

## New species of Dinophyceae from Indian waters.

### I. The genera *Haplodinium* Klebs emend. Subrahmanyam and *Mesoporos* Lillick\*

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In an earlier paper on the phytoplankton organisms of the west coast of India, mention was made of several new taxa (Subrahmanyam, 1958). It is well known that even the finest bolting silk net does not retain all the organisms in the water and quite a lot—the nanoplankton—escape through the meshes. Such organisms amount to as much as 50 per cent of the total quantity of phytoplankters and are of great importance in the economy of the waters (Subrahmanyam and Sarma, 1966). In the present account, four new species belonging to this nanoplankton category are described, three of the genus *Haplodinium* Klebs emend. Subrahmanyam and one of the genus *Mesoporos* Lillick; so far, only one species of the former is known from Java; of the latter, only five species, all from Europe (Schiller, 1933-38 and others under references).

As the generic diagnosis of *Haplodinium* was based on only for one species known till now, this has been amended to include the species recorded from India.

I have great pleasure in dedicating this account to the late Prof. M. O. Parthasarathy Iyengar, my teacher. Two of the new species are named after him, viz., *Haplodinium iyengaricum* and *Mesoporos parthasarathicus*; one species of *Haplodinium*, *H. jonesicum* is named after Dr. S. Jones, Director, Central Marine Fisheries Research Institute, whose interest and encouragement in these investigations is also gratefully acknowledged. I am deeply indebted to Rev. Fr. H. Santapau for the latin diagnoses of the genus and species included here. I thank Mr. N. K. Prasad for carefully finishing figures 1, 2, and 3.

#### Genus *Haplodinium* Klebs

Till now only one species, *H. antjoliense* Klebs is known. In view of the finding of three new species which have all the characteristics of the genus but differ considerably to justify creation of the new species, the diagnosis for the genus is amended to receive the new species also.

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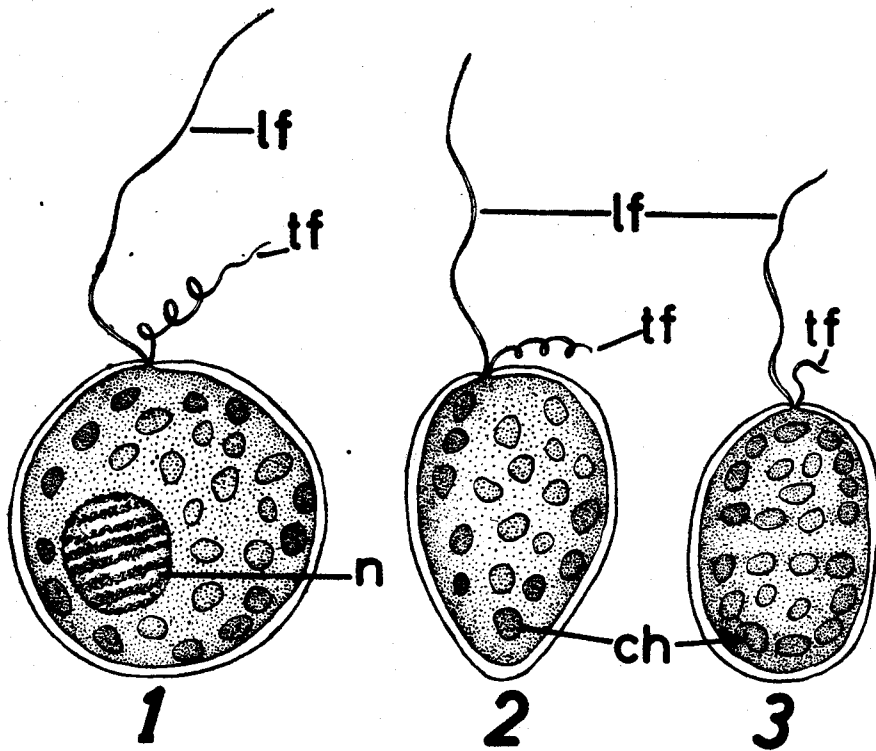


Fig. 1. *Haplodinium iyengaricum* Subrahmanyam  $\times 2500$ ; 2. *H. indicum* Subrahmanyam  $\times 1500$ ; 3. *H. jonesicum* Subrahmanyam  $\times 1500$ . *n*=nucleus; *tf*=transverse flagellum; *lf*=longitudinal flagellum; and *ch*=chromatophore.

