Bull. Fish. Res. Stn., Ceylon. Vol. 16, No. 2, pp. 19–28, December, 1963

Some Marine Algae from Ceylon—2. *Laurencia* Lamouroux

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Since the erection of the genus *Laurencia* by Lamouroux (1813), several species have been added to or removed from it by various authors, especially Kuetzing, Harvey and Montagne. In 1863 J. Agardh attempted the first systematic arrangement of *Laurencia* in his *Species genera et ordines Algarum* Vol. 2 which he revised subsequently in *Epicrisis* (1876). Since then several new species have been described.

The complete systematic classification of this genus was undertaken by Y. Yamada (1931). He made a thorough study of it by examining the collections kept at several universities and herbaria. The characters used by Yamada are used in the classification of the Ceylon species in this paper. Yamada's classification is based mainly on the arrangement of the surface cells of the branchlet i.e. whether in cross-sectional view the surface cells are elongated radially and arranged like palisade cells or not. The other characters used are the presence or absence of lenticular thickenings in the walls of the medullary cells, and the presence or absence of protrusions of the surface cells in the final branchlets. Cribb (1958) has shown that in some species like *Laurencia pygmaea* and *Laurencia heteroclada* the surface cells vary between different collections, and sometimes between different plants of the same collection with regard to the presence of a distinct protrusion or its complete absence. He has also shown that in some species like *Laurencia obtusa* the walls of the medullary cells lack lenticular thickenings while others, like *Laurencia ventusa*, possess lenticular thickenings; in still others, such as *Laurencia heteroclada*, there may be a variation from an abundance to a complete absence of such thickenings, depending on the specimen.

Classification on the basis of branching is not reliable, as there is considerable variation within a species. To some extent the compression or terete nature of the frond is useful. The nature of attachment by a single holdfast is another useful character.

During one of my visits to the herbarium of the Royal Botanical Gardens, Peradeniya, I found a good collection of *Laurencia* the identification of which required revision. These specimens together with my own collection from various parts of the island have been used in the present study of the taxonomy of the Ceylon species of *Laurencia*. In the present paper 12 species of *Laurencia* are described. The classification and key to the species are based on the characters given by Yamada (1931) and Cribb (1958).

Description of *Laurencia* Lamouroux

Laurencia Lamouroux

Yamada 1931, p. 185; Cribb 1958, p. 159; Smith 1944, p. 376.

Plants erect, solitary or in gregarious tufts from a common disc-shaped cell, seldom decumbent. The erect shoots moderately firm to quite fleshy, usually cylindrical in some species, or markedly compressed, pinnate or radially branched, and heterothallic. Spermatangia borne on trichoblasts that lie closely packed within cup-shaped depressions near tips of branches. Carpogonial filament four-celled, borne on a trichoblast, only evident during early development of carpogonial filament. Supporting cell of carpogonial filaments also bearing sterile filaments. Auxiliary cell cut off from supporting cell after fertilization and fusing with it and its sterile

filaments to form a large irregularly shaped placental cell. Gonimoblast filaments grow upwards from placental cells and with only the terminal cells developing into carposporangia. Mature cystocarp surrounded by a pericarp partially united with adjoining vegetative tissue of the thallus. Tetrasporangia separated from one another and embedded just beneath the surface of the branches. Sporangia tetrahedrally divided.

Key to the species of *Laurencia*

1.	Surface cells elongated radially and arranged like palisade cells in transverse section of branchlet	2
1.	Surface cells neither elongated radially nor arranged like palisade cells in transverse section of branchlet	5
2.	Holdfasts formed at the apices of decumbent axes ..	1. *Laurencia perforata*
2.	Holdfasts not formed at the apies of decumbent axes	3
3.	Branches covered with wartlike branchlets even when the plant is young	2. *Laurencia papillosa*
3.	Branches not as above	4
4.	Branches with branchlets not abundant, ultimate branchlets very short and wart like	3. *Laurencia paniculata*
4.	Branches pinnate but ultimate branchlets not very short and wartlike	4. *Laurencia cruciata*
5.	Lenticular thickenings present in the walls of the medullary cells	6
5.	Lenticular thickenings absent or very few in the walls of the medullary cells ..	7
6.	Plants small and decumbent, branching often in whorls ..	5. *Laurencia nidifica*
6.	Plants large without percurrent axis, branches often fastigiate	6. *Laurencia scoparia*
7.	Fronds not clearly compressed	8
7.	Fronds clearly compressed	10
8.	Plants attached by a single discoid holdfast without accessory stoloniferous attaching branches	9
8.	Plants attached by more than one holdfast, often with several erect axes from stoloniferous attaching branches	7. *Laurencia heteroclada*
9.	Fronds with percurrent axis	8. *Laurencia obtusa*
9.	Frond without percurrent axis	9. *Laurencia poitei*
10.	Lenticular thickenings present at least in part of the frond	10. *Laurencia concinna*
10.	Lenticular thickenings absent in the frond	11
11.	Short tuberculate branchlets profuse and conspicuous ..	11. *Laurencia ceylanica*
11.	Tuberculate branches present sometimes, but not so profusely and conspicuously as in *L. ceylanica*	12. *Laurencia platyclada*

