

OBSERVATIONS ON *TAONIA ATOMARIA F. CILIATA* (LAMOUR.) NIZAMUDDIN

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Abstract

Taonia atomaria f. ciliata (Lamour.) Nizamuddin is raised to specific level and designated as *Taonia pseudo ciliata* (Lamour.) Nizamuddin & Godeh comb. nov. characterized by twisted, linear, narrow, ciliato-dentate, strongly marginally proliferated segments, in cell structure of the thallus which basipetally grades from (3-) 4-6(-8) layers and a single sporangial basal stalk cell partially embedded in the thallus.

Introduction

During the survey of marine algae from the eastern coast of Libya (Cyrenaica) a collection from a dominant colony of brown alga resembling *Taonia* J. Agardh belonging to the family Dictyotaceae (Dictyotales) was made. This genus comprises three species (i) *T. atomaria* (Woodw.) J. Agardh, the type species (ii) *T. australasica* J. Ag. and (iii) *T. lennebackerae* Farlow ex J. Ag. They are widely distributed but separated from each other. *T. atomaria* grows along the western coast of Europe and the Mediterranean Sea (J. Agardh, 1848, 1894; Hamel, 1939; Harvey, 1849; Kützing, 1843, 1849, 1859). *T. australasica* inhabits the South eastern coast of Australia (Allender & Kraft, 1983; Womersley, 1987). *T. lennebackerae* is an inhabitant of South Western coast of North America (Abbott & Hollenberg, 1976).

Nizamuddin (1981) recognized (i) *T. atomaria f. atomaria* J. Agardh and (ii) *T. atomaria f. ciliata* (Lamour.) Nizam., which are characterized by entire segment and irregular arrangement of medullary cells, in the former and ciliato-dentate, marginally proliferated segments and regular arrangement of medullary cells in the latter. Specimens under investigation mostly resemble *T. atomaria* in general morphology and habit but on the basis of additional features such as linear, narrow segments, cell structure of the thallus and single basal stalk celled sporangia. *T. atomaria f. ciliata* is raised to the specific level as *Taonia pseudociliata* (Lamour.) Nizamuddin & Godeh comb. nov.

Materials and Methods

Materials were collected from Spilia, near Benghazi and fixed in 4% formalin seawater solution for anatomical studies. Some specimens were mounted on herbarium sheets, preserved and kept in the Department of Botany, University of Garyounis, Benghazi (CHUG). Sections were made longitudinal to the axis at the apex, midfrond and at the base. Cross sections were made through the apex, midfrond and the base. Sections were made by hand and stained in 1% KI_2 or Anilin blue solution. Anatomical sections were based on fresh and preserved materials. Projection tube was used for the diagrams.

