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Preliminary Survey of Aldabra Vegetation

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Preliminary survey of Aldabra vegetation

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The vegetation of Aldabra, except for the area around the settlement and a number of *Casuarina* groves, is probably in approximately its original condition. It is mostly a varied evergreen or semi-deciduous scrub or scrub-forest, with open areas of grass or sedge meadow and ephemeral vegetation. Many local cover types can be distinguished according to the I.B.P.-Fosberg classification. The total flora will come to about 200 species, of which 47 are thought to be exotics. Of these, only *Casuarina equisetifolia* presents a serious threat to the native vegetation. In certain areas grazing by tortoises exerts a conspicuous influence on the physiognomy of the vegetation. Mangroves line the lagoon shores in many places. Meadows of 'sea-grasses' cover much of the coral reef surrounding the atoll.

The original vegetation of Aldabra was, before man's arrival, undoubtedly a complex of scrub and scrub-forest, more or less xerophytic, variable in density, and interrupted here and there by grassy openings and bare, occasionally flooded, rock or silt flats.

The physiognomy was doubtless much influenced locally by tortoise grazing, the intensity of this varying with the density of the tortoise population, just as at present.

Much of the island still remains very much as it was then, in spite of the introduction of goats. The latter have, fortunately, been slow in multiplying, and their influence on the vegetation is hard to estimate.

The most important changes resulting from human activity stem from the introduction of exotics. Coconuts and *Casuarina* have been planted on most of the significant sand flats, certainly eliminating the original vegetation there.

The great majority of the 47 exotic plants on the atoll have not spread outside West Island, a few are on Isle Michel and at Anse Malabar and Anse Mais, where there have been temporary human settlements. A very few have turned up elsewhere. The only exotic here regarded as a serious problem is *Casuarina*, which will be discussed further on. Certainly every precaution should be taken to keep the introduction of exotic plants to a minimum and sooner or later consideration should be given to eliminating those now present.

The present vegetation pattern may only be drawn in very broad terms, as much of the island has not been studied, and is difficult of access. Air photos give a rough picture, but as yet insufficient study has been devoted to identification and interpretation of types distinguished on air photos to give a reliable method.

Most of the atoll is covered by an evergreen or semi-deciduous scrub or scrub-forest, differentiated into a number of structural and floristic types, largely correlated with physiographic units of the generally low, flat limestone surface. Most conspicuous among these are: a microphyllous sclerophyll scrub of *Pemphis acidula*, found on low-lying very rough, sharp 'champignon' or pitted limestone; a series of broad-leafed evergreen and semi-deciduous scrub and scrub-forest types on higher generally less rough surfaces, the density roughly proportional to the roughness of the substratum; and mangrove scrub and forest on tidally inundated lagoon margins. A single patch of taller forest of *Ficus*, *Calophyllum* and other genera occurs on a small area of higher porous limestone at Takamaka.

Peripheral sand dunes and sand ridges have grass of several sorts, and patches of scrub-forest of strand trees.

Groves of introduced coconuts and *Casuarina* have been established on sand flats at a number of places, forming rather tall forests. The *Casuarina* has spread vigorously onto neighbouring champignon and pavé, and has suppressed the native scrub and scrub-forest that originally occupied the land.

The *Casuarina* poses the most serious long-term threat to the integrity of the terrestrial ecosystem of Aldabra. It is easy to estimate the spread and aggressive capacity of this tree. Most of the groves are high in the centre, with usually a few large, probably planted, trees, with the size and stature decreasing toward the edges where the young forest diffuses into the native vegetation in the form of seedlings taking root on any exposed spot of soil between the bushes. This slow take-over of the landscape may well result in the island eventually being completely dominated by *Casuarina* except for the mangrove swamps. Very few of the native species survive long under even a thin canopy of *Casuarina*. The reasons for this are not clear, but would be a good problem for an ecological investigation.

Many *Casuarina*, *Guettarda*, and other trees have been toppled by storms. Defoliation was conspicuous all along the north and northwest coasts after a 2-day northwest wind that carried a lot of spray. Distortions and lineations of trees on the Trade Wind sides of the atoll attest to the strong influence of the wind on the vegetation physiognomy and arrangement.