1. *Laurencia paniculata* (Agardh) J. Agardh

De Toni 1904, p. 788; Yamada 1931, p. 192, pl. 3, fig. a; Boergesen 1936, p. 53; 1938, p. 230; Durairatnam 1961, p. 72, pl. XVII, Figs. 3 and 4; *Laurencia intermedia* Yamada, p. 72, Pl. XVI, Fig. 7; *Chondria obtusa* var. *paniculata* Agardh; 1822, p. 343; *Laurencia thuyoides* Kuetzing, 1865, p. 26, pl. 74, Figs. A and B.

Plants reach a height of 5-6 cm.; attached to the substratum by a hold fast. Thallus green, cylindrical, caespitose with a principal percurrent axis and a pyramidal appearance. Branches shorter upwards; uppermost branchlets short and wart-like. Branches panniculate pinnate. Apices of ultimate branchlets truncate or clavate. In transverse section of thallus, surface cells radially elongated and arranged in a palisade manner. No lenticular thickenings in walls of medullary cells.

The plants in the collection are sterile and no antherdia or cystocarps were seen.

I have re-examined the specimen which I described as *Laurencia intermedia* Yamada in 1961 along with some of my collections of *Laurencia paniculata* and I am now of the opinion that it is a form of *Laurencia paniculata*.

Distribution in Ceylon : In shallow rock pools in Mandativu island, Galle and Kottegoda (Matara).

Geographic distribution : Malayan Archepelago, New Caledonia, Indian Ocean, Mediterranean Sea, Adriatic Sea, Japan.

2. *Laurencia papillosa* (Forskaal) Greville

Greville, 1830, p. 52; De Toni, 1903, p. 789; Boergesen, 1918, p. 246, fig. 236; 1937, Nos. 1 and 2, p. 49; No. 6. p. 347; 1939, p. 118; 1945, p. 47; 1952, p. 64; 1954, p. 46. Cribb, 1958, p. 169, pl. 7, figs. 6-8. Durairatnam, 1961, p. 72, pl. XVI, figs. 1-3; *Fucus papillosus* Forskaal, 1775, p. 190; *Fucus thyrsoides* Turner, Fuci, 1808-1819 tab. 19; *Chondria papillosa* Ag. 1822, p. 344; Systema, 1824, 203.

Plants in sheltered areas reach height of about 10 cm. while those in exposed areas reach up to about 6 cm. Thalli of plants in exposed regions are firmer and more cartilaginous than those in sheltered areas. Plants attached firmly to substratum by a broad thick disc which gives off several erect shoots. Holdfasts occasionally formed, when developing branches touch substratum. Olive green or purplish in colour; axes above the holdfast terete, but due to tendency of the plant to be branched in one plane, frond appears more or less compressed. Axes of mature plants terete. Branchlets loosely beset with wart like branchlets even when young. Numerous ramuli are set at right angles in mature main axes. Occurence of these ramuli may at times be so numerous, as to make the axse hardly visible. Branchlets simple, shortly cylindric or broadly turbinate, 650-1025 μ in diameter. Branchlets form a compact subcorymbose branchlet systems, some of which grow out into main axes 1-25 mm. in diameter. Tetraspores found at end of wart-like ramuli, similar to the sterile ones; spermatangial branchlets slightly broader than sterile branchlet, broadly turbinate, arranged singly or in branchlet system. Cystocarps found singly or in dense branchlet systems. In transverse section, peripheral cells are radially elongated, about 28μ long and 9μ broad and arranged like palisade cells. In surface view they are not projecting. Medullary cells much larger, with thick walls. Lenticular thickenings absent in walls of medullary cells. Central cylinder very indistinct.