### Genus **Haplodinium** Klebs 1912 emend. Subrahmanyam

Unicellular, body globular, broadly egg-shaped; in some instances laterally compressed when broad view almost rectangular with rounded corners. Cell wall firm, compact, smooth, made of cellulose-like substance. Two flagella at the anterior end; one long, directed forwards, the longitudinal flagellum, often longer or equal to body length, inserted slightly ahead of the transverse flagellum. The latter vibrates perpendicular to the former, and often twisted like a screw. Chromatophores two, plate-like, or a number of discs, disposed peripherally, yellowish brown in colour. At the anterior end, often one vacuole present which may pulsate. Nucleus characteristically peridinean, at the centre or somewhat posteriorly placed. In brackish and marine waters. Type species, *H. antjoliense* Klebs recorded from brackish water in Java.

### **Haplodinium** Klebs emend. Subrahmanyam

Corpus unicellulare, globosum, late ovatum, interdum lateraliter compressum, aspectu lato fere rectangulare, angulis rotundis. Cellularum

parietes firmi, compacti, leves, constantes e materia simili cellulosa. Flagella bina ad apicem anteriorem, quorum unum longum et in frontem directum, flagellum longitudinale, saepe longius corpore vel aequilongum, insitum paulo anteriore flagello transverso. Hoc ultimum vibrat perpendiculariter ad aliud et saepe curvatur spiraliter. Chromatophora bina, laminata, vel disci plures peripheraliter dispositi, luteolo-brunnei. Ad apicem anteriorem saepe vacuolum adest, quod pulsare potest. Nucleus typice, peridineus, ad centrum vel aliquanto posterius positus. In aquis salinis et marinis. Species typica *H. antjoliense* Klebs ex insula Java.

The type species possesses two plate-like chromatophores; all the new species described here have several small discoid chromatophores and differ from each other in size and shape.

**Haplodinium iyengaricum** Subrahmanyam sp. nov. (Fig. 1)

Cells almost globular, cell wall firm, smooth. Two flagella at the anterior end; longitudinal one equal to body length or a little longer. Transverse flagellum twisted, directed away from the former, rarely found directed in the same axis as former. Chromatophores several, discoid, yellowish brown. Vacuole at the anterior end not always evident. Nucleus large, peridinean, placed more posteriorly in the body. Size of cells: long axis 18.5 to 20.7  $\mu$ ; across 17 to 20  $\mu$ . In the inshore waters off Calicut on the west coast of India. Common during July, first recorded in July 1951.

**Haplodinium iyengaricum** sp. nov.

Cellulae fere globulares, parietibus firmis levibus. Flagella bina ad apicem anteriorem; longitudinale quidem aequae longum ac corpus vel paulo longius; transversum vero curvatum, directum procul ab alio, rarius directum in eundem axim ac aliud. Chromatophora plura, discoidea, luteolo-brunnea. Vacuolum ad partem anteriorem, nec semper evidens. Nucleus magnus, peridineus, situs posterior in corpore. Cellulae: axis longus 18.5–20.7  $\mu$ ; diam. 17–20  $\mu$ . In aquis marinis ad Calicut ad oras occidentales Indiae. Frequens mense julio, primo notatum julio 1951.