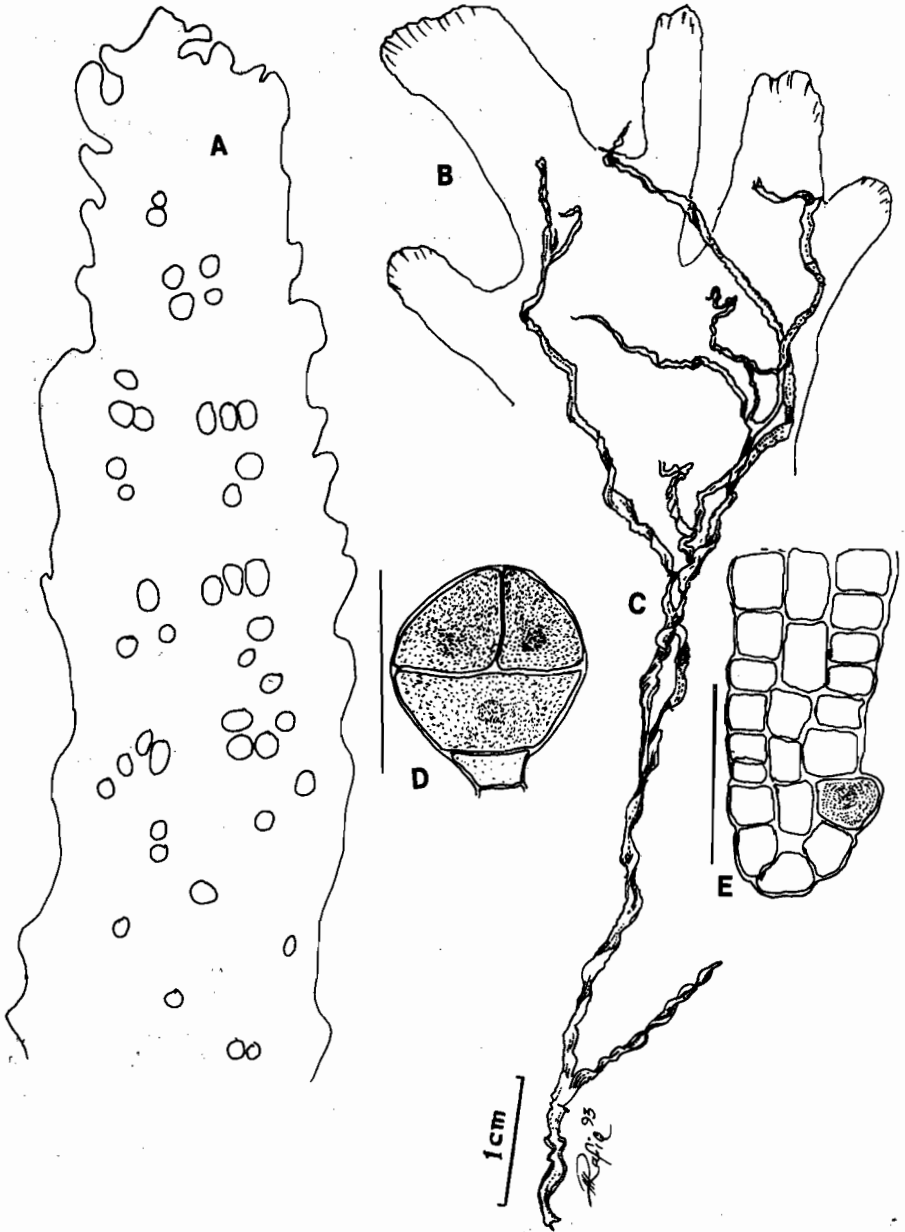


Fig.1. *Taonia pseudociliata* (Lamour.) Nizam. and Godeh *comb. nov.*, A. Apical portion of the thallus showing lobes or dentations bearing scattered sporangia. (Scale bar 1 mm), B. Apical portion of the thallus showing branching with flat apices. (Scale bar 1 mm), C. A part of twisted segment showing pattern of branching (Scale bar 1 cm), D. A mature sporangium, E. C.S. through the apex (Scale bar 100 μ m).