The specimens at hand were collected in exposed localities extending from Senthamkulam to Point Pedro as well as in sheltered areas in the Jaffna lagoon. In the exposed localities they were found attached to rocks in rock pools, while in the lagoon they were attached to rocks, corals and other algae in shallow sandy water, and at Nainativu they were found growing on coral debris.

According to Yamada (1931) a transverse section of branchlets of the type specimen of *Laurencia papillosa* shows that the surface cells are strongly elongated radially and arranged like palisade cells. Cribb (1958) states that in his specimens collected from Queensland and Papua there is no such radial elongation of surface cells in transverse section. The Ceylon specimens agree with the type specimen since the surface cells are strongly elongated.

Distribution in Ceylon : Mandativu, Pungudutivu, Nainativu, Jaffna lagoon, Senthamkulam, Keerimalai to Point Pedro.

Geographic distribution : Atlantic Ocean, Mediterranean Sea, Red Sea, Sandwich Islands, West Indies, Mauritius, Australia.

3. *Laurencia perforata* (Bory) Montagne

De Toni 1903, p. 784; Boergesen 1930, p. 69, fig. 26; Yamada 1931, p. 193, figs. A and B, pl. 3 fig. a; Taylor 1950, p. 144; Cribb 1958, p. 164, pl. 3, figs. 1-2. *Fucus perforatus* Bory 1803, p. 503, pl. 5, fig. 1; *Laurencia vaga* Kuetzing 1865. p. 18, pl. 50; De Toni 1903, p. 784.

Plants form cushion-like colonies reaching a height of 2-4 cm. Olive-green or purplish in colour. Arched sub-erect axes given off from a disc-like holdfast. Apices of branches attenuate and produce a few rhizoids which later become holdfasts and give rise to new arched axes. Erect branchlets often un-branched, 3-4 mm., clavate or cylindric-clavate. Irregular, alternate branchlets sometimes present.

Branches constricted at insertions. In transverse section, surface cells not protruding, arranged radially in a palisade manner, with no lenticular thickenings in walls of medullary cells.

My specimens closely resembles figs. 1 and 2, pl. 3 of Cribb (1958) and his descriptions. They also resemble Ceylon algae No. 74, labelled *Laurencia perforata* Mont. kept at the herbarium of the Royal Botanical Gardens, Peradeniya, Ceylon.

Distribution in Ceylon : Galle.

Geographic distribution : Australia, Bikini, and other Northern Marshall Islands, Madeira, New Caledonia.

4. *Laurencia cruciata* Harvey

Harvey 1854, p. 544; De Toni 1903, p. 790; Yamada 1931, p. 198, pl. 5 a, fig. E; Boergesen 1933, p. 135; Cribb 1958, p. 166.

Plants found growing in clumps, attaining a height of 6-8 cm. Olive-green or pinkish when fresh, but yellowish brown when dried. Erect shoots given off from single discoid holdfast. Branching more proliferous above than below, almost distichous, wide angled. Successive branches 2-4 mm. apart. Frond slightly flattened or mostly terete with scars. Branchlets cylindrical or clavate. Tetraspores borne on simple, turbinate to cylindrical branchlets. Sexual branchlets not present. In transverse section surface cells smooth, not projecting, elongated radially and arranged like palisade cells. Medullary cells rounded or polygonal. No lenticular thickenings in walls of medullary cells.

The plant was found growing in a shallow rock pool at Galle Buck, Colombo.

In the Herbarium of the Royal Botanical Gardens, Peradeniya, there is a specimen 74 (1) not labelled, and another number 72 labelled as *Laurencia perforata* Mont. collected from Colombo. I have examined these specimens carefully. There are no holdfasts at the apices of the decumbent branches and the plants are much larger than *Laurencia perforata*. Further the plant agrees with the description of Cribb (1958), and in transverse section it agrees with Yamada's figure (1931, p. 199, fig. E). These specimens also agree with the specimens collected by me in Colombo. I am of the opinion that these plants should be referred to as *Laurencia cruciata* Harvey.

Distribution in Ceylon : Colombo.

Geographic distribution : Indian Ocean, Australia.