We have insufficient data to make any valid generalizations about the relation of the vegetation to the rainfall régime, and almost no data on the phenology of the plants. Many of the characteristics of the vegetation will only be elucidated by observations made over a long period, which may profitably be undertaken when a permanently staffed station is set up.

The following is a schematization of the available data according to the classification presented in the I.B.P. Handbook No. 4, pp. 73–120 (1967) followed by brief characterizations of the discernible vegetation types and their habitat preferences. No floristic list is offered, as that is to be supplied in the form of a flora of the island, in preparation by Mr Renvoize and myself.

Aldabra vegetation types, arranged according to I.B.P.-Fosberg scheme of classification of formations

Closed evergreen to semi-deciduous vegetation
- Broad-leaf forest and scrub
  - Megaphyllous sclerophyll forest
    - *1 *Cocos nucifera* groves
  - Megaphyllous sclerophyll scrub-forest
    - 2 *Pandanus* forest and grove
  - Mesophyllous
    - Orthophyll forest
      - 3 *Pisonia* groves
    - Orthophyll scrub-forest and tall scrub
      - *4 Mixed scrub-forest and tall scrub
      - 5 *Guettarda* scrub-forest and tall scrub
      - *6 *Thespesia populneoides* scrub
      - 7 *Cordia* thicket
      - 8 *Thespesia populnea* thicket
    - Orthophyll scrub
      - *9 Mixed scrub
      - 10 *Scaevola* scrub
      - 11 *Acalypha* scrub
    - Sclerophyll scrub-forest
      - 12 *Calophyllum–Ficus–Maillardia* forest
      - 13 *Sideroxylon* thicket
      - 14 *Tournefortia* thicket
    - *Sclerophyll swamp forest, scrub-forest and scrub
      - 15 Mixed mangrove
      - 16 *Rhizophora* forest and scrub-forest
      - 17 *Ceriops* forest and scrub-forest
      - 18 *Avicennia* scrub-forest and scrub
      - 19 *Bruguiera* scrub-forest and scrub
      - 20 *Lumnitzera* scrub
    - Microphyllous sclerophyll scrub
      - *21 *Pemphis* scrub
      - 22 *Suriana* scrub
      - 23 *Maytenus* thorn scrub
  - Needle-leaf non-resinous forest and dwarf scrub
    - *24 *Casuarina* forest
    - 25 *Plumbago* dwarf scrub

* Areas estimated to be mappable on maps at scales available for Aldabra.

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Submerged meadows
- 26 *Cymodocea–Thalassia–Halodule* meadows

Algal vegetation
- 27 Cyanophycean film and boring algae

Open evergreen vegetation
Broad-leaf
Megaphyllous sclerophyll forest
- *28 *Cocos nucifera* groves

Mesophyllous
Orthophyll
- *29 *Guettarda* krumholz
- *30 *Guettarda* scrub and scrub-forest
- *31 *Thespesia populneoides* scrub-forest
- *32 Mixed scrub and scrub-forest
- 33 Mixed herb vegetation
- 34 *Acalypha* scrub

*Sclerophyll swamp scrub-forest and scrub
- 35 Mixed mangrove scrub and scrub-forest
- 36 *Avicennia* scrub and scrub-forest
- 37 *Lumnitzera* scrub
- 38 *Bruguiera* scrub and scrub-forest

Sclerophyll herb vegetation
- 39 *Acrostichum aureum*

Narrow-leaf non-resinous forest
- *40 *Casuarina* forest

Algal vegetation
- 41 Submerged algal meadows

Sparse evergreen vegetation
Mesophyllous
Orthophyll
- *42 Mixed scrub
- 43 *Guettarda* scrub-forest
- 43a *Guettarda* krumholz
- 44 Mixed herb vegetation
- 45 *Acalypha* scrub

Sclerophyll swamp
- *46 *Pemphis–Lumnitzera* scrub
- *47 Mixed mangrove scrub
- *48 *Avicennia* scrub or scrub-forest

