

TWO MOST ABUNDANT SPECIES OF *ULVA* AND *ENTEROMORPHA* FROM COAST OF JEDDAH, SAUDI ARABIA

S.M.Saifullah and Mohammad Nizamuddin
Department of Botany, University of Karachi,
Karachi-75270, Pakistan.

ABSTRACT: The present paper reports mass occurrence of two algal species *Ulva grandis* Saifullah and Nizamuddin and *Enteromorpha intestinalis* (Linnaeus) Link in a protected coastal area in Jeddah, heavily polluted with domestic sewage. They seem to prefer low salinity eutrophic waters for their maximum growth.

KEY WORDS: *Ulva grandis* - *Enteromorpha intestinalis* - taxonomy - Saudi Arabia.

INTRODUCTION

The coast of Jeddah, Saudi Arabia, is characterized by coral reefs which make it shallow over a considerable distance. These reefs make the near shore water partially isolated from relatively deeper waters and may create stagnating conditions in some low lying areas. The South Corniche of Jeddah happens to be such a place. It is situated on the southern part of Jeddah and is also a site of discharge of city's major sewage disposal unit. This makes the area even more stagnant and isolated from the open sea waters as low salinity waters of sewage do not mix freely with them. Saifullah *et al.* (1988) have already described the area in detail and recorded very low salinity values there.

During frequent visits to the site it was noted that a number of algae including phytoplankton and seaweeds formed dense green blooms on different occasions and the water appeared dark-green in colour instead of normal blue as a result. Saifullah *et al.* (1988) have already recorded a bloom of unicellular alga, *Platymonas* in the area. On other occasions large seaweeds were also found occurring massively likewise, and these are reported as under.

MATERIALS AND METHODS

Specimens were fixed in 5% formalin-seawater for anatomical work and some mounted on herbarium sheets which are stored in herbaria of Department of Botany, University of Karachi, Faculty of Marine Science, King Abdul Aziz University, Jeddah and Botanisches Garten und Botanisches Museum, Berlin-Dahlem.

DESCRIPTION OF THE SPECIES

Ulva grandis Saifullah and Nizamuddin, 1977

(Fig.1, Plate 1A)

Ulva grandis Saifullah and Nizamuddin, 1977:p.526, pl.I, figs.1-2, pl.IIA.

Thallus extensively expanded, more than a metre long and broad, dark green, attached but often free-floating being detached from the substratum, leathery in texture, not adhering to the paper on drying, membrane 55-65 μm thick, central space lacking; cells not isodiametric and irregularly arranged in surface view; in T.S. cells vary from broader than long to longer than broad, 20-30 μm long and 12-15 μm broad; chloroplasts cup-shaped, parietal, with more than 5 pyrenoids.

The description of the Jeddahian specimens strongly conforms to that of *Ulva grandis* from Karachi coast but differs in thickness of the thallus and in cells not being always broader than long (Saifullah and Nizamuddin, 1977). There is also some external morphological resemblance with *U. sorensenii* (Chapman, 1956) and *U. expansa* (Abbott and Hollener, 1976), however, it greatly differs with them in thickness, absence of central space and in unlobed fronds. This species occurred massively forming a characteristic dense green bloom in stagnant waters protected by coral reefs on South Corniche of Jeddah on 1st May 1985. The area was very shallow and highly polluted with sewage, as the point of disposal of city's sewage discharge was very close to the site and consequently salinity values were very low (Saifullah *et al.*, 1988). The area has already been described in detail and is also a place of frequent phytoplankton blooms (Saifullah, *et al.*, 1988). The thalli grew as attached forms submerged underwater but later became free-floating after being detached. One could see a huge dense green mass of floating specimens which later shifted to the adjacent seashore and piled up there with time creating a characteristic odour as they decompose. The alga has an economic potential if harvested and exploited economically.

It is most probable that the large species of *Ulva* reported elsewhere occurring in similar habitat (North *et al.*, 1972) may also be *U. grandis*. It is speculated that further work on *Ulva* from polluted environment in other parts of the world will certainly increase its range of distribution which is presently limited.

LOCALITY:

South Corniche, Jeddah (Leg. Saifullah, No.11. 1.5.85).

DISTRIBUTION:

North Arabian Sea (Pakistan) and Red Sea (Saudi Arabia).