5. *Laurencia nidifica* J. Agardh

De Toni 1903, p. 785; Yamada 1931, p. 202; Cribb 1958, p. 168, pl. 5, fig. 12, pl. 6, fig 1-3.

Plants found in clumps growing on stones or rocks in shallow, sheltered waters. Fronds small, decumbent, about 5 to 6 cm. high, sometimes mat-like with basal parts loosely entangled, and attached to the substratum by means of rhizoids. Fronds terete and filiform, fleshy, cartilaginous, dull green in colour. Several erect shoots are given off from prostrate axes. Branching is usually opposite or in whorls of 3 or 4, very rarely alternate irregularly or secund. Lower part of axes more or less devoid of branchlets, but branchlets are numerous in the upper part of the axes, and distance between successive branchlets about 1-2 mm. Final branchlets contracted at the base and are cylindric or cylindro-clavate. Branchlets bearing tetraspores

resemble the sterile ones, while those bearing the spermatangial branchlets are pyriform or distinctly urceolate. Cystocarps absent in my specimens. In transverse section of branchlet, the surface cells are not arranged like palisade cells, and there are some lenticular thickenings in the walls of the medullary cells.

In the herbarium of the Royal Botanical Gardens, Peradeniya, Ceylon, there are 4 specimens under one cover named *Laurencia microclada Kuetz*. These specimens were collected in Jaffna in 1846 by Gardner. I have examined these specimens carefully and I am inclined to believe that this is *Laurencia nidifica* J. Agardh. It resembles *Laurencia nidifica* collected by me from Jaffna.

The specimens have a close resemblance to type specimen No. 36628 described by Yamada (1931) a specimen from the Hawaiian Islands kept in the Agardhian herbarium. He describes the plant as being weak, and possessing an entangled base. The surface cells in the final branchlets are not arranged like palisade cells, and lenticular thickenings are present in the walls of the medullary cells. According to Cribb (1958) the specimen has a close resemblance to plants from Queensland. It shows some resemblance to *Laurencia ventusta* Yamada in general habit and branching. However, the final branchlets in *Laurencia ventusta* are more slender, less cartilaginous, and lenticular thickenings are abundant in the walls of the medullary cells.

Distribution in Ceylon : Near Pungudutivu, Jaffna.

Geographic distribution : South Eastern Queensland, Australia, Hawaiian Islands, Celebes.

6. *Laurencia scoparia* J. Agardh

De Toni 1903, p. 784; Yamada 1931, p. 214, pl. 13, fig. b. figure N.

Plants caespitose, 4-12 cm. in height, without percurrent axis, cartilaginous, terete and filiform. Several axes being given off from disc-shaped holdfasts. Branching subdichotomous, often fastigiate; branchlets given off in all directions. Ramuli clavate and filiform, alternately or oppositely arranged. Tetrasporic branchlets of branches fasicled and sub-clavate at apices. In transverse section surface cells of branchlets squarish or slightly elongated and not arranged like palisade cells. Lenticular thickenings present in walls of medullary cells.

This species is not represented in my collection, but I have examined specimen No. 133 labelled as *Laurencia scoparia* var *orientalis* Grun. collected in 1882 and kept under the cover *Laurencia heteroclada* at the Royal Botanical Gardens, Peradeniya, Ceylon.

This plant has a very close resemblance to *Laurencia forsteri* (Mert.) Grev., and *Laurencia heteroclada* Harvey. It can be distinguished from the former in that the branches are not often fastigate, and from the latter where the frond is not cartilaginous. The plant also has a resemblance to *Laurencia obtusa* and it may be one of the numerous variable forms belonging to this species.

Distribution in Ceylon : South Coast.

Geographic distribution : La Guayra, Puerto Cabell.

7. *Laurencia heteroclada* Harvey

Harvey 1854, p. 544; 1860, pl. 148; De Toni 1903, p. 782; Yamada 1931, p. 238; Cribb 1958, p. 175, pl. 10, fig. I-II; pl. 13, fig. 4; Durairatnam 1961, p. 73, pl. XVII, fig. 8. *Laurencia arbuscula* Sonder 1845, p. 55; Kuetzing 1865, pl. 72, fig. *a* and *b*.