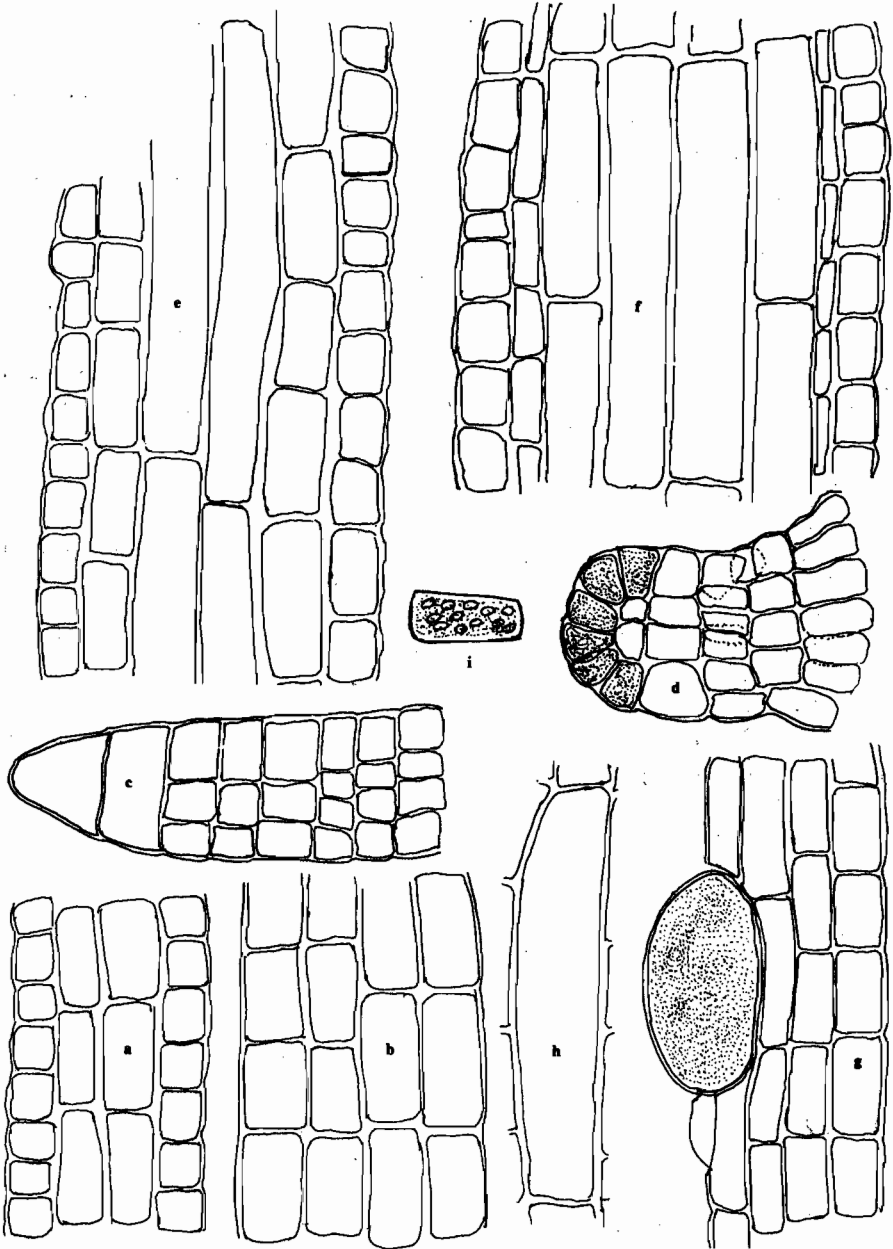


Fig.2. *Taonia pseudo ciliata* (Lamour.) Nizam. and Godch *comb. nov.* (a) L.S. of the segment 500 μm from the apex, (b) L.S. of the segment 1 mm from the apex, (c) L.S. of the distal segment showing an apical cell and its segmentation, (d) A group of apical cells in surface view, (e) L.S. through the midsegment, (f) L.S. through the stipe. (g) L.S. below the apex of a segment showing cell structure and oblong sporangia partially embedded, (h) A single medullary cell, (i) A single surface cell. (Scale bar 100 μm).

TAXONOMIC TREATMENT

Taonia pseudociliata (Lamour.) Nizamuddin & Godeh *comb. nov.* Fig.1 A-E, Fig.2 a-i, Fig.3 a-h, Figs.4 & 5.

Basionym: *Fucus pseudocillatus* Lamouroux 1805: Diss. 41, t. 25, f.2. Synonyms: *Dictyota penicillata* Lamouroux 1809a: 331; 1809b:42; 1813: 273. *Dictyota ciliata* Lamouroux 1809a:331, 1809b:41, (nom. superfl.). *Dictyota laciniata* Lamouroux 1809a:331; 1809b:41; 1813:273. Duby 1830: 955. *Ulva serrata* De Candolle in Lamarck et De Candolle 1805:11 *Stypopodium atomaria* β *ciliata* Kützing 1843: 341; 1849: 564; 1859:24, t.61, f. β . *Dictyota setosa* Duby 1830:955. *Taonia atomaria* f. *ciliata* (Lamour.) Nizamuddin 1981:37. Godeh *et al* 1992:16.

Holdfast: discoid and strongly felted up to 3 cm diam., bearing variously branched septate rhizoids. **Fronds** (Fig.5) stipose, caespitose, erect, basally and distally attenuated (up to 3 mm and 1 mm broad respectively), up to 24 cm high, flat, di- polychotomously branched into segments, variously deeply cleft from the apex downwards. Segments linear-narrow, flat, pedatus, variously furcate or irregularly branched, distally attenuated up to 15 cm long up to 5 mm broad, (90-) 150-250 μ m thick; near the apices up to 1 mm broad and 90-100 μ m thick, strongly ciliato-dentate, strongly marginally proliferated throughout, zonate, distantly twisted except at the apex (Figs.1C,4). **Structure:** Apex much divided into lobes (Fig.1A) or is flat (Fig.1B) and the vegetative growth takes place by means of a group of apical cells. (Fig.2d). Apical cell first segments transversely and is followed by two vertical divisions leading to the early formation of 3 cell layers in longisection of distal segments (Fig.2c) and in C.S. (Fig.1E). Internal structure grades basipetally from (3-) 4-6 (-8) cell layers. **Surface cells** arranged in longitudinal rows, (18-) 24-45 μ m long and (6-) 9-21 μ m broad and differentiated from the medullary cells. Near the apex and above the midfrond or segment there are 4 layers of cells, 90-125 μ m thick (Fig.2a,b,g, Fig.3,a,d,e) but below the midfrond or segment 6 layers of cells (Figs.5,15) and in the lowermost part of the frond or segment or stipe there are 8 layers of cells (Fig.2f. Fig.3g) measuring 150-250 μ m thick. **Peripheral cells** radial in cross section containing dense plastids but rectangular in longitudinal section. **Central or medullary cells** large and broad in cross section (Fig.3 e-g) but elongated in longitudinal section (Fig.2, e.f.h) measuring (60-) 130-205 (-285) μ m long and 25-40 μ m broad. **Phaeophyceean hairs** (deciduous) in concentric zones. **Sporangia** (Fig.1A) not in sori, scattered, singly or in twos or threes, rarely in zones, with no indusium, partly lying above the surface thallus (Fig.2g, Fig.3 a,b) with a single basal stalk cell, spherical (75-85 μ m diam.) or oblong 80-125 μ m long and 60-105 μ m broad with 2-layered thick-walled (Fig.2g, Fig.1.A.D) producing 4 round spores 30-35 μ m diam (Fig.3c). **Sexual reproduction** unknown.