Sclerophyll herb vegetation
- 49 *Acrostichum aureum*
- 50 *Fimbristylis cymosa*

Closed to open or sparse ephemeral herb meadows
- 51 Mixed ephemeral herb meadow
- 52 *Mollugo* meadow
- 53 *Bacopa* meadow

Closed to open short grass
Orthophyll
- 54 Mixed grass 'tortoise pastures'
- 55 Submerged meadow
- 56 Mixed sedge meadows
- 57 *Cyperus ligularis* meadow
- 58 *Fimbristylis ferruginea* meadows

Sclerophyll
- 59 *Fimbristylis cymosa* meadow
- 60 *Sporobolus virginicus* meadow
- 61 *Sclerodactylon* bunch grass
- 62 *Cyperus conglomeratus* stands

Algal vegetation
- 63 Cyanophycean boring algal vegetation

* Areas estimated to be mappable on maps at scales available for Aldabra.

Coconut groves

Closed to open, evergreen megaphyllous sclerophyll forest; columnar trunks to 20 m tall, topped with enormous rosettes of pinnate leaves; scattered shrubs and ground vegetation of various grasses and herbs.

Found on a few sandy areas as in the settlement, Anse Mais, and Ile Michel. May form a mixture or mosaic with *Casuarina* forest.

Pandanus *forest and groves*

Closed evergreen megaphyllous sclerophyll scrub-forest; trunks and sparse branches smooth with ring-like leaf scars and root primordia, bases supported by cone-shaped masses of stilt roots, great spiral tufts of spiny-toothed strap-shaped leaves to 1 m or more long, trees usually 6 to 8 m tall; pure stands or with admixture of broad-leaf orthophyll species.

Found usually in small groves rarely in more continuous stands, most prominent on coastal ridges, very scarce on West Island and western end of South Island. Not predominantly associated with water-holes, as previously believed, but occasionally found in such situations.

Pisonia *grove*

Broad-leaf evergreen mesophyllous orthophyll forest of *Pisonia grandis*, with thick pale trunks, to 15 m tall.

One very small grove on beach-flat at Point Hodoul, only isolated *Pisonia* trees elsewhere on the island.

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Mixed scrub and scrub-forest

Closed to open or sparse broad-leaf evergreen mesophyllous orthophyll to subsclerophyll woody vegetation 1 to 6 or 7 m tall with several species of sedges locally forming a ground cover with a number of other herb species. Composition of the woody layer varied, including about 50 species of shrubs and small trees, not one of these dominant except very locally. The most frequently present are:

Sideroxylon inerme
Polysphaeria multiflora
Mystroxylon aethiopicum
Maytenus senegalensis
Euphorbia abbottii
Ochna ciliata
Erythroxylon acranthum
Apodytes dimidiata
Ficus thonningii
Canthium bibracteatum
Terminalia fatraea
Ficus avi-avi

Less frequent but still notable are:

Guettarda speciosa
Scutia myrtina
Secamone fryeri
Tarenna trichantha
Ficus nautarum
Phyllanthus cheloniphorbe
Allophylus alnifolia
Scaevola taccada
Dracaena reflexa
Pandanus cf. *tectorius*
Acalypha claoxyloides
Flacourtia ramontchii
Jasminum elegans
Sarcostemma viminea
Triainolepis fryeri
Tricalysia sonderiana
Clerodendrum glabrum

Some 22 other species were seen occasionally in this type. Not all the species listed as frequent occur in all stands, and locally areas are dominated by one or other of them, which, if of any substantial size, are treated as separate types, though most of them could equally well be included in the mixed scrub, and for mapping purposes can scarcely be treated otherwise.

This type and its variants occur on areas that lie at least a few decimetres above the areas dominated by *Thespesia populneoides*, *Pemphis acidula*, and any mangrove species. There seems to be some slight correlation between density of vegetation and roughness of substratum, and between sparseness of vegetation and flatness of the platin. It is by far the most generally distributed, as well as the most variable of the types found on the island. Certain species, found locally, may indicate where the type may be subdivided on floristic grounds, but detailed phyto-sociological studies would be needed for such subdivision. Subdivision for mapping may be based on physiognomic grounds, especially spacing.