Plants terete, filiform, found in clumps arising from stoloniferous branches and attached by means of numerous holdfasts. Several erect axes are given off, reaching a height of 6-8 cm. Sometimes a single axis is attached by a holdfast with several stoloniferous branches. Plants fleshy and ping. Branching of sterile fronds alternate, opposite or subsecund. Alternate and opposite types of branching mixed, but in the Ceylon specimens there is a dominance of

alternate branching of main axes and opposite branching of branchlets. All branches terete; branchlet cylindric, subcylindric or clavate. Tetrasporic systems compound, subcorymbose or panicled and arranged subvertically or opposite, very rarely alternate. Spermatangial branchlets not seen. Cystocarps ovoid or suburceolate near the end of branches. In transverse section, peripheral cells not or only slightly elongated; not arranged like palisade cells and do not project in surface view. No lenticular thickenings in the walls of the medullary cells.

In the herbarium of the Royal Botanical Gardens, Peradeniya there are two specimens collected by Alston, Nos. 209 collected on 14th July, 1926, from Galle and No. 2049 collected on the 29th March, 1927, from Tangalle. These have been identified as *Laurencia heteroclada* Harvey by him. Madame Van Bosse has identified specimen No. 209 as *Laurencia obtusa* Lambouroux.

Specimen No. 209 has a close resemblance to the figure given by Cribb (1958, pl. 13, fig. 4) but very much different to *Laurencia yendoi* Yamada (1931, Plate 24). According to Cribb (1958) lenticular thickenings are present in abundance in Queensland specimens, but Yamada (1931, p. 238) has not mentioned the presence of lenticular thickenings on the walls of the cortical cells. I too have not observed any lenticular thickenings in the Ceylon specimens. The Ceylon specimens also have a resemblence to *Laurencia forsteri* (Mertens) Greville from which it can be distinguished by the absence of lenticular thickenings in the walls of the medullary cells Yamada (1931, p. 214).

Distribution in Ceylon : Hambantota, Galle and Tangalle.

Geographic distribution : Australia, Japan.

8. *Laurencia obtusa* (Hudson) Lamouroux

Lamouroux 1813, p. 42; Greville 1830, p. 111; De Toni 1903, p. 791; Boergesen 1918, p. 247; 1933, p. 135; 1938, p. 230; 1945, p. 58; Taylor 1928, p. 180, pl. 33, fig. 3; Yamada 1931, p. 222; Newton 1931, p. 388; Cribb 1958, p. 173, pl. 9, fig. 3; Durairatnam, p. 73, pl. XVII, fig. 5.

Fucus obtusus Hudson 1778, p. 586; Turner, 1808, pl. 21; *Chondria obtusa* C. Agardh, 1822, p. 340; *Laurencia pyramidalis* Bory, p. 854; *Laurencia multiflora* Kuetzing 1865, p. 21, pl. 58 a, b; *Laurencia oophora* Kuetzing, p. 20, pl. 57, figs. a and b; *Laurencia cymosa* Kuetzing, p. 21, pl. 57, figs. c and d.

Plants forming an intricate mass; cylindrical 0.5-1.5 mm. thick, with a percurrent axis and reaching a height of 15 cm. or more. One to several axes are given off from a discoid holdfast. Plants soft and fleshy, dark purplish, olive-green or yellowish and strongly adhering to paper. Stem terete. Branches mostly opposite or subopposite, sometimes irregular or verticillate. Ramuli cylindrical or clavate truncate or rounded at apices; simple or longer branches beneath their apices, 1-10 mm. long, 300-900μthick and often tripartite. Fertile branches cylindrical to cylindroclavate or truncate, 350-600μin diameter and 1-2 mm. long. Tetraspore bearing branchlets simple and similar to sterile branchlets. Tetraspores found beneath thickened summits of ramuli. Spermatangial branchlets usually simple and clavate. Cystocarps borne on branches bearing ramuli or on ramuli themselves. Cystocarps oval, sessile, about 220μ long, 165μ broad, each opening by a large orifice. In transverse section. surface cells small and not radially elongated or arranged like palisade cells. Cells protruding in surface view. Medullary cells without lenticular thickenings in cell walls.

Distribution in Ceylon : Hikkaduwa, Tangalle, Matara, Pearl Banks.

Geographic distribution : Atlantic Ocean, Mediterranean Sea, Indian Ocean, Australia, Danish West Indies, Mauritius, Gulf of Iran, England, Red Sea, Malay Peninsula, Palao Islands.

Laurencia obtusa (Hudson) Lamouroux var *divaricata* Yamada

Yamada 1931, p. 233; *Laurencia divaricata* J. Agardh 1863, p. 754; 1876, p. 649; De Toni 1903, p. 786.

