/. *Mar. biol. Ass. India,* 1960, 2 (2): 221-22$

FLORA OF THE PEARL BEDS OFF TUTICORIN*

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THIS account deals with the algae collected during a survey of the pearl and chank beds off Tuticorin during December 1958 to May 1959, conducted by Dr. F. Baschieri-Salvadori, F.A.O. Underwater Expert, in collaboration with Mr. K. Nagappan Nayar of the Central Marine Fisheries Research Institute and Mr. Isaac Rajendran of Madras State Fisheries, to whom the author is grateful for the algal collections. In addition, during the above period pearl fishery was in progress (March to May) and the algae brought by divers along with oysters were also studied by the author.

Practically no information is available on the deep water algae of the Indian coast except a few records published by Boergesen (1937a, 19376 and 1938). The present account gives a fair picture of the flora of these pearl beds (Paars) in relation to substratum and depth. Though all the Paars had some form of algal vegetation, of the 33 Paars examined, only 11 had luxuriant growth of algae. Broadly, these Paars are grouped into four zones based on the dominant community ; i.e., dominated by red algae as in Zone I, dominated by green algae as in Zone II, a balanced vegetation without any particular group dominating as in Zone III, and dominated by brown algae as in Zone IV. It may be mentioned here that Zone III merges with Zone IV and the dominance by brown algae in Zone IV is not very distinct. Table 1 gives the details of Paars, substratum and algal growth ; Text-Fig. 1 indicates the Paars studied.

A more critical consideration of these zones reveals that Zone IV has the maximum luxuriance of vegetation, with a complex community attaining almost a good balance between the red and brown algae, though the collections from the luxuriant beds of Karai Karuwal, Velangu Karuwal and Trichendur Poontottam Paars indicate the dominance of brown algae, particularly Sargassums. Among the red algae, the more striking ones are *Gracilaria edulis* (Gmel.) Silva, *Hypnea valentiae* (Turn.) Mont., and *Polysiphonia tuticorinensis* Boergs. The next best is Zone I, having an excellent growth of *Avarainvillea erecta* (Barkel.) Gepp, *Bryopsis corymbosa* J. Ag., *Caulerpa fergusonii* Murr., *C. peltata* Lamx., *C. taxifolia* (Vahl) Ag., *Halimeda opuntia* (L.) Lamx., and *H. tuna* (Ellis & Sol.) Lamx. Though the two Paars of this zone have excellent growth of green algae, the dominant community consists of red weeds. In Zones I and II, crustose coralline algae and epiphytic algae are very common. In these categories, notable ones are *Acrochaetium* spp., *Climacosphenia moniligera* Ehrenberg, *Griffithsia* sp., *Leveillea jungermannioides* (Mart, et Herv.) Harv., *Licmophora abbreviata* Ag., *Lithophyllum* sp., *Lithothamnium fruticulosum* (Kiitz.) Foslie, *Melobesia pustulata* Lamx., *Polysiphonia platycarpa* Boergs., and *Sphacelaria furcigera* Kiitz.