On air photos in some areas of mixed scrub-forest the trees seem to be arranged conspicuously in rows, oriented east–west to southeast–northwest. In these rows the trees tended to lean somewhat to the westward, suggesting that the Trade Winds were involved in the origin of this curious arrangement. While I was there, in January and February, the Trade Winds did not blow at all, but later J. Frazier reported that they blew constantly with considerable force.

Guettarda *scrub-forest*

Open or sparse, rarely dense, broad-leaf evergreen mesophyllous orthophyll scrub or scrub-forest, usually with considerable admixture of *Pandanus* cf. *tectorius* and various other mixed forest species. Usually 3 to 6 m tall, with ordinarily a scattered shrub layer, frequently of *Solanum aldabrense*, and a sparse herb layer of many species, mostly confined to pits in the limestone, elsewhere kept eaten down by tortoises.

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This type is found on broad coastal ridges of champignon and on sand ridges and dunes. On exposed areas it is distorted and wind-sculptured and can be distinguished as 'krumholz', for convenience here distinguished as a separate type. *Guettarda* forest is known only from the eastern part of South Island from the Dune Jean-Louis area eastward.

Over large areas in the Cinq Cases region the *Guettarda* forest is mostly dead, composed mainly of whitened skeletons of trees, these frequently tipped over. There is no obvious cause for this. In an area southeast of Cinq Cases Camp, on the inner slope of a broad rough coastal ridge, of 105 *Guettarda* trees counted, 37 were living, 30 were standing but dead, and 38 were fallen. Of the fallen ones four were pointing in the northeast quadrant, two in the southwest quadrant, and 32 in the northwest quadrant. The forest in this area was open to sparse. A few *Pandanus* trees were also dead. The scattered individuals of other species mostly appeared in healthy condition.

Thespesia populneoides *scrub and scrub-forest*

Open to sparse, locally closed, broad-leaf evergreen mesophyllous orthophyll or subsclerophyll, 3 to 6 m tall, principally of the one species of tree, with local ground cover of sedges and, around waterholes, scrub patches of *Lumnitzera racemosa*. The trunks of the dominant species are short, and almost never straight, the crowns wider than high. Tortoises seem rather seldom to eat the leaves, but do apparently eat the fruits.

This species is found on platin lying 1 or 2 dm below the general level of ground bearing mixed scrub and 1 or 2 dm above that occupied by *Lumnitzera*, and *Pemphis*, and well above the level of mangrove swamps.

Thespesia populnea *thickets*

Small patches or clumps of this species, forming a dense broad-leaf evergreen mesophyllous orthophyll or subsclerophyll scrub-forest up to 6 or 8 m tall, tangled.

These thickets occur discontinuously at the landward bases of sand dune areas or sandy beach deposits.

Cordia subcordata *thickets*

Small patches or clumps of this species, forming a tangled scrub 2 to 4 or 5 m tall, with branches clear to the ground; broad-leaf semi-deciduous, mesophyllous orthophyll.

These thickets also occur very sparingly at the inner edges of sand dunes or beach ridges, mostly on the north side of the atoll.

Scaevola taccada *scrub*

Closed to open broad-leaf evergreen mesophyllous orthophyll scrub 0.5 to 1.5 m tall, often with low spreading branches, bright green leaves, soft wooded. Relatively pure stands of this species.

Rather restricted in distribution, on sand or champignon areas near the coast.

Tournefortia *thicket*

Limited stands of open to closed broad-leaf evergreen mesophyllous succulent-sclerophyll scrub or scrub-forest; twisted hard-wood trunks with fleshy, frosty-green, rather large leaves, found locally on coastal dunes on the south coast of South Island, as at Dune Jean-Louis. Sometimes with admixture of other coastal thicket species.

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Acalypha claoxyloides *scrub*

Closed to open or sparse broad-leaf evergreen mesophyllous orthophyll scrub up to 1 to 1.5 m tall, green; pure to somewhat mixed stands of this species, with other mixed scrub species.

Frequent but rather small patches on sand or champignon, usually near the coast; in exposed places along the east coast, the bushes are growing in pits in the champignon, not rising much above the general level of the rock.