Enteromorpha intestinalis (Linnaeus) Link

(Fig.2, Plate 1B)

Enteromorpha intestinalis (Linnaeus) Link; Abbott and Hollenberg, 1976:p.76; Anand, 1940:p.13; Chapman, 1956:p.404; De Toni, 1889:p.123; Durairatnam, 1961:p.18;

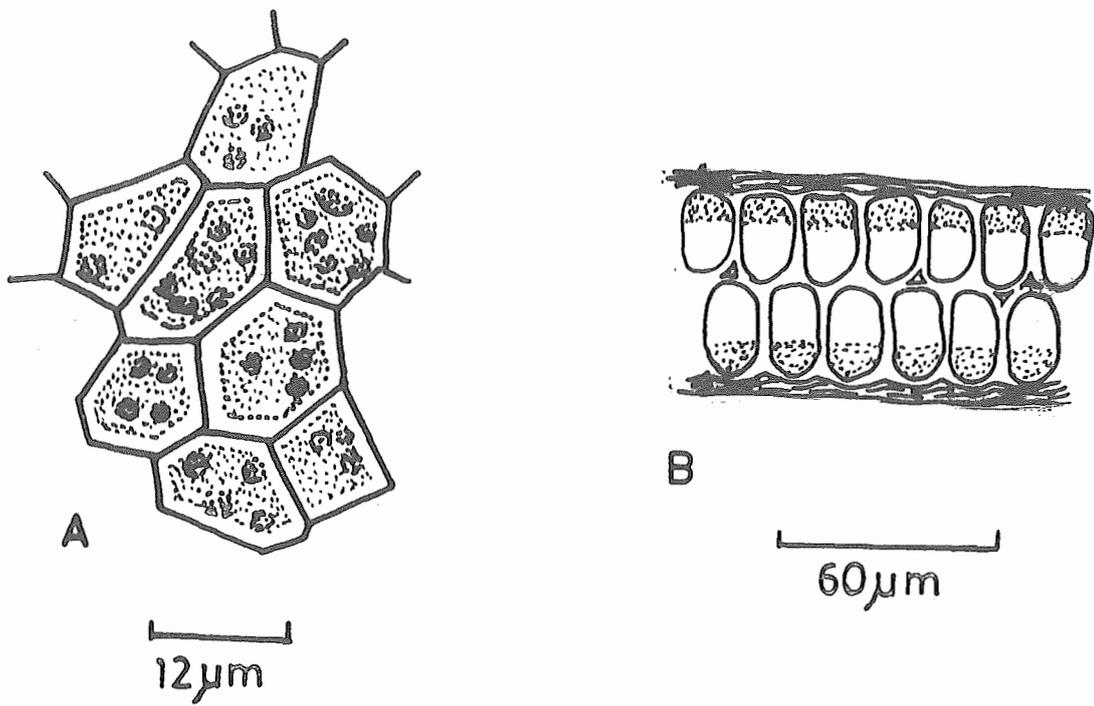


Fig.1. *Ulva grandis* Saifullah and Nizamuddin; A, Surface view of the thallus; B, T.S. of the thallus.

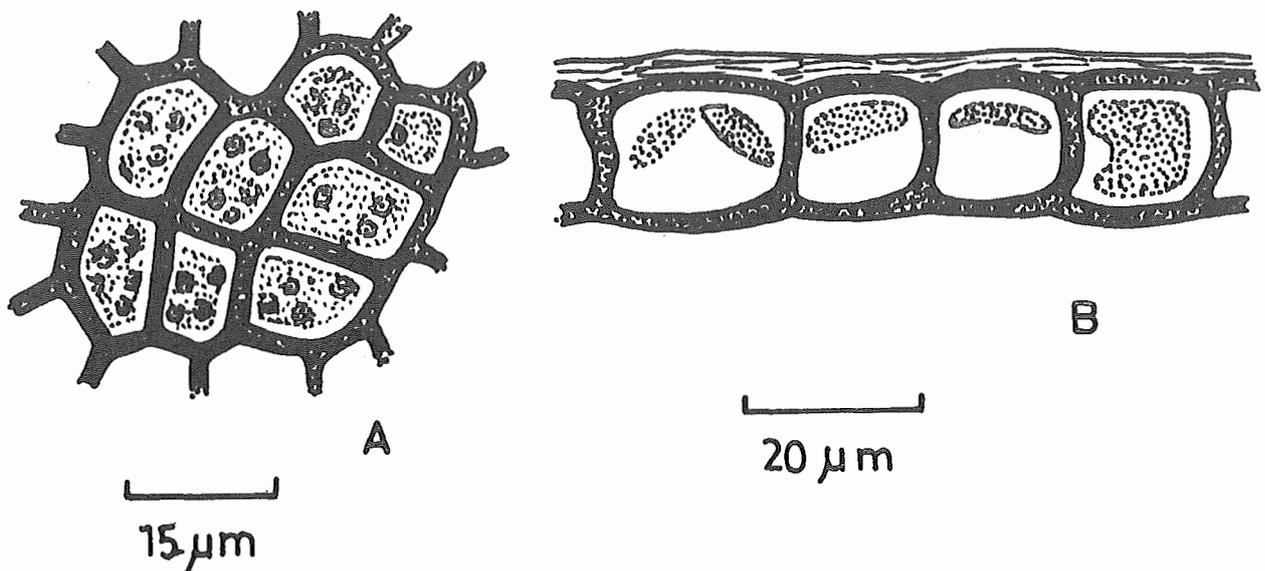


Fig.2. *Enteromorpha intestinalis* (Linn.) Link; A, Surface view of the thallus; B, T.S. of the thallus.