I have examined a specimen marked Ceylon Algae 138, in the herbarium of the Royal Botanical Garden, Peradeniya, Ceylon. Only parts of the plant are available.

In transverse section of the branchlets, surface cells do not project. Cells squarish or slightly elongated radially, but not arranged like palisade cells. No lenticular thickening could be seen in walls of medullary cells.

It seems to belong to this species and it closely resembles the variety *divaricata* J. Ag. It resembles Yamada's figure (1931, Pl. 16a) of the type specimen in J. Agardh's herbarium.)

Distribution in Ceylon : Matara.

Geographic distribution : Red Sea, Australia, Indian Ocean.

Laurencia obtusa (Hudson) Lamouroux var. *majuscula* Harvey

Harvey, Cat. No. 309 b; Yamada 1931, p. 223, pl 16a; Boergesen 1933, p. 135; 1939, p. 120.

Plants forming dense tufts up to 16 cm. high. Usually a single erect axis given off from a single disc shaped holdfast. Numerous branches given off from all sides of main axis. These branches in turn gives off small branchlet 1.5-2 cm. long. Branches and branchlets clavate. Thallus terete, with a percurrent axis and paniculate outline. Thallus red or scarlet in colour, soft and adhering closely to paper. Tetrasporic branchlet system simple, and similar to sterile branchlet. In transverse section, peripheral cells are squarish, with rounded corners. Cells not elongated radially. Peripheral cells much larger, without lenticular thickenings in cell walls. Surface cells project very much near ends of branchlets.

These plants were dredged from the Pearl Banks in the Gulf of Mannar.

I have examined Harvey's Ceylon algae No. 20 and Ferguson's Ceylon Algae No. 159 labelled as *Laurencia dendroidea* J. Ag. and No. 334 labelled as *Laurencia calptera* Dickie kept at the Royal Botanical Gardens, Peradeniya, Ceylon, and I agree with Yamada (1931) that these should be referred to the present variety.

Boergesen 1939, had compared a specimen from the Iranian Gulf mounted together with Harvey's Ceylon Algae No. 20 in the Kew Herbarium, and stated that the Iranian specimen agreed with his specimens collected from Dwarka, India.

Distribution in Ceylon : Pearl Banks in the Gulf of Mannar.

Geographic distribution : Warmer Atlantic, Pacific and Indian Ocean, Australia, Japan, Iranian Gulf.

Laurencia obtusa (Hudson) Lamouroux var. *snackeyi* Yamada

Yamada 1931, p. 225.

In the herbarium of the Royal Botanical Gardens, Peradeniya, there is a small plant labelled as *Laurencia obtusa* var. *snackeyi* W. V. B. The specimen No. 658 was collected by Alston in March 1927, and it is indicated that it had been identified by Madame Weber Van Bosse.

The Ceylon specimen is small about 5 cm. high, and brown when fresh. One to several axes being given off from a disc shaped holdfast. The branches are thick, about 1 mm. in diameter, and give off secondary branchlets which give off small tubercules. In transverse section of branchlet, surface cells not projecting and not elongated radially.

Madame Weber Van Bosse had reported a new form *Laurencia paniculata* forma *snackeyi* from Malayan Archipelago. Yamada 1931 had examined this species at Eerbeek and placed this as a form under *Laurencia obtusa* Lamouroux, since there was no evidence of palisade-like cells. Weber Van Bosse had determined the Ceylon species as *Laurencia obtusa* var *snackeyi*.

Distribution in Ceylon : On rocks at Tangalle.

Geographic distribution : Saman Island near Timor, Malayan Archipelago, Palao Islands of the tropical Pacific.

9. *Laurencia poitei* (Lamour.) Howe

Howe, M. A., 1905, p. 583; Boergesen, 1918, p. 245; De Toni, 1924, p. 673, Yamada, p. 219 Plate 15, fig. a; Durairatnam, 1961, p. 73, Plate XVI, fig. 8; *Fucus poitei* Lamour., 1805, p. 63, tab. 31, figs. 2-3; *Laurencia gemmifera* Harvey, 1853, p. 73, tab. 18B; *Laurencia tuberculosa* J. Ag.1863, p. 760; 1876, p. 657; De Toni, 1904, p. 801; *Gracilaria poitei* J. Agardh, 1863, p. 596; 1876, p. 421.