Calophyllum–Ficus–Maillardia *scrub-forest*

Closed broad-leaf evergreen mesophyllous sclerophyll forest 8 to 12 m tall, with dense canopy, or tall shrub layer, and little ground cover. Largely composed of *Ficus* spp., *Calophyllum inophyllum*, *Maillardia* sp., and a number of tall shrubs, especially

Macphersonia madagascariensis
Flacourtia ramontchii
Scolopia sp.
Mystroxylon aethiopicum
Psychotria pervillei
Polysphaeria multiflora
Dracaena reflexa

This type, in well-developed form, is found only on one small patch of very porous limestone lying 0.5 m or more above the level of the surrounding platin. It is called the Takamaka Grove, from the local name for *Calophyllum inophyllum*, found only here on the atoll.

Sideroxylon inerme *thicket*

Closed broad-leaf evergreen mesophyllous sclerophyll scrub-forest. This is a variant of the mixed scrub-forest reaching perhaps 6 to 8 m in height, containing many species but dominated by *Sideroxylon*, with some *Pandanus*.

It occurs in small patches, mainly in the Takamaka area. There is no obvious difference in the terrain from that of ordinary mixed forest but the soil tends to be black and mostly humus.

Mangrove swamp

Closed to open or sparse broad-leaf evergreen mesophyllous sclerophyll forest, scrub-forest or scrub: with stilt roots, pneumatophores, knees and other apparent adaptations to inundation of the basal parts.

Several floristic phases of this type are considered together, as they would all have essentially the same diagnosis. A mixed mangrove type may be distinguished containing a number of species, most of which may also form pure stands. These are:

Rhizophora mucronata
Bruguiera gymnorhiza
Ceriops tagal
Avicennia marina
Lumnitzera racemosa
Sonneratia alba
Xylocarpus granatum
X. moluccensis

The last three do not form important stands on Aldabra. *Lumnitzera* forms only scrub, and is in places mixed with *Pemphis acidula* in sparse stands.

The mangroves occupy tidally inundated areas of various types of substratum, most frequently a mud or marl, possibly resulting from a disintegration of coral limestone under the influence of acid humus or peat produced by the mangroves.

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Pemphis acidula *scrub*

Usually closed, sometimes open, rarely sparse, broad-leaf evergreen microphyllous sclerophyll scrub; very densely and rigidly branched, wood extremely hard. Dominated by *Pemphis* but frequently with some admixture of *Sideroxylon inerme* and, very locally, *Vernonia aldabrensis*.

Generally found on exceedingly rough champignon lying up to a metre or so lower than the surrounding mixed scrub or scrub-forest, frequently forming a narrow belt outlining mangrove areas, a broader belt intermittently stretching along the north coast and parts of the south coast west of Dune d'Messe, and a much broader belt along parts of the lagoon coast, also on some of the rocks and islets in the lagoon, rarely on sand in restricted amounts; roots in places inundated by spring tides. Past estimates of the area covered by *Pemphis* have been greatly overestimated.

Suriana maritima *scrub*

Usually closed, rarely open, broad-leaf evergreen microphyllous sclerophyll scrub; dominated by *Suriana maritima* or somewhat mixed with *Pemphis* and other halophytic shrubs.

Forming a few restricted patches on sand or champignon partly covered by sand, or a narrow fringe around the edges of *Guettarda* or *Pandanus* forest at tops of beaches or on low dunes. Known only from the northeast and rarely the south coasts.

Maytenus senegalensis *thicket*

Closed to open broad-leaf evergreen mesophyllous or microphyllous sclerophyll thorn-scrub; to 3 or 4 m tall, of this one species.

Only observed once, at Passe Gionnet on a low area surrounded by *Pemphis* scrub, just landward of the mangrove belt, on yellow marly soil possibly occasionally flooded by highest spring tides.

Casuarina equisetifolia *forest*

Closed to open, needle-leaf non-resinous evergreen sclerophyll forest; dominated by *Casuarina* but in places with an admixture of *Cocos nucifera*. Patches tend to be very tall, up to 20 to 25 m in centre and becoming lower toward edges. Sparse shrub layer and ground layers of few species, but differing from place to place.

