gupta, 2015).

The genus *Apatococcus* F. Brand belongs to the phylum 'Chlorophyta' and Order 'Chlorellales' in the family 'Chlorellaceae'. It is cosmopolitan, and is composed of globular cells which, in most cases, divide into two or three planes, and form irregular, cubic packets, sometimes forming short uniseriate i.e. arranged in a single row, layer, or series of filaments. The cells are uninucleate, often lobed, parietal chloroplast without pyrenoids. The genus *Apatococcus* consists of 5 species viz. *A. constipates* Printz, *A. fuscideae* Beck & Zahradnikova, *A. lobatus* (Chodat) J.B.Petersen, *A. minor* Edlich, and *A. vulgaris* (Guiry & Guiry, 2021) including *A. lobatus* as holotype of the genus.

*A. lobatus* has been recorded in Austria, Great Britain, Czech Republic, France, Italy, Germany, Netherlands, Romania, Spain, and Ukraine of Europe, Japan (Asia), Queensland (Australia), New Zealand, and Pacific Islands (Guiry & Guiry, 2021). In India, it was found to have occurred in the iron pole in the AJC Bose Indian Botanic Garden, Howrah (Das & Gupta, 2015); they observed that the occurrence of *A. lobatus* was inversely proportional to the availability of the sun, possibly due to dependency on the atmospheric moisture.

In our study, *A. lobatus* was found to be growing on the painted iron poles (situated at the elevation of 1505 m between 27.5970° N–27.5971° N latitudes and 85.3074° E–85.3809° E longitudes in the Fern Garden within the National Botanical Garden of Godawari, Lalitpur, Nepal. The species has been neither included in the checklist of the algal flora of Nepal (Prasad, 2011) nor mentioned in the recent publication of Rai & Ghimire (2020). Likewise, Joshi (1977; 1979), Prasad & Prasad (2001), and (Dhakal *et al*. 2021), who have carried out the studies on the algal flora of the Godawari area of Lalitpur district, have also not mentioned the present genus. So, we confirmed this genus to be the new one in the list of algal flora of Nepal.

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## Materials and methods

### Study area

The study was conducted within the National Botanical Garden (NBG) of Godawari which is situated at the foothills of Phulchoki mountain of Lalitpur district of Nepal. Geographically, this garden is located between 27.5985°–27.5946° N latitudes and 85.3770°–85.3881° E longitudes at an altitude of 1,480–1,520 m above the mean sea level (Figure 1). The study sites exhibit subtropical type of climate. The average annual temperature as recorded in 2020 was 15.9 °C with the averages of 20.3 °C in June and 9.1 °C in January, respectively, and the average annual rainfall of 2,595 mm (Climate–data.org, 2020). The study was conducted in August, 2021.

**Collection and identification of the algal samples**

The samples were collected from the painted iron surfaces in the fern garden within the NBG. The algae were scrapped using toothbrush. The samples were brought to the Cryptogams Section of the National Herbarium and Plant Laboratories at Godawari (Lalitpur district) where they were preserved in 4% formalin. Their microscopic study was performed using a Huma Scope LED Microscope with 10 MP Camera Adaptor.

