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ARCHITECTURAL ~~ECOLOGICAL~~ ASPECTS OF THE MANGROVE FOREST IN FRENCH GUIANA

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Nearly the whole coastline of French Guiana is bordered by mangroves which may extend inland from a few meters up to approximately 15 kilometers. On the coastal edge, the mangroves' appearance depends on the sedimentation conditions which vary along the coast according to the play of sea currents. These currents give rise to areas which are heavily attacked by the sea, alternating with vast areas of mud flats (ROSSIGNOL 1978).

These mud flats gradually emerge at low tide and it is found that they extend way out to sea. When these flats are sufficiently raised, they are colonised by pioneer mangrove species. Two types of colonisation are observed : Laguncularia racemosa Gaernt. (Combretaceae) and Spartina brasiliensis ~~Aubl.~~ Radl (Poaceae).

Along the banks of rivers crossing the mangroves, there are pure stands of L. racemosa, upstream of the estuaries. These stands, more or less dense, are associated further upstream with a small Lythraceae, Crenea maritima Aubl.. L. racemosa stands have juvenile individuals as well as mature ones. Further upstream these L. racemosa stands are pure yet lose their young individuals - only mature trees remain. Further inland, sometimes 3km from the estuary, (Approuague and Sinnamary), Rhizophora mangle is associated with L. racemosa, eventually becoming the dominant species.

Only R. mangle constitutes the riparian vegetation of the upper estuaries, associated with Montrichardia arborescens (Araceae).

Between the coastal pioneer formations and the riparian formations, the mangrove forest is almost uniquely populated by Avicennia nitida Jacq. (Verbenaceae). On the inland edge of these stands there is either a belt of R. mangle, if it is swamp, which is usually the case, or a senile population of A. nitida covered with epiphytes underneath which spreads a thick layer of Acrostychum aureum.

Fig. 1 is a diagram showing the distribution of plants in the mangroves of French Guiana. This distribution is original due to the extensive populations of A. nitida and the pioneering role of L. racemosa, whilst R. mangle is banished upstream of the estuaries.

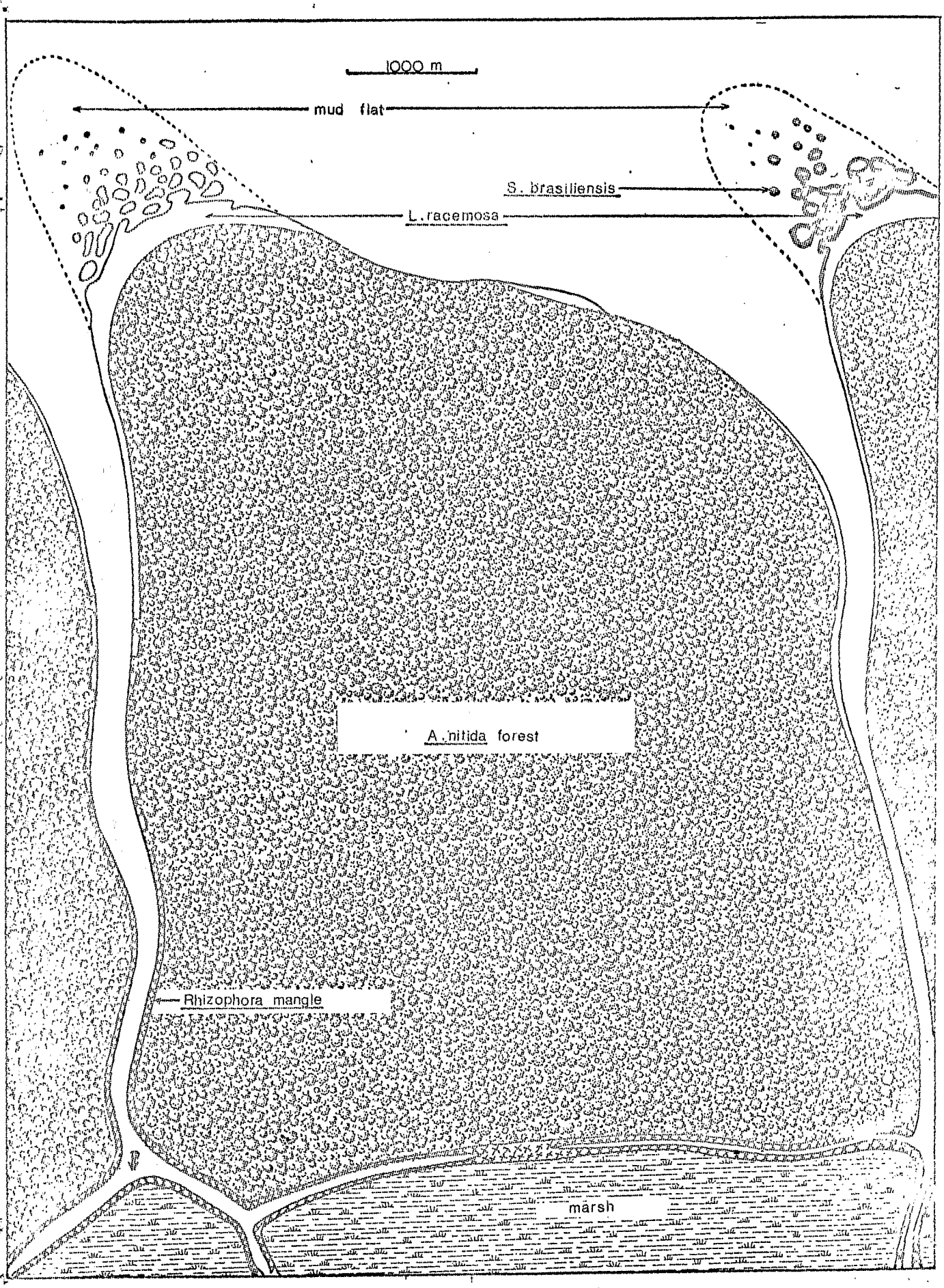
1000 m
mud flat
S. brasiliensis
L. racemosa
A. hitida forest
Rhizophora mangle
marsh

