FROM: FULLER, I. M.Sc. THESIS, HERIOT-WATT UNIVERSITY, 1982.
KEY TO GENERA OF HORMIDIUM, ROSENVINGIELLA, ULOTHRIX, UROSPOR
AND TO SPECIES OF ULOTHRIX.

(Fig nos. apply to Thesis)

2.3.2. Key to the Genera

1. (a) Filament breadth less than 8.5μm. Chloroplast plate-like and unlobed cell length: breadth ratio (1-0)-1.5-3.0.....Hormidium.

(b) Filament breadth less than 8.5μm. Chloroplast not as above. Cell length: breadth ratio less than 1.5.....2.

(c) Filament breadth greater than 8.5μm.....2.

2. (a) Filament breadth 7-18μm in uniseriate filaments. Chloroplast stellate, fills cell. Paired rhizoids and/or longitudinal striations along filament wall present.....Rosenvingiella.

(b) Filament breadth 8.0-65μm. Cells variously shaped. Chloroplast Parietal, lobed. Cell wall smooth or mucilaginous.....Ulothrix.

(c) Cell wall 20-100μm or more. Cells barrel shaped. Chloroplast reticulate in older filaments, parietal in younger filaments. Filament wall follows cell contours.....Urospora.

2.3.3. Descriptions of the Genera

1. Filament breadth less than 8·5μm. Cell wall firm, thin, and uncontaminated by microparticles. Chloroplast plate like and unlobed (see fig. 37), not touching transverse cell walls in longer cells. Cell length: breadth ratio 1.5 to 3, but possibly shorter in estuarine plants than freshwater or terrestrial plants. In addition the chloroplast may be expanded in plants in brackish situations (fig. 36).

Reproduction mainly by fragmentation into short filament lengths with rounded ends (fig. 20). Mucilaginous geniculations may be present (fig. 21), and mucilage exists on any rounded, non rhizoidal basal cell collected from the field.....Hormidium.

2. Filament breadth 30-100μm wide, cell wall firm, smooth and non mucilaginous. Chloroplast parietal in young filaments and reticulate in older filaments, usually with many pyrenoids. Cells barrel shaped; cell length: breadth ratio 0.5-1.5. Filament wall contours follow cell contours (fig. 23).

Asexual reproduction by quadriflagellate, posteriorly pointed zoospores.

Young filaments with parietal chloroplasts may be distinguished from Ulothrix by the large length: breadth ratio of the cells (>1) in plants 20-30μm wide, the large number of pyrenoids and slightly reticulate nature of the chloroplast (fig. 25).....Urospora penicilliformis

3. Filament breadth of uniseriate filaments 7 to 18μm. Filament wall firm, non mucilaginous, sometimes marked by longitudinal striations. Chloroplast axile with a central pyrenoid. Cell shape various, but regularly arranged. Cell length: breadth ratio 0.3 to 0.7. Cell dimensions are derived from Fuller (1978).

Rhizoids frequently present in pairs or groups of three; rhizoids mucilaginous. Reproduction mainly by fragmentation. Filaments sometimes multiseriate in part (fig. 38).....Rosenvingiella.

Note Macleod (1982) used numberical taxonomy techniques to investigate the genus Rosenvingiella. She came to the conclusion that a continuum of morphological variation of Rosenvingiella filaments exists in the field and that only one species exists, Rosenvingiella polyrhiza.

4. Filament breadth 8-65μm. Cell wall variously structured, according to species. Chloroplast lobed and parietal, a closed or unclosed girdle usually occupying the cell length. Cell length: breadth ratio 0.3-1.5. Filament wall contours do not follow cell contours, except in reproductive phases of some species.

Asexual reproduction by aplanospores or quadriflagellate non pointed zoospores.....Ulothrix.

(differs from Newton etc.)

Key to Ulothrix species (sensu Lokhorst 1978) found in estuaries.

1. Filaments with a thick, smoothly surfaced filament wall, uncontaminated by microparticles. Local inflation of the cell wall occasionally present..... 4.

2. Filaments with a roughly surfaced wall, caused by microparticles embedded in mucilage. Filament breadth 15-38μm.....Ulothrix flacca. Fig. 10.

3. Filaments with a firm, thin cell wall, mostly uncontaminated by microparticles. Local swelling of cell wall lacking. Filament breadth less than 18μm. ..... 5.