Found on champignon, sand, or rarely platin, in various parts of the atoll, but especially in areas occupied by man at one time or other, oldest trees probably planted by man in most places, but spreading spontaneously, suppressing most of the native species when well developed. In most areas many large *Casuarina* trees have been recently blown down, mostly pointing in the northwest quadrant.

Plumbago aphylla *dwarf scrub*

Dense rather matted low pure stands of broom-like essentially leafless *Plumbago aphylla*; sparsely branched, terete, tough, semi-woody, grey-green stems, abundantly arising from woody root-crowns, short woody-stems, and elongate stolon-like decumbent woody branches, 4 to 6 dm tall, but stems up to 1 to 1.5 m long, usually rather depressed, but occasionally nearly upright.

This type occurs very locally and in limited patches of a few square metres to 0.5 hm^2 or so, in platin or poorly developed champignon just back of coast. Seen in Dune Jean-Louis area and north of settlement on West Island.

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Mixed herb vegetation

Open to sparse stands of various low herbs, including *Boerhavia*, *Asystasia*, *Hedyotis*, *Portulaca*, *Lagrezia*, *Solanum nigrum*, *Phyllanthus* spp., *Acrostichum*, *Dioscorea*, *Maerua*, *Ruellia*, *Eragrostis* spp., *Euphorbia* spp,. and other less common or very local species; of very low stature where heavily grazed by tortoises, but elsewhere from 1 to 3 dm or even more in height.

This occurs locally in open platin, growing in cracks and crevices and in accumulations of soil in depressions, and also on less extreme champignon, where the plants grow especially in pits in the limestone. Where tortoises are abundant the plants are eaten down so that they only occupy the bottoms of the pits, either out of reach of tortoises or in pits so small that the heads of tortoises cannot enter.

Acrostichum *stands*

A. aureum is dominant in three limited vegetation types on Aldabra. In certain rather restricted water-holes, usually rather saline, but varying greatly in this respect, it forms dense masses up to 1 m tall. In a limited area well inland in the southeast corner of the island in platin that has become dissected by deep crevices with water in them, *Acrostichum* up to 0.5 to 0.6 m tall fills the crevices and forms a rather open stand, with scattered *Ficus avi-avi* shrubs. In rather worn-down areas of the coastal champignon terrace, especially near Cinq Cases, small *Acrostichum* plants, 1 to 4 dm tall, occupy pits that are deep enough to hold some moisture. Over some limited areas this is the principal vegetation forming rather sparse stands with the tops of fronds emerging from the pits. Although *Acrostichum* is widespread on the island it is dominant locally only in the east and southeast parts.

Sedge meadows

Closed to open stands of bunchy, tough sedges of a number of species, especially *Cyperus ligularis*, *Fimbristylis ferruginea*, and *F. cymosa*, with *Cyperus obtusiflorus* less frequent. These usually occur in pure patches, but occasionally mixed, and rarely mixed with *Sporobolus virginicus*. The bunches may be discrete, even widely spaced, or frequently crowded into a dense sod, with shoots from 5 to 50 cm or more tall. The *Fimbristylis cymosa* component is definitely sclerophyllous in texture, the others more nearly orthophyllous.

Appreciable stands of these types are found principally on platin, but locally also on sand areas. On platin they occur where there is some accumulation of soil, except that *Fimbristylis cymosa* may occur on almost bare rock.

Sporobolus virginicus *meadow*

Dense sod of *Sporobolus virginicus*, with matted underground rhizomes and above-ground stolons, erect shoots up to 2 or rarely 3 dm and root-systems reaching at least 1 m depth are a common feature of the coastal sand ridge and dunes. The shoots are rather harsh and sclerophyllous, and are exposed to a heavy, more or less continuous, salt spray. This is essentially a pure stand of *Sporobolus* with only sporadic individuals of other plants here and there.

Sclerodactylon *bunch grass*

Considerable patches of coastal sand-ridge and dunes are covered with dense to loose stands of large bunches or tussocks of the coarse grass, *Sclerodactylon macrostachyum*. The leaves of this

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are thick and quill-like, greyish pubescent, stiff and pungent. The fruiting culms are somewhat taller than the leaves, reaching half a metre. The bunches may be connected by rhizomes, accounting for the pure stands of this species.