Specimens Examined: Spilia, near Benghazi (Leg. M. Godeh, 8-5- 1985 GB 001254; 5-4-1985 GB 001255; 10-4-1985 GB 001256; 12-3- 1991 GB 001143 in CHUG. Nizamuddin, 5-4-1991; 25-4-1991; 11-5- 1991; 12-5-1991 sublittoral; 16-5-1991; 28-4-1991 in CHUG. 25-4- 1991 herol. no.B36442). Susa (Leg. M. Godeh, 30-4-1986 GB 001258 CHUG). Drift.

Discussion

Taonia internally possesses 4 cell layers i.e., 2 layers of flat peripheral cells and 2 layers of regularly arranged flat medullary cells (Hamel, 1939; Harvey, 1849; Kützing,

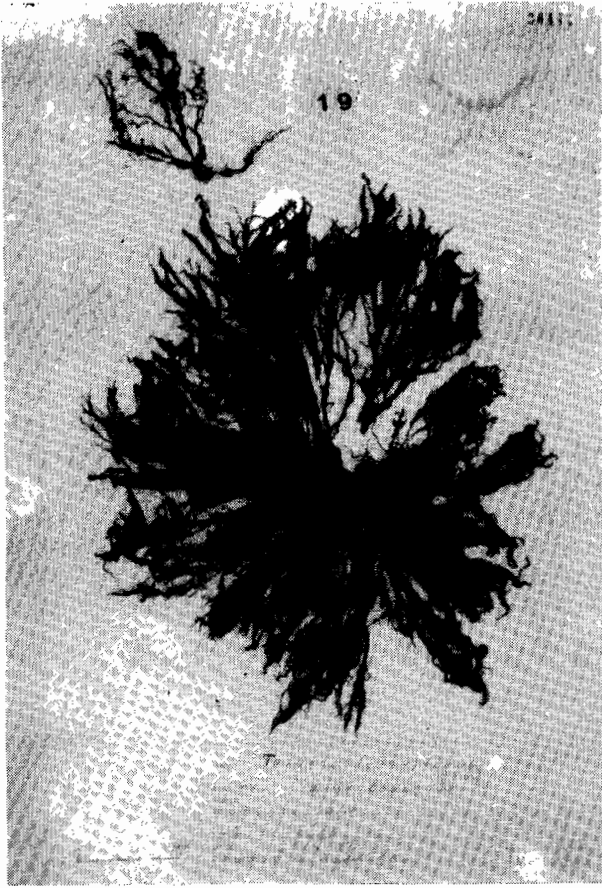


Fig.5. *Taonia pseudociliata* (Lamour) Nizam. and Godeh *comb. nov.* - Habit of the thallus (B 36442).

The surface cells are of similar size to the medullary cells in *T. atomaria* and *T. australasica* (Allender & Kraft, 1983) but more differentiated in *T. lennebackerae* (Mathieson, 1966) and in *T. pseudociliata*. Sporangia are unstalked in *T. atomaria* (Hamel, 1939, f. 6d) but a single basal stalk cell partially embedded within the frond is shown in *T. lennebackerae* (Mathieson, 1966) and also in *T. pseudociliata*, while those of *T. australasica* are borne on 3 stalk cells (Allender & Kraft, 1983; Womersley, 1987).

On the basis of more cell layers, a single sporangial stalk cell, and narrow segments, we believe this species to be distinct from previously described species of *Taonia*.

Key to the species of *Taonia*

- 1 - Fronds linear-narrow, twisted, margin ciliato-dentate, marginally proliferated; internal structures grade basipetally from (3-) 4-6 (-8) cell layers -----
----- *T. pseudociliata*

- 1- Fronds broad, smooth, mostly entire, internal structures grade basipetally from 2-4 (-6) cell layers. ----- 2
- 2- Sporangia without a basal stalk cell and internal structures grade basipetally from 2-4 (-6) cell layers ----- *T. atomaria*
- 2- Sporangia with basal stalk cells and internal structures grade basipetally from 2-4 (-5) cell layers ----- 3
- 3- Sporangia with a single basal stalk cell and internal structures grade basipetally from 4(-5) cell layers ----- *T. lennebackerae*
- 3- Sporangia with 3 basal stalk cells and internal structures grade basipetally from 2-4 cell layers ----- *T. australasica*

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