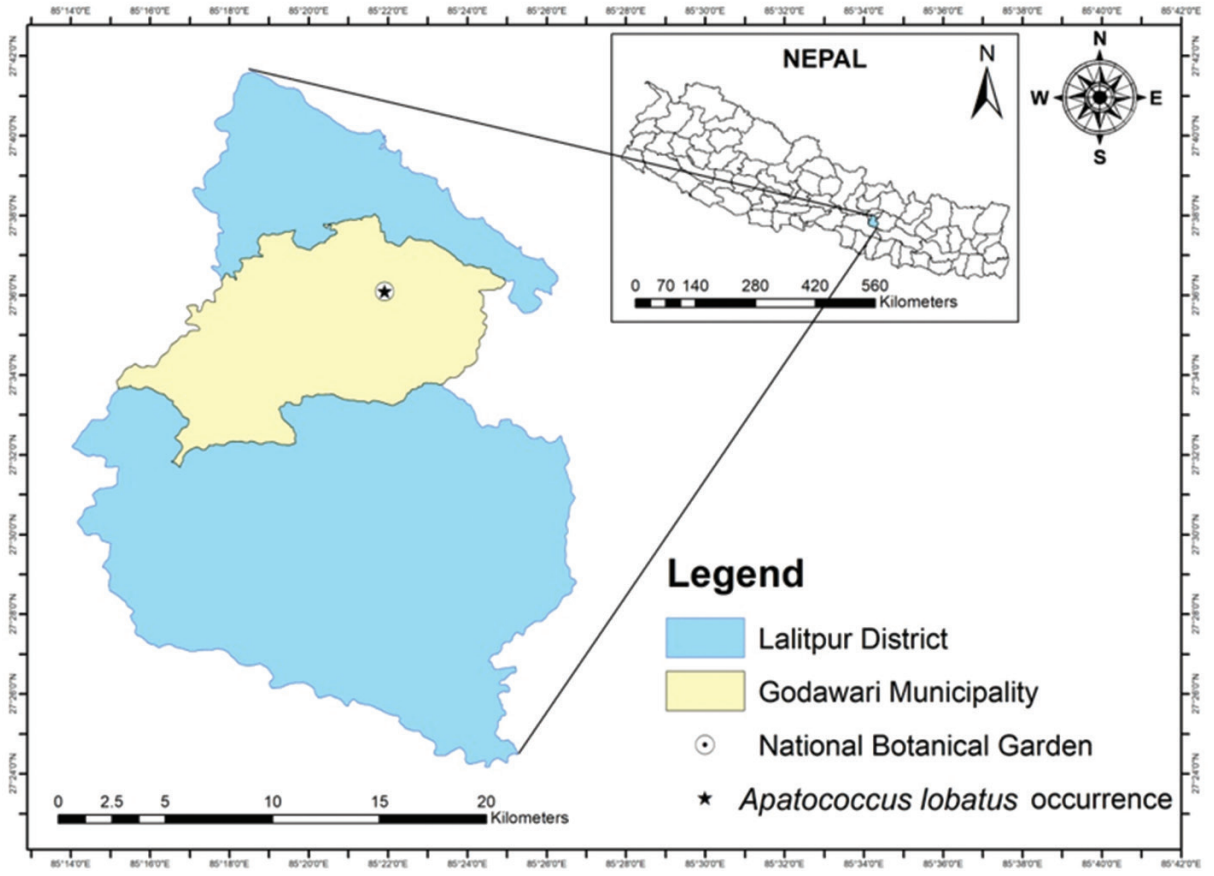


**Figure 1: Map showing the occurrence of *A. lobatus* (Chodat) J. B. Petersen in the study area (NBG, Godawari)**


**Fig. 2 (A): Growth of *A. lobatus* on painted iron pole; and (B): Collection of algal sample in a bottle using a toothbrush**

## Results

***Taxonomic treatment:*** The taxonomic treatment of Petersen (1928) was followed while confirming the samples of *A. lobatus* in the Laboratory.

***Basionym:*** *Pleurococcus lobatus* Chodat (1902).

The cells of this species were found to be spherical to slightly irregular in shape; the mature ones being in the group of 2–4 in number divided in both horizontal and vertical directions; cell–diameter being 3.7–7.2 µm; chloroplast parietal, and pyrenoid inconspicuous (Figure 3).