Plants 3-12 cm. in height without percurrent axis, slightly compressed, with irregular ramification and attached by a single holdfast. Branches of different sizes, some long and some short, spreading and flexuous, and in turn bear small tubercle like branchlets. Tetrasporangia found in upper ends of tubercle-like branchlets. In transverse section. peripherial cells subquadrate and not elongated and arranged like palisade cells. Unlike the West Indian species (Boergesen 1918), peripheral cells are not provided with papillae. Inner cells of medullary tissue are large while those towards periphery are smaller and roundish. Lenticular thickenings absent in the walls of medullary cells. This species was found in abundance growing luxuriously in Jaffna lagoon and in shallow areas near the islands off the Jaffna Peninsula. I have carefully examined the specimen labelled *Laurencia tuberculosa* var. *palmata* Grun. collected at Jaffna in 1846 and kept at the herbarium of the Royal Botanical Gardens, Peradeniya. I find that this specimen resembles in all respects the plants collected by me both morphologically and anatomically.

This plant differs from *Laurencia tuberculosa* var. *gemmifera* J. Agardh by the absence of strongly projecting surface cells observed by Howe and other phycologists.

Distribution in Ceylon : The plants were found growing at a depth of about 3 feet at Mandativu, Pungudutivu, Jaffna lagoon and Kankesanturai.

Geographic distribution : Britain, West Indies.

10. *Laurencia concinna* Montagne

De Toni 1903, p. 806; Weber Van Bosse 1923, p. 240, pl. 25, fig. b (in part as *Laurencia brongniartii*); Cribb, 1958, p. 162, pl. 2, fig. 1-4; pl. 13, fig. 1-2. *Laurencia calliptera* Kuetzing, 1865, p. 24, pl. 69, a-b; *Laurencia grevilleana*, Harvey 1854, p. 545; 1958, pl. 15; De Toni 1903, p. 806.

Plants grow in clumps reaching a height of 7 cm. or more. One to several axes given off from a disc-shaped holdfast. Main axis 2-3 mm. broad. Fronds light pink to golden yellow and strongly compressed. Branching distichous, alternate or opposite. Branches about 2-3 mm. wide. Sterile branches flattened 250-800μ in diameter. Various forms of tetraspore producing branchlets present. They are sub-cylindric to cylindric-clavate, or compound and pinnate, subsecund or irregularly subcorymbose. Spermatangial branchlets sessile, and arranged irregularly or regularly close to each other. They are wartlike, turbinate to pyriform and 675-750 μ in diameter. Cystocarpic branchlets turbinate, cystocarps oval. In transverse section of branchlets, surface cells not projecting, small and quadrate, not arranged like palisade cells. Outermost cells of medulla very much larger than peripheral cells. Lenticular thickenings present in walls of medullary cells.

In the herbarium of the Royal Botanical Gardens, Peradeniya, there are a number of specimens of *Laurencia concinna* Montagne. These specimens very much resemble the specimen in the herbarium of Montagne collected by d'Urville at " Ile Toud " as described by Yamada (1931). In transverse section of these specimens, the surface cells are very small and quadrate and much smaller than the medullary cells. Cribb (1958) points out that only in specimens from Southern Queensland cells of the tetrasporic branchlets are not radially elongated. He points out that in the sterile specimens the surface cells are distinctly elongate. I have not come across radially elongated cells in transverse sections of the Ceylon species. Apart from this the Ceylon specimens resemble the descriptions and figures given by Cribb (1958).

Harvey (1858) pointed out that the main difference between *Laurencia grevilleana* and *Laurencia concinna* is the absence of opposite ramifications. But in the Ceylon species collected

in the same area both alternate and opposite ramifications were found. These can be observed in the specimens kept at the herbarium of the Royal Botanical Gardens, Ceylon. I agree with Cribb (1958) that *Laurencia grevilleana* and *Laurencia concinna* are synonyms.

Distribution in Ceylon : On rocks near Matara Rest House.

Geographic distribution: Malayan Archipelago, Toud Island, Lord Howe Island. New Caledonia, Australia.

11. *Laurencia ceylanica* J. Agardh

De Toni 1903, p. 805; Laurencia spec. Harvey, Alg. exsic. No. 17; Yamada 1931, p. 244, pl. 30 fig. a; Boergesen 1936, p. 93; Durairatnam, p. 74, Plate XVII, figs. 6 and 7.