**Haplodinium indicum** Subrahmanyam sp. nov. (Fig. 2)

Cells somewhat pear-shaped, narrowed end posterior. Wall firm. Anterior end flattened, posterior tapers to a blunt end. Cross-section round. Longitudinal flagellum slightly longer than body; transverse twisted and directed away from the former. Chromatophores many discs, yellowish brown. Vacuole seen at the anterior end at times. Characteristic peridinean nucleus at the centre. Length 39  $\mu$ , breadth 27.3  $\mu$ . In the sea off Calicut on the west coast of India. Occurs during September, first recorded in 1951.

**Haplodinium indicum** sp. nov.

Cellulae pyriformes, angustiores ad apicem posteriorem. Parietes firmi. Apex anterior companatus, posterior fastigatus in apicem hebetem. Sectio transversa companata. Flagellum longitudinale paulo longius corpore; transversum curvatum et directum procul ab alio. Chromatophora plura discoidea, luteolo-brunnea. Vacuolum notatum nonnumquam ad apicem anteriorum. Nucleus typice peridineus in centro. Long 39  $\mu$ , latit. 27.3  $\mu$ . In mare prope Calicut ad oras occidentales Indiae. Adest mense septembri, primo notatum 1951.

**Haplodinium jonesicum** Subramanyan sp. nov. (Fig. 3)

Cell body firm, slightly laterally compressed; viewed at from the flat side, sides almost straight with extremities flatly rounded. Longitudinal flagellum almost as long as the body of cell; transverse flagellum short, twisted. Chromatophores many discs, yellowish brown, peripherally disposed. Nucleus not seen due to denseness of chromatophores. Vacuole not evident. Length 29.7  $\mu$ , breadth (broad view) 18  $\mu$ . In the sea off Calicut on the west coast of India. Common in July.

**Haplodinium jonesicum** sp. nov.

Corpus cellularum firmum, paulum lateraliter compressum; aspectu e latere plano, latera fere recta apicibus complanate rotundatis. Flagellum longitudinale fere aequae longum ac corpus cellulae; transversum breve, curvatum. Chromatophora plura discoidea, luteolo-brunnea, peripheraliter disposita. Nucleus haud visus ob densum chromatophorum. Vacuolum haud evidens. Long 29.7  $\mu$ , latit. (aspecto lato) 18  $\mu$ . In mare prope Calicut ad oras occidentales Indiae. Frequens mense julio.

In the specimen figured, chromatophores are seen oriented in two groups, probably cell in the process of division (transverse ?).

Genus **Mesoporos** Lillick (= **Porella** Schiller)

