INTRODUCTION

Seaweeds are macroscopic algae, which form an important component of the marine living resource. They are available largely in shallow coastal waters wherever there is a substratum on which they can grow and flourish. Based on their pigmentation, the seaweeds are broadly grouped into green, brown and red macroalgae. They are harvested by man for centuries, particularly in Japan and China, where they form a part of the staple diet. The uses of seaweeds as food, fodder and manure are well known in many countries. Fresh, dried and processed seaweeds are utilized as human food and the food value depends upon the minerals, trace elements, proteins and vitamins present in them. They are eaten as salads, curries, soup and vegetable. Species of Ulva, Caulerpa, Codium, Hydroclathrus, Sargassum, Porphyra, Gracilaria, Euchema, Halymenia, Acanthophora and Laurencia are used as food in Japan, Indonesia, China, Philippines and other countries of Indo-Pacific region (Subba Rao, 1965; Levring et al., 1969; Michanek, 1975; Chapman and Chapman, 1980). Seaweeds are cheap sources of minerals and trace elements. Hence meals prepared from seaweeds can be given as supplementary to the daily rations of cattle, poultry and other farm animals. Seaweed meals can be obtained by grinding the cleaned and washed seaweeds of Ulva, Enteromorpha, Sargassum, Padina, Dicyota, Gracilaria and Hypnea (Thivy, 1960; Dave et al., 1979).

Seaweeds are the only source for the production of agar, alginate and carrageenan. These phytochemicals are extensively used in various industries such as of food, confectionary, textile, pharmaceutical, dairy and paper mostly as gelling, stabilizing and thickening agents. Apart from these biochemicals, other products such as mannitol, laminarin and fucoidin are also obtained from marine macroalgae. Now
attempts are being made for screening pharmaceutically active compounds from seaweeds.

The Indian system of medicine called ‘Ayurveda’ has been gaining ground in recent times; not only because of the aphrodisiacs but also on the overall merit of the system. It is a treasure house of the use of plants for medicinal purposes. Algae, both marine and fresh water, are known as ‘Saivala’ in Ayurveda and have many times been referred to as possessing medicinal properties. The word ‘Saivala’ has been derived from the Sanskrit, which means the ‘green plant mass lying on the surface of water’ (Misra and Sinha, 1979). In this Ayurveda, Susurutha, a famous physician in ancient times (16th century), used seaweeds in the form of decoction, paste and fresh algal extracts for the ailments of ulcer, blood clotting, unnatural semen discharge, piles etc.

The sea has immense biomedical potential which could be exploited not only as source of drugs for treatment of disease but also of new and novel structures with useful biological activity. In folk medicines, seaweeds have been used for a variety of remedial purposes such as eczema, gallstone, gout, scrofula, cooling agent for fever, menstrual trouble, renal problem, scabies etc., (Chapman, 1970; Hoppe, 1979). Marine flora and fauna are reported to have a wide spectrum of interesting biological properties (Renn, 1993). Seaweeds were considered to be of medicinal value in the orient as early as 3000 BC. The Japanese and the Chinese used brown algae in the treatment of goiter and other glandular diseases. Several red algae including Chondrus crispus, Gracilaria, Gelidium and Pterocladia have been used to treat various stomach and intestinal disorders and Corallina officinalis, Corallina rubens and Alisidium helminthocorton used in the early days to control worms in the digestive tract. The algae apparently absorb enough water and their water content
helps relieving constipation and other associated discomforts. A number of species of marine algae have been found to have anticoagulant and antibiotic properties. Carrageenan may be useful in ulcer therapy and the alginates are found to prolong the rate of activity of certain drugs (Mathieson, 1969). Species of Sargassum were used for cooling and blood cleaning effect.

Pharmacognosy is the study of compounds sort out by humans or animals and ingested or otherwise used as supposed medicines. Its methodologies involve macroscopic and microscopic description of plant histology, taste, colour and other distinguishing features. Thus, research in pharmacognosy scientific evaluation and standardization of the drugs from new and little known herbals, have gained their drive since there is an upsurge of interest in the molecular aspects of the drugs.

Pharmacology (from Greek, pharmakon, "drug"; and - logia) is the study of drug action. More specifically it is the study of the interactions that occur between a living organism and exogenous chemicals that alter normal biochemical function. The field encompasses drug composition and properties, interactions, toxicology, therapy, and medical applications and antipathogenic capabilities. Pharmacology deals with how drugs interact within biological systems to affect function. It is the study of drugs, of the body's reaction to drugs, the source of drugs, their nature, and their properties.

However, a thorough review of literature revealed that unlike the terrestrial plants, the marine plants especially the seaweeds have not been studied from the pharmacognosy and pharmacology point of view. Hence the present study was taken up to fulfill the following objectives:

- Collection of the commonly available seaweeds in the Gulf of Mannar region (Hare Island, Tiruchendur) representing the green, brown and red macroalgae
viz., *Ulva lactuca* Linnaeus, *Caulerpa scalpelliformis* (R.Brown ex Turner) C.Agardh; *Sargassum wightii* Greville; *Padina tetrastromatica* Hauck; *Gracilaria foliifera* (Forsskal) Boergesen; *Acanthophora spicifera* (Vahl) Boergesen.

- Pharmacognostic studies on the aforesaid seaweeds entailing the following parameters.
- Macroscopic studies of the six seaweeds.
- Anatomical analysis of these seaweeds.
- Fluorescence analysis of the dried powdered seaweed samples, treated samples and their extracts in various solvents.
- Quantitative determination of moisture content, different ash types and extractive values.
- Phytochemical screening of the seaweed extracts obtained by successive soxhlet extraction in various solvents.
- Quantification of protein, carbohydrate, lipid, organic carbon, fibre content, minerals (K, Ca, Mg, Na) calorific value, tannin, phenol, anthocyanin, vitamins A, B₃, C, E and β-carotene present in the powdered seaweed samples.
- Gas Chromatography Mass Spectrometry (GC-MS) studies of the methanol extract of the six seaweeds.
- Evaluation of antioxidant activity of the seaweed samples.
- Antimicrobial assay of the different solvent extracts of these seaweeds against pathogenic bacteria and fungi.
- Pharmacological study involving antiarthritic activity of one of the seaweed extracts.