Plants forming compact clumps 3 to 6 cm. high and 2 to 3 mm. broad. Numerous erect or spreading axes arise form a common disc shaped holdfast attached to rocks. Plants are rigid and cartilaginous, but adhering well to paper; usually green in colour when young but becoming pinkish or slightly reddish in mature plants. Branching takes place from base as well as above. Erect branches terete. A characteristic feature of this plant is the very short and tuberculate nature of the ultimate branchlets. All the plants collected by me were sterile. In transverse section, surface cells radially elongated and somewhat palisade-like. No lenticular thickenings were found in walls of medullary cells.

These plants are characteristic of the Western coast of Ceylon extending from Ambalangoda to Galle. The plants are attached to rocks or stones in shallow regions.

In the herbarium of the Royal Botanical Gardens, Peradeniya, I have examined Harvey's Ceylon Algae No. 17 which completely resembles the specimens collected by me morphologically and anatomically. I have also examined Ferguson's Ceylon Algae, No. 27 which have been labelled as *Laurencia complanata* Suhr (Dickie) and *Laurencia* (Harvey) Grunow. These specimens differ from Harvey's Ceylon Algae No. 17 in that the plants have narrower fronds and possess fewer branchlets.

There is yet another specimen No. 27 labelled *Laurencia pinnatifida* (det. S. O. Gray). This plant closely resembles Harvey's Ceylon Algae No. 27 and specimens of *Laurencia ceylanica* collected by me. Under the same cover there is a specimen of *Laurencia ceylanica* Harvey collected by Ferguson in October 1886 and distributed by Alston as No. 2059 and another from rocks in shallow water areas near Gintota collected by Alston in August 1926 and bearing the No. 238. All these exhibit the same characters of *Laurencia ceylanica.* There is yet another specimen No. 2076 under the same cover collected by Alston in May 1928 from Ambalangoda which has been determined by Weber Van Bosse as *Laurencia ceylanica* Harvey. I have examined these specimens carefully and I find that they do not have the characteristic short tuberculate branchlets of *L. ceylanica.* I think it is more reasonable to consider this as a variety of *Laurencia obtusa* Lamx. especially, variety *snackeyi.*

Distribution in Ceylon: Hambantota, Hikkaduwa, Gintota, Ambalangoda.
Hambantota, Hikkaduwa, Gintota, Ambalangoda.

World distribution, India: Japan, Hawaiian Islands.

12. *Laurencia platyclada* Boergesen

Boergesen 1934, p. 21, Fig. 13, Pl. III; Durairatnam 1961, p. 74, Plate XVI, Figs. 4-6.

Plants 8 to 10 cm. in height attached to rocks or stones by means of a disc. shaped holdfast. Branching irregular, thallus flattened, twice as broad as thick, 1.2 to 2.5 mm. Branches given off alternately or subopppositely from margins of thallus in the upper portions. Tuberculate branches sometimes present. Stichidial branches short. Cystocarps large and sessile and spread over surface of thallus. In transverse section of branchlet, the peripheral cells are as long as broad with convex walls. No lenticular thickenings were observed in walls of medullary cells.

The plant has some resemblance to *Laurencia flexuousa* Kuetzing as mentioned by Boergesen (1934), but the thallus of *Laurencia flexuosa* is narrower. Although this plant has some resemblance to *Laurencia ceylanica* J. Ag. it can be differentiated by the absence of the characteristic short tuberculate branchlets and the radially elongate somewhat palisade surface cells.

Summary

The herbarium material belonging to the genus *Laurencia* kept at the Royal Botanical Gardens, Peradeniya together with my collections of material belonging to this genus from various parts of Ceylon have been examined.

Most of the material belonging to the genus *Laurencia* had been incorrectly identified and their true identity has been determined. A key to the Ceylon species of *Laurencia* is given.

Acknowledgements

I wish to thank Dr. J. W. L. Peiris, Deputy Director, Research, Agricultural Department, for kindly allowing me to examine the herbarium sheets of *Laurencia* kept at the Royal Botanical Gardens, Peradeniya, and also to Mr. K. L. D. Amaratunga, Research Officer, Systematic Botany, attached to the herbarium for his co-operation.

I am very grateful to Professor Frank W. Jane, Royal Holloway College, University of London, for going through the paper and giving valuable suggestions.

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