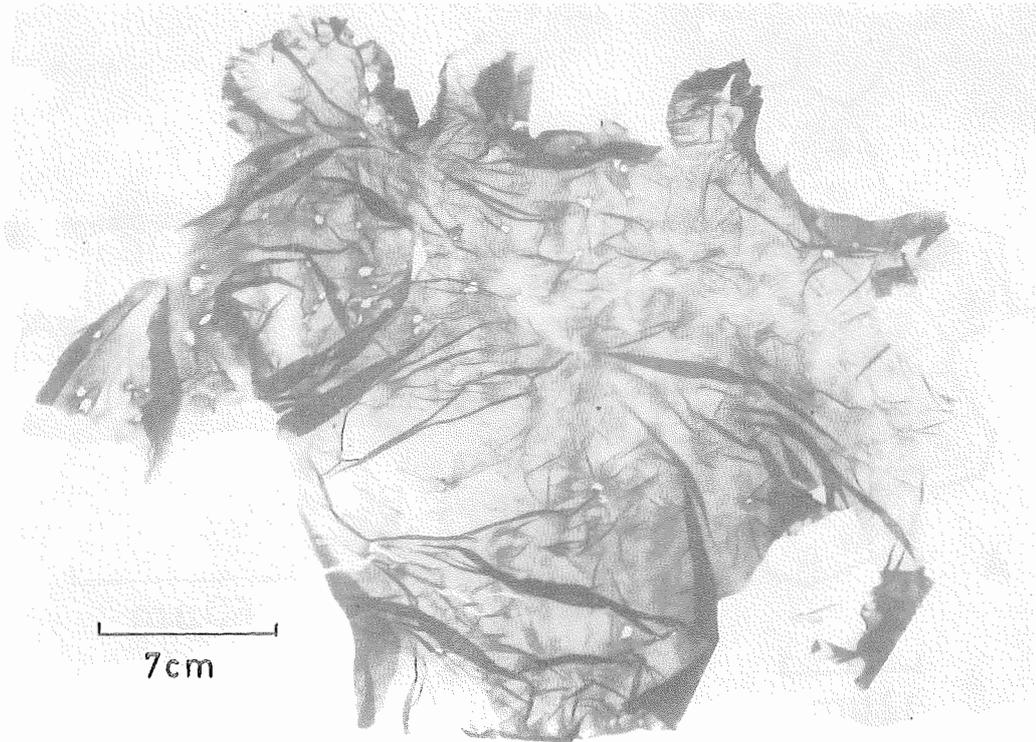


Plate 1A. A portion of thallus of *Ulva grandis* on herbarium sheet.