***Collectors of samples:*** The samples were collected by S. Dhakal and R. Tamang of the NBG.

***Date of collection:*** 10th August, 2021.

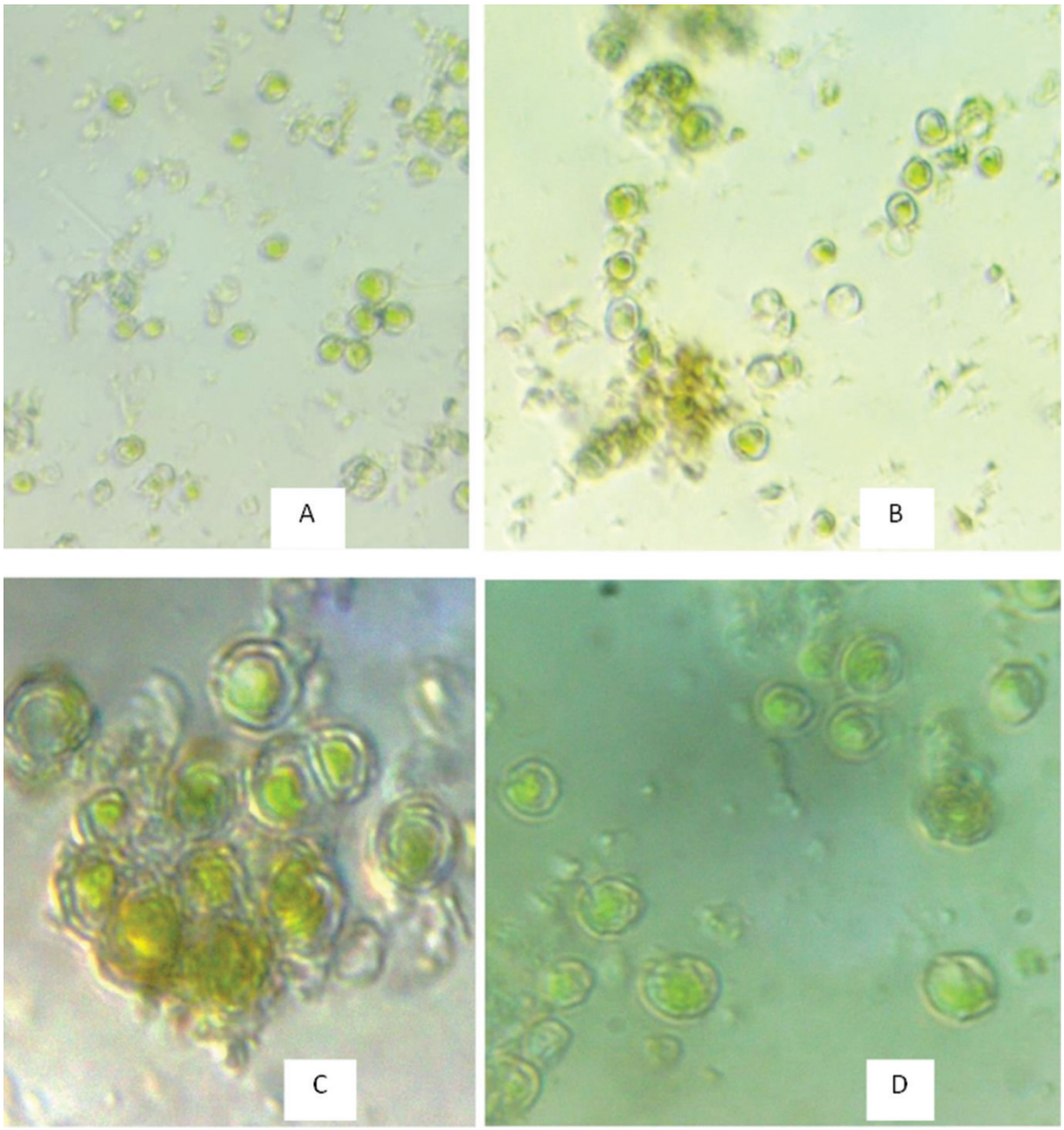


**Figure 3 (A–C): Cell morphology and colony formation of *A. lobatus*; (D): Cells representing parietal chloroplast**.

## Discussion

The finding of the genus *Apatococcus* as new record in National Botanical Garden area; one of the most familiar and important scientific research centers of department of Plant Resources reveals that we need to do more exploration regarding the algal flora of Nepal and young researchers are needed to be a focus for future algal survey.

## Conclusion

*A. lobatus* (Chodat) J. B. Petersen found in the NBG of Godawari (Lalitpur district) was detected as a new generic record for algal flora of Nepal.

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