This type occupies sites that seem identical with those occupied by *Sporobolus virginicus* but the two are seldom mixed. What determines which will be in a particular spot is not obvious, though considerable attention was paid to it.

Cyperus conglomeratus *stands*

Open bunch-grass of clumps of stiff erect *C. conglomeratus*, up to 7 dm tall, are rather similar to the *Sclerodactylon* stands. This species is much more local, found in sandy flats and on low beach ridges on West Island.

Mixed orthophyll 'tortoise pastures'

Thin, close-cropped sod of a number of grasses, sedges and small-leafed dicotyledonous herbs, forming fairly continuous cover but cropped to 1 to 3 cm tall during January and February, and seen to be continually grazed during this period.

This type occurs, mainly in the east end of the island, on silty very flat soil filling depressions in the limestone of platin and poorly developed champignon or pavé areas. These depressions vary from a few decimetres across to several or many metres.

Some of the plants involved are:

Panicum sp. nov.
Dactyloctenium pilosum
Sporobolus sp. nov.
Sida parvifolia
Bulbostylis cf. *filiformis*
Phyllanthus spp.
Euphorbia sp.

Ephemeral herb meadows

Closed to open or sparse depressed annual herbaceous vegetation that appears very rapidly on areas that are unavailable for a part of the year either by being submerged or too dry or saline, immediately after rain or heavy dew makes sufficient moisture available for seed germination. These are made up of a few species of annuals, either in mixtures or, in the case of one or two species, of pure stands. *Mollugo spergula*, *Bacopa monnieri*, *Panicum* sp., *Sporobolus* sp., *Phyllanthus* sp. and *Euphorbia* sp. are the plants principally involved, and the first two of these occasionally occur in pure stands.

This vegetation occurs on the bottoms of intermittent pools that dry up toward the end of the dry season, forming silt or clay flats, and on flats of silty materials that are very rarely flooded by the highest spring tides, around the edges of mangrove areas where these border on platin. Ephemeral herb vegetation has only been observed in the Cinq Cases region.

Another type of ephemeral vegetation, not observed by me except in very limited amounts, is a pure stand of *Bulbostylis* sp. which grows either on dry mud flats or on bare platin with only a minimum amount of soil.

Submerged meadows in fresh or brackish pools

In a few rather large and apparently permanent fresh or brackish water pools in the platin of South Island are open to closed stands of delicate slender aquatic plants. *Naias graminea* and *Chara* sp. have been observed forming vegetation of this sort in a few pools. The two plants

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seem to occur in separate pools. The pools have muddy bottoms and the plants are loosely rooted or at least the lower parts embedded in the mud.

Submerged meadows, marine

On the reef flats all around Aldabra, as well as extending well into the lagoon around the passes are extensive areas of a usually dense sod of marine seed-plants, so-called sea-grasses. These have creeping matted rhizomes on or under the surface of loose fine sediments (probably accumulated as a result of the presence of this vegetation), and shoots up to 3 to 4 dm tall. This vegetation seems usually to be formed of a mosaic of patches of pure stands of each of the several species involved, and of mixtures. The most abundant species are *Cymodocea ciliata* and *Thalassia hemprichii*, with *Halodule* spp., *Cymodocea rotundata* less common, and *Syringodium isoetifolium* only very local. The most extensive and most varied area of this vegetation is on the broad sandy reef flats on the west end of the island. On reef flats on other, more exposed sides *Cymodocea ciliata*, the toughest, most resistent of the species, forms dense pure stands with massive tangled mats of rhizomes. In the reef-flat areas of this vegetation are bare excavated areas, probably resulting from excessive wave action tearing loose portions of the mat.

Algal vegetation (terrestrial)

Limestone surfaces, generally, are stained grey by a layer of boring algae, mostly Cyanophyceae, which extend into the limestone as much as 5 mm. When the rock is broken this layer, beneath the surface, is green. The only limestone surfaces lacking this microscopic vegetation are those recently covered by sand, sand-blasted surfaces, and the bottoms of some solution pools that are covered by a thin deposit of marl.