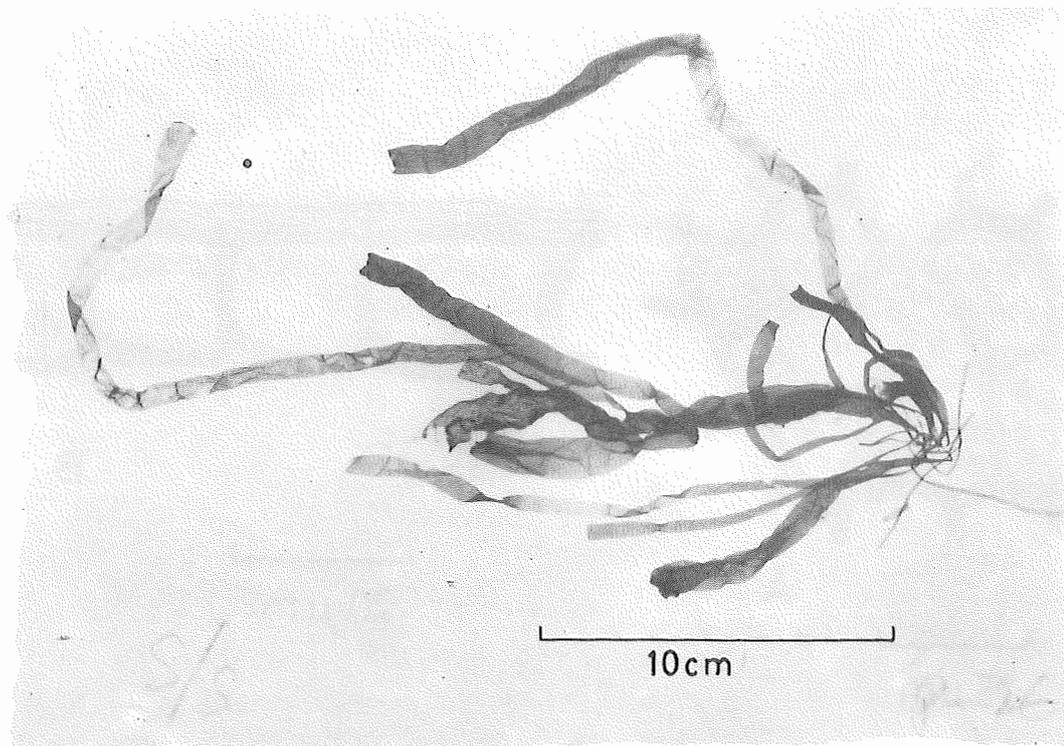


Plate 1B. Habit of *Enteromorpha intestinalis*.

Nasr, 1947:p.21; Saifullah and Nizamuddin, 1977:p.529; Womersley, 1984:p.161, pl.I, figs.3,4, pl.II, B&C.

Thallus slender, tubular, branched or unbranched, more than a metre long and 7mm broad, free-floating entangled masses in adult stage but attached when young, several fronds arising from the same base (caespitose), adhering strongly to the paper on drying; membrane up to 20 μm thick, younger specimens 10-15 μm thick, outer wall up to 5 μm thick and lamellated; cells not isodiametric, arranged irregularly in surface view; in T.S. cells almost square 10-20 μm high and up to 15 μm broad; structurally composed of a single layer of rectangular cells with a central cavity; chloroplast parietal with one to many pyrenoids.

This species was also collected from the same habitat as that of *U. grandis* but on a different date, that is, 11 November 1986 and contributed to green discolouration of coastal waters. It grew extensively to form free-floating entangled masses on the surface of stagnant waters. These masses later drifted to the shore where they piled up in huge amounts creating a characteristic pungent smell as they rot. This species has also been reported elsewhere from polluted areas (Anand, 1940; Jones, 1987; Saifullah and Nizamuddin, 1977).

LOCALITY:

South Corniche, Jeddah (Leg. Saifullah, No.12. 11.11.86).

DISTRIBUTION:

Cosmopolitan occurring preferably in brackish and estuarine environment with polluted stagnant waters.

ACKNOWLEDGEMENTS

We are thankful to Dr. A.S. Mandura and Dr. A.K. Khafaji, both of Faculty of Marine Science, K.A.A. University, Jeddah for their help in collection of the specimens. We are also indebted to Professor J. Gerloff of Botanischer Garten und Botanisches Museum, Berlin for reviewing the manuscript.

REFERENCES

- Abbot, I.A. and G.J. Hollenberg. 1976. *Marine algae of California*. Standard University Press, California. Pp.1-827.
- Anand, P. 1940. *Marine algae from Karachi. Part I. Chlorophyceae*. University of Punjab, Lahore. Pp.1-76.
- Chapman, V.J. 1956. The marine algae of New Zealand. Part. I. Myxophyceae and Chlorophyceae. *Journal of the Linnean Society (Botany)* 55: 333-501.
- De Toni, G.B. 1889. *Sylloge Algarum omnium Cognitarum. Vol. I. (Chlorophyceae)*, Padua. Pp.1-315.
- Durairatnam, M. 1961. *Contribution to the study of the marine algae of Ceylon*. Fisheries Research Station Department of Fisheries Ceylon, Bulletin No.10. Pp.1-181.
- Jones, D.A. 1987. *A field guide to the sea shores of Kuwait and the Arabian Gulf*. University of Kuwait Publications, Kuwait. Pp.1-624.
- Nasr, A.H. 1947. *Synopsis of the marine algae of the Egyptian Red Sea Coast, 1931*. Bulletin of the Faculty of Science, Cairo, Egypt, No.26. Pp.1-115.

- North, W. J., G.C. Stephens and B.B. North. 1972. Marine algae and their relation to pollution problems. *In: Marine pollution and Sea life* (Ed. Marine Ruivo). F.A.O. Publications, Fishing News (Books) Ltd. London. Pp.1-624.
- Saifullah, S.M. and M. Nizamuddin. 1977. Studies of the marine algae from Pakistan: *Ulvaes*. *Botanica Marina* 20: 521-536.
- Saifullah, S.M., A.S. Mandura and A.K. Khafaji. 1988. A *Platymonas* bloom in coastal waters of Jeddah, Saudi Arabia. *Pakistan Journal of Botany* 20: 285-289.
- Womersley, H.B.S. 1984. *The benthic marine flora of Southern Australia. Part.I*. Government Press. Adelaide, . Pp.1-329.