4. (i) Filament breadth 20-65μm usually greater than 30μm. Filament wall of constant thickness. Filament tightly curled in the reproductive state. Filament wall hydrophobic.....Ulothrix speciosa. Figs. 5 and 7.

   (ii) Filament breadth 14-29μm. Filament wall thickness variable. Filament not tightly curled when reproductive.....Ulothrix palusalsa. Fig. 39.

5. (i) Filament breadth 7.5-12. μm. Chloroplast girdle usually open, not always reaching transverse walls in young filaments. Cell length: breadth ratio 0.61 to 1.51, larger in young filaments.....Ulothrix subflaccida. Fig. 2.

   (ii) Filament breadth 9-16μm. In absence of zoosporogenesis or gametogenesis secondary rhizoids frequently present.....Ulothrix implexa. Fig. 38.

(Natural History), London; LD – Botanical Museum, Lund; PC – Muséum National d'Histoire Naturelle, Laboratoire de Cryptogamie, Paris; S – Section for Botany, Swedish Museum of Natural History (Naturhistoriska Riksmuseet), Stockholm; UPSV – Växtbiologiska Institutionen, Uppsala Universitat, Uppsala. Some herbarium specimens were from the herbarium collection of Dr. Kornmann; these are cited as HELGOLAND. Prior to microscopy observations the herbarium specimens could be made to resume their original habit by treatment with a synthetic detergent. The detergent consisted of 50cc distilled water, to which about two drops of a concentrated solution of TEEPOL was added.

KEY TO THE SPECIES

1a. Filaments usually with a soft cell wall, smoothly surfaced but occasionally sparsely studded with fouling organisms and/or micro-particles. (Local) inflation of the cell wall occasionally present, certainly so after adding a 1% JKJ solution in 5% lactophenol 2

b. Filaments usually with a firm cell wall, smoothly or roughly surfaced and often (densely) contaminated with fouling organisms and/or micro-particles. (Local) swelling of the cell wall absent, even after adding JKJ 3

2a. Diameter of vegetative cells (9.7—)14.8—63.6(—85.8) μm, cell height (3.6—)4.8—15.6(—22.9) μm. Zoosporangia absent. On the gametophytic filaments (8—)16—128 and possibly more gametes per cell. Dioecious plants. Predominantly in intertidal areas, both on hard substrates and soft soils.
1. Ulothrix speciosa

b. Diameter of vegetative cells (8.4—)12.1—25.8(—28.9)μm, cell height (3.6—)4.8—16.9(—20.4) μm. Zoospores 4—16 per cell. Gametes (8—)16—32 per cell. Monoecious plants. Soils both in intertidal and inland salt marshes.
3. Ulothrix palusalsa

3a. Growth habit mostly as a complex basal-erect system, filaments often coalescent. Diameter of vegetative cells (4.8—)14.4—32.6(—44.2)μm, cell height (3.6—)4.8—9.6(—15.7)μm. Zoospores (4—)8—32 per cell, gametes (4—)8—64(—128) per cell. Monoecious plants. Hard substrates, predominantly in open intertidal areas . . . . . **2. Ulothrix flacca**

b. Growth habit fundamentally consisting of one upright filament with a basal cell (slightly) modified for attachment, filaments never coalescent 4

4a. Diameter of vegetative cells (3.6—)9.6—15.4(—26)μm, cell height (3.6—)4.8—10.9(—15.6)μm. Zoospores (2—)4—16(—32) per cell. Gametes (4—)8—32 per cell. Upon ripening of the gametangia cell contents olivaceous. In absence of zoosporogenesis or gametogenesis secondary rhizoids frequently present. Wide-spread in all kinds of brackish-water localities, and sometimes invading fresh water in considerable quantities. Never observed on soils in salt marshes.
4. Ulothrix implexa

b. Diameter of vegetative cells (4.8—)7.6—12.1(—13.2) μm, cell height (3.6—)4.8—15.7(—18.1) μm. Zoospores (1—)2—4(—8) per cell. Gametes (2—)4—16 per cell. Upon ripening of the gametangia no change of colour of cell contents. In the absence of reproductive stages secondary projections not obvious. Wide-spread in all kinds of brackish-water habitats, also on soils in salt marshes.
5. Ulothrix subflaccida