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TABLE 1

Zone	Number.*	Name of Paar	Depth in Meter	Substratum	Algal growth
I	1	Devi Paar	12-15	Flat rock with very little sand.	excellent
	2	Pernandu Paar	12-14	do.	do.
	3	Vaippar Periya Paar	12-14	Thick sand over muddy bed with broken shells.	poor
	4	Cruxian Paar	12-18	Rocky covered with sand and plenty of shells.	fair
	5	Vantivu Arupagam Paar	10-12	Rocky and coral bed covered with sand.	excellent
	6	Nagara Paar	13-14	Rocky bed with very little sand.	fair
	7	Uti Paar	14-17	Flat rock with very little sand.	fair
	8	Uduruvi Paar	14-17	do.	poor
II	9	Kilati Paar	13-14	do.	fair
	10	Attuvai Arupagam Paar	14	Sandy bed with very few rocks.	poor
	11	Pattarai Paar	14-18	Flat rock with little sand and broken shells.	poor
	12	Pasi Paar	14-18	Flat rock covered with sand.	fair
	13	Attonbadu Paar	16-18	Sandy bed with broken shells.	good
	14	Tolayiram Paar	15-21	Rocky with patches of sand.	excellent
	15	Kutadiar Paar	15	Flat rock with very little sand.	fair
	16	Par Kudanjan Paar	14-17	Rocky with very little sand * spread over.	poor
	17	Nenjurichan Paar	15	do.	do.
	18	Mela Onbadu Paar	14-16	do.	good
	19	Vada Onbadu Paar	16-17	do.	do.
	20	Saith Onbadu Paar	14-16	do.	excellent
III	21	Puli Pundu Paar	15-18	Rocky with patches of sand-covered areas.	good
	22	Pinnakayal Sultan Paar	17	Sandy with broken shells,	poor
	23	Sankuraiya Pattu Paar	20	do.	do.
	24	Rajavukku Sippi Soticha Paar	16-18	Flat rock with crevices and little sand.	fair
	25	Kudamuttu Paar	14-16	Flat rock with little to heavy covering of sand.	fair
	26	Saith Kudamuttu Paar	14-16	Flat rock with crevices.	good
	27	Kadian Paar	14-16	Fissured rock with little sand.	poor
	28	Kanava Paar	14-16	Sandy bed with broken shells.	poor
	29	Naduvu Malai Piditta Paar	16-18	Sand covered rocky bed.	poor
IV	30	North Karuwal Paar	16-18	Rocky with little sand.	excellent
	31	Karai Karuwal Paar	16-18	do.	do.
	32	Velangu Karuwal Paar	16-18	do.	do.
	33	Trichendur Poontottanri Paar	14-18	Fissured rock with sand.	do.

* This number corresponds with the numbering of Paars in text figure 1.

The largest single Paar in the groups examined is in Zone II—Tolayiram Paar—and has a vegetation which could be considered to represent the typical pearl bed flora. The collections from this Paar showed most of the species collected from the rest of the 32 Paars, though the green algae dominated. Zone III, as indicated earlier, had a balanced vegetation. Here, the remarkable feature is the absence of most of the foliose forms; even Dictyotas were very few. Further, the beds in this

zone were rather poor and most of the algae collected were found growing on the oyster shells.

Though much emphasis cannot be given to size in relation to depth, it is worth mentioning that in general, the deep water algae are more delicate and most of them