Algal vegetation (fresh water)

Many fresh to brackish pools have a conspicuous algal scum or bloom, and sludge. This was not studied, but was seen to be eaten by tortoises.

Algal vegetation (marine)

Some areas of lagoon bottom have algal meadows. These were not studied by me, but have been described by Price (this volume, p. 123).

List of species mentioned with authors

(Note. This is *not* a full list of the flora)

Acalypha claoxyloides Hutch.
Acrostichum aureum L.
Allophylus alnifolia (Baker) Radlk. ex Engler
Apodytes dimidiata E. Mey. ex Bernh.
Asystasia bojeriana Nees
Avicennia marina L.
Bacopa monnieri (L.) Wettst.
Boerhavia elegans Choisy
Bruguiera gymnorhiza (L.) Lam.
Bulbostylis cf. *filiformis* C. B. Cl.
Calophyllum inophyllum L.
Canthium bibracteatum (Bak.) Hiern
Casuarina equisetifolia L.
Ceriops tagal (Perr.) C. B. Rob.
Clerodendrum glabrum E. Mey.
Cocos nucifera L.
Cordia subcordata Lam.
Cymodocea ciliata Ehrenb. ex Aschers.
C. rotundata Aschers. & Schweinf.
Cyperus conglomeratus Rottb.
C. ligularis L.
C. obtusiflorus Vahl
Dactyloctenium pilosum Stapf
Dioscorea nesiotis Hemsl.
Dracaena reflexa Lam.
Eragrostis spp.
Erythroxylon acranthum Hemsl.
Euphorbia abbottii Baker

Euphorbia spp.
Ficus avi-avi Bl.
Ficus nautarum Bak
Ficus thonningii Bl.
Fimbristylis cymosa R. Br.
Fimbristylis ferruginea Vahl
Flacourtia ramontchii L'Her.
Guettarda speciosa L.
Halodule uninervis (Forsk.) Aschers.
Halodule wrightii Aschers.
Hedyotis sp.
Jasminum elegans Knobl.
Lagrezia madagascariensis (Poir.) Moq.
Lumnitzera racemosa Willd.
Macphersonia madagascariensis Bl.
Maerua pubescens Gilg.
Maillardia sp. nov.
Maytenus senegalensis (Lam.) Exell
Mollugo spergula L.
Mystroxylon aethiopicum (Thunb.) Leosn.
Naias graminea Del.
Ochna ciliata Lam.
Pandanus cf. *tectorius* Park.
Panicum sp.
Pemphis acidula Forst.
Phyllanthus cheloniphorbe Hutch.
Phyllanthus maderaspatensis L.
Phyllanthus sp.
Pisonia grandis R. Br.
Plumbago aphylla Boj. ex Boiss.
Polysphaeria multiflora Hiern
Portulaca oleracea L.
Portulaca sp.
Psychotria pervillei Baker
Rhizophora mucronata Lam.
Sarcostemma viminea R. Br.
Scaevola taccada (Gaertn.) Roxb.
Sclerodactylon macrostachyum (Benth.) Camus
Scolopia sp.
Scutia myrtina (Burm. f.) Kurz
Secamone fryeri Hemsl.
Sida parvifolia DC.
Sideroxylon inerme L.
Solanum aldabrense C. H. Wright
S. nigrum L.
Sonneratia alba J. E. Sm.
Sporobolus sp.
Sporobolus virginicus L.
Suriana maritima L.
Syringodium isoetifolium (Aschers.) Dandy
Tarenna trichantha (Bak.) Brem.
Terminalia fatraea DC.
Thalassia hemprichii (Ehrenb.) Aschers.
Thespesia populnea (L.) Sol. ex Correa
T. populneoides (Roxb.) Kostel.
Tournefortia argentea L. f.
Triainolepis fryeri (Hemsl.) Brem.
Tricalysia sonderiana Hiern
Vernonia aldabrensis Hemsl.
Xylocarpus granatum Koen.
X. moluccensis (Lam.) Roem.

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