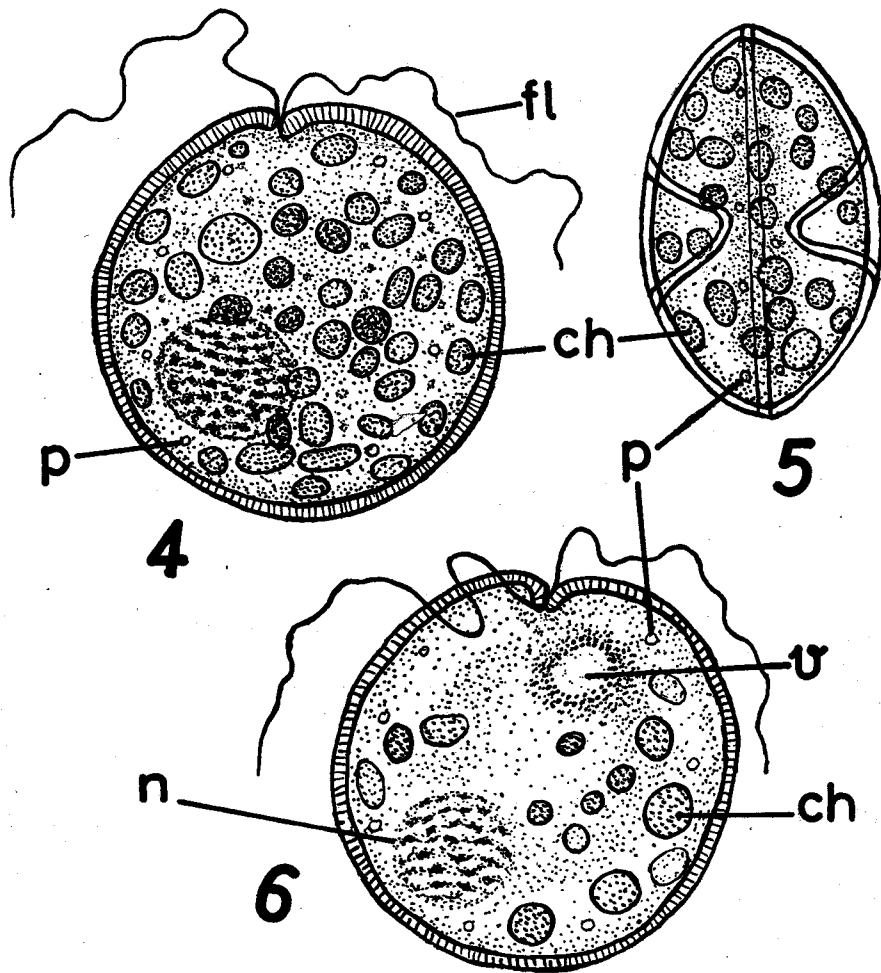
Cells in valve view round, oval, or irregular, more or less laterally compressed. Teeth absent at the straight or obliquely running flagellar canal or flagellar pores. Valve halves each with a conical depression towards inside approximately at the centre, at the base perforated so that cell substance can issue out. Chromatophore two or more, dissected plate or discoid; yellow or yellowish brown; peripherally disposed; no pyrenoid. One or two flagellar pores. Flagella two. Multiplication by division.

*Mesoporos* is an example of a primitive form for the existence of openings for escape of protoplast, which in higher Dinophyceae is of common occurrence. The pores are a morphological peculiarity which influences the entire cell, characteristic of this genus (Schiller, 1933-38).

**Mesoporos parthasarathicus** Subrahmanyam sp. nov. (Figs. 4, 5, and 6)

Cells almost round in valve view, long axis : 17.5 to 19.5  $\mu$ ; across 15.6 to 16.4  $\mu$ ; laterally compressed, side view lens-shaped, measuring 7.8 to 9.8  $\mu$  across at the middle. Wall firm, striated. Lateral view shows two conical depressions towards the centre from each valve, openings at the base of these not recognizable. A number of tiny pores present, placed more or less at regular intervals. Chromatophores several discoid plates of differing sizes, yellowish brown. Flagella two, long, whip-like, issuing out of a single pore. No teeth present.

In the sea off Calicut on the west coast of India. Occurs in November; first recorded in 1956.



Figs. 4, 5 and 6. *Mesoporos parthasarathicus* Subrahmanyam  $\times 4000$ . n=nucleus; fl=flagellum; p=pore; v=vacuole; and ch=chromatophore.

**Mesoporos parthasarathicus** sp. nov.

Cellulae fere rotundae aspectu valvae, axis longi 17.5–19.5  $\mu$ ; diam. 15.6–16.4  $\mu$ ; lateraliter compressae, aspectu laterali lenticulari, magn. 7.8–9.8  $\mu$  ad medium. Parietes firmi, striati. Aspectus lateralis monstrat depressiones conicas duas ad centrum ex unaquaque valvula, foramine ad harum basin haud distinguend. Nonnulli pori minuti adsunt, siti plus minusve ad intervalla regularia. Chromatophora: nonnullae laminae discoideae magnitudinis diversae, luteolo-brunneae. Flagella bina, longa, emergentia ex uno poro. Dentes nulli.

In mare ad Calicut ad oras occidentales Indiae. Mense novembri, primo notata anno 1956.

Species of this genus do not appear to have been recorded outside Europe.

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