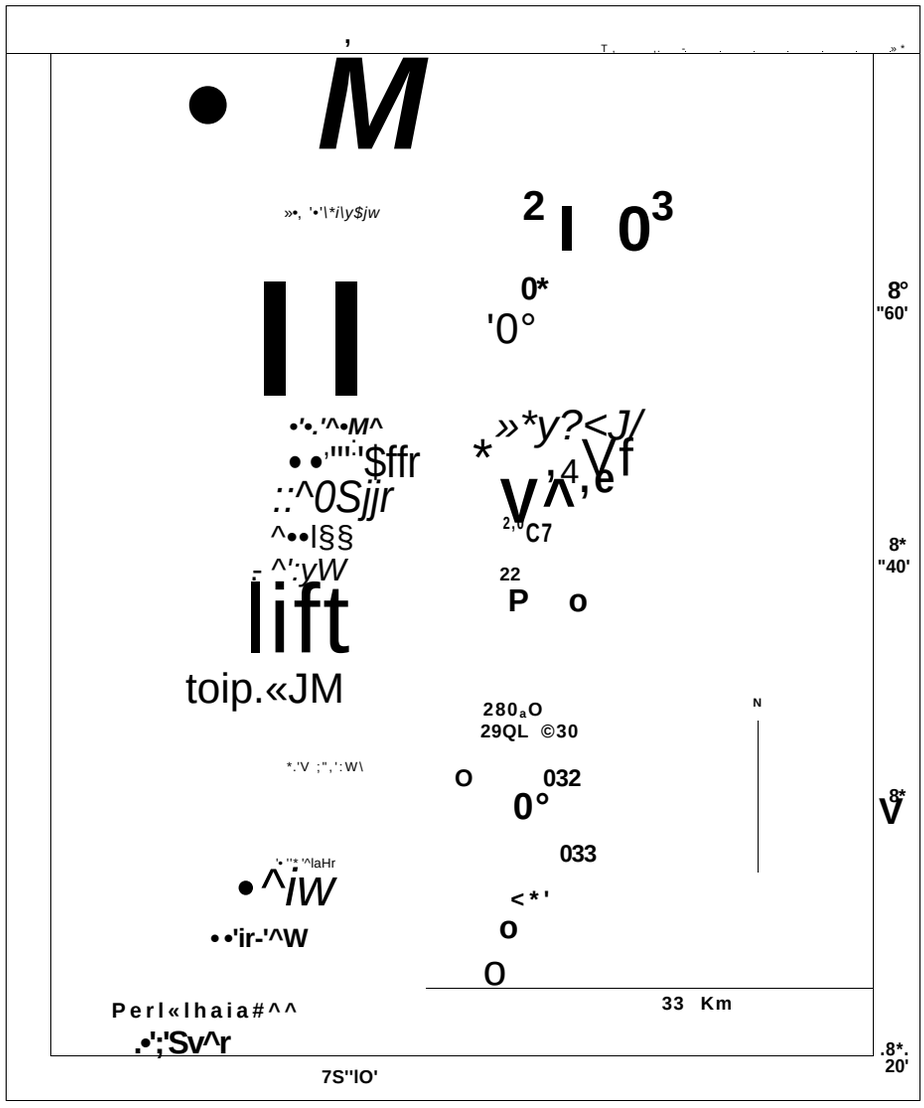

Fig. 1.

are small-sized species. The probable exceptions seen in this study are *Spathoghssum asperum* and *Polysiphonia tuticorinense.* Even in the case of Sargassums and Padinas, the plants are very much reduced and in the latter, calcification is also very little,

From the list of algae given in this account, it will be clear that the algae of the pearl beds are mostly of the types found in coral beds or rocky regions of the Indian coast, irrespective of depth. In other words, there seems to be no selectivity for algae with regard to depth. But, in the case of green algae, the majority of forms inhabiting the deep waters belong to the Siphonales. Very surprisingly, blue-green algae, were totally absent in the above collections ; only twice the author got a few filaments of *Lyngbya* sp., entangled among *Hypnea valentiae*. Further, the dominance of green algae depends on the presence of sand or mud on the Paars; very favourable growth of Caulerpas, Padinas and Halimedas were seen on those Paars which are covered with sand. Same is the case with Gracilarias and Hypneas.

List of algae in the four zones

ZONE I:

Avrainvillea erecta (Berkel.) Gepp, *Bryopsis corymbosa* J. Ag., *Caulerpa fergusonii* Murr., *C. peltata* Lamx., *C. taxifolia* (Vahl) Ag., *Climacosphenia monilfgera* Ehrenberg, *Halimeda opuntia* (L.) Lamx., *H. tuna* (Ellis & Sol.) Lamx., *Licmophora abbreviata* Ag., *Dictyota atomaria* Hauck, *D. bartayresiana* Lamx., *Padina commersonii Bory, Spathoglossum asperum* J. Ag., *Acanthophora spicifera* (Vahl) Boergs., *Herposiphonia insidiosa* (Grev.) Falkenb., *Heterosiphonia stuposa* (J. Ag.) De-Toni, *Hypnea valentiae* (Turn.) Mont., *Jania rubens* (L.) Lamx., *Laurencia obtusa* (Hudsl) Lamx., *L. papillosa* (Forssk.) Grev., *Leveillea jungermannioides* (Mart, *et* Herv,) Harv., *Lithophyllum* spp., *Lithothamnium fruticulosum* (Kiitz.) Foslie, *Melobes\a pustulata* Lamx., *Polysiphonia platycarpa* Boergs., *P. tuticorinense* Boergs. ,

ZONE II:

Avrainvillea erecta (Berkel.) Gepp., *Caulerpa cupressoides* (Vahl) Ag., *C. fergusonii* Murr., *C. peltata* Lamx., *C. taxifolia* (Vahl) Ag., *Cladophora utriculosa* Kiitz., *Climacosphenia moniligera* Ehrenberg, *Codium coronatum* Setch., *Halimeda tuna* (Ell. *et* Sol.) Lamx., var. *platydisca* (Decsne.) Barton, *Licmophora abbreviata* Ag., *Microdictyon tenuius* (Ag.) Decsne., *Neomeris annulata* Dickie, *Struvea tuticorinensis* •Boergs., *Ulva lactuca* L., *Dictyopteris australis* Sond., *D. delicatula* Lamx., *Dictyota bartayresiana* Lamx., *D. dichotoma* (Huds.) Lamx., *D. maxima* Zan., *Ectocarpus breviarticulatus* J. Ag., *Hormophysa triquetra* (L.) Kiitz., *Padina commersonii* Bory, *P. gymnospora* (Kiitz.) Vick., *Sargassum wightii* (Grev. & Mscr.) Ag., *Spathoglossum asperum* J. Ag., *Sphacelaria tribuloides* Menegh., *Acanthophora spicifera* (Vahl) Boergs., *Acrochaetium canarense* Boergs., *A. tuticorinense* Boergs., *Amphiroa fragilissima* (L.) Lamx., *Botryocladia kptopoda* (J. Ag.) Kylin, *Ceramium rubrum* (Huds.) Ag., *C. transversale* Collins et Herv., *Champia indica* Boergs.. *C.parvula* (Ag.) Harv., *Chondria transversalis* Boergs., *Claudea multifida* Harv., *Galaxaura oblongata* (Ell. et Sol.) Lamx., *Gelidiopsis variabilis* (Grev.) Schmitz, *Gracilaria edulis* (Gmel.) Silva, *Halymenia floresia* (Clem.) Ag., *Heterosiphonia muelleri* (Sond.) De-Toni, *H. stuposa* (J. Ag.) De-Toni, *Hypnea musciformis* (Wulf.) Lamx., *H. pannosa* J. Ag., *H. valentiae* (Turn.) Mont., *Laurencia obtusa* (Huds.) Lamx., *L.paniculata* J. Ag., *Lophocladia lallemandi* (Mont.) Schmitz, *L. trichoclados* (Mett. *et* Ag.) Schmitz, *Martensia fragilis* Harv., *Melobesia pustulata* Lamx., *Neurymenia fraxinifolia* (Mert.) J. Ag., *Polysiphonia platycarpa* Boergs., *P. tuticorinensis* Boergs., *Roschera glomerulata* (Ag.) W-vB., *Sarconema filiforme* (Sond.) Kylin, *Scinaia• hatei* Boergs., *Spyridiq filamentosq* (Wulf.) Harv.,~ *Vanvoorstia spectabilis* Harv.

ZONE III:

Cladophora utriculosa Kutz., *Bryopsis plumosa* (Huds.) Ag.,. *Halimeda opuntia* (Ell. e^Sp.14 Lamx^*JklQcqrpus arabicus* Fig. *et* De-Not., *Dictyota maxima* Zan., *Champia indiCa*: Boergs., *Galdxdura oblongata* Lamx., *Hypnea musciformis* (Wulf.) Lamx., *Jania rubens* (L.) Lamx., *Laurencia paniculata* J. Ag., *Lithothamnium fruticulosum* (Kiitz.) Foslie; *Melobesia pustulata* Lamx., *Roschera glomerulata* (Ag.) W. vB., *Spyridia filamentosa* (Wulf.) Harv., *S.fusiformis* Boergs.

ZONB IV :

This Zone had the same flora as Zone II, but in addition the following algae were also collected from the Paars of this zone : *Dictyopteris muelleri* (Sond.) W. v B., *Sargassum myriocystum* J. Ag., *Champia globulifera* Boergs., *Dictyurus purpurascens* Bory, *Grateloupia lithophila* Boergs., and *Lynkiella karuvaiensis* Varma. Of these, *Lynkiella karuvaiensis* and *Dictyums purpurascens* were seen ony in Karai Karuwal and Velangu Karuwal Paars.

From all the four Zones, *Halophila ovalis* (R. Br.) J. D. Hooker was collected ..and this member of the Hydrocharitaceae was always associated with sand covered Paars,

•- Detailed descriptions of some of the interesting species as well as a few doubtful genera will be published elsewhere.

• - " " • - " REFERENCES

BOERGESEN, F. 1937a. Contributions to a South Indian marine algal flora, I, /. *Indian hot. Soc*, 16 (1 & 2) 1-56.

".. . ..'.', .'..'4937b. Contributions to a South Indian marine algal flora, II, *Ibid. ,16 (6):* 311-57.

S'.-i? ' " '-'i' ,1938,' "Contrfbuti0nstoa!s6ajiIndian marine algal flora, III, *Ibid.,* 17(4): 205-3S.