Fig. 1

Before discussing the architecture of the various stands found, it is necessary to give architectural models, (HALLE and OLDEMAN 1970) of the plants populating these stands. (Fig. 2).

Laguncularia racemosa Gaernt. (Combretaceae) (Fig 2-1)

After a brief unbranched phase during which an orthotropic stem forms with opposite leaves and 7 or 8 internodes, the plant branches in a slightly rhythmic manner into sequences of 3 to 5 pairs of secondary axes which are relatively weak and are followed by one stronger pair. The secondary axes, although sometimes parallel to the ground, have no plagiotropic differentiation at the level of the leaves. The plant may bear axes of the third order possessing a terminal and lateral inflorescence. Flowering is early - it may occur in individuals 1m high. Taking into consideration the discretely rhythmic branching of the main stem, this initial model of L. racemosa would therefore be an Attims' one, as described by HALLE and OLDEMAN (1970).

In individuals of this species, it is found that reiteration of the model may occur very early, before the plant has reached 1m high. These reiterated stems are often very slanting, enabling the plant to cover the ground. The reiterations are not due to any traumatism of the apex // they are of an adaptive nature.

Avicennia nitida Jacq. (Verbenaceae) (Fig 2-2)

The main stem of a young plant is vertical and orthotropic, bearing opposite, decussate leaves. During the unbranching phase 7 or 8 internodes are formed. Branching is diffuse and the secondary axes are not very slanting. The axes of the 3rd order have a lateral and terminal inflorescence. Sexual maturity is reached when plants are 2 to 3m high. All lateral axes have a slight plagiotropic differentiation as seen by the arrangement of the leaves on the horizontal plane. The initial model of A. nitida could therefore be placed between those of Attims and Roux as described by HALLE and OLDEMAN (1970).

Reiteration may appear on young individuals of 2.5 to 3m high. These early reiterations, which are traumatic, are always subapical and related to the death of the apex. The reiterated stems straighten up very quickly and then grow vertically.

It must also be noted that the main stem of A. nitida cannot bear to be sloping : any stem sloping by accident immediately produces a series of reiterated stems which are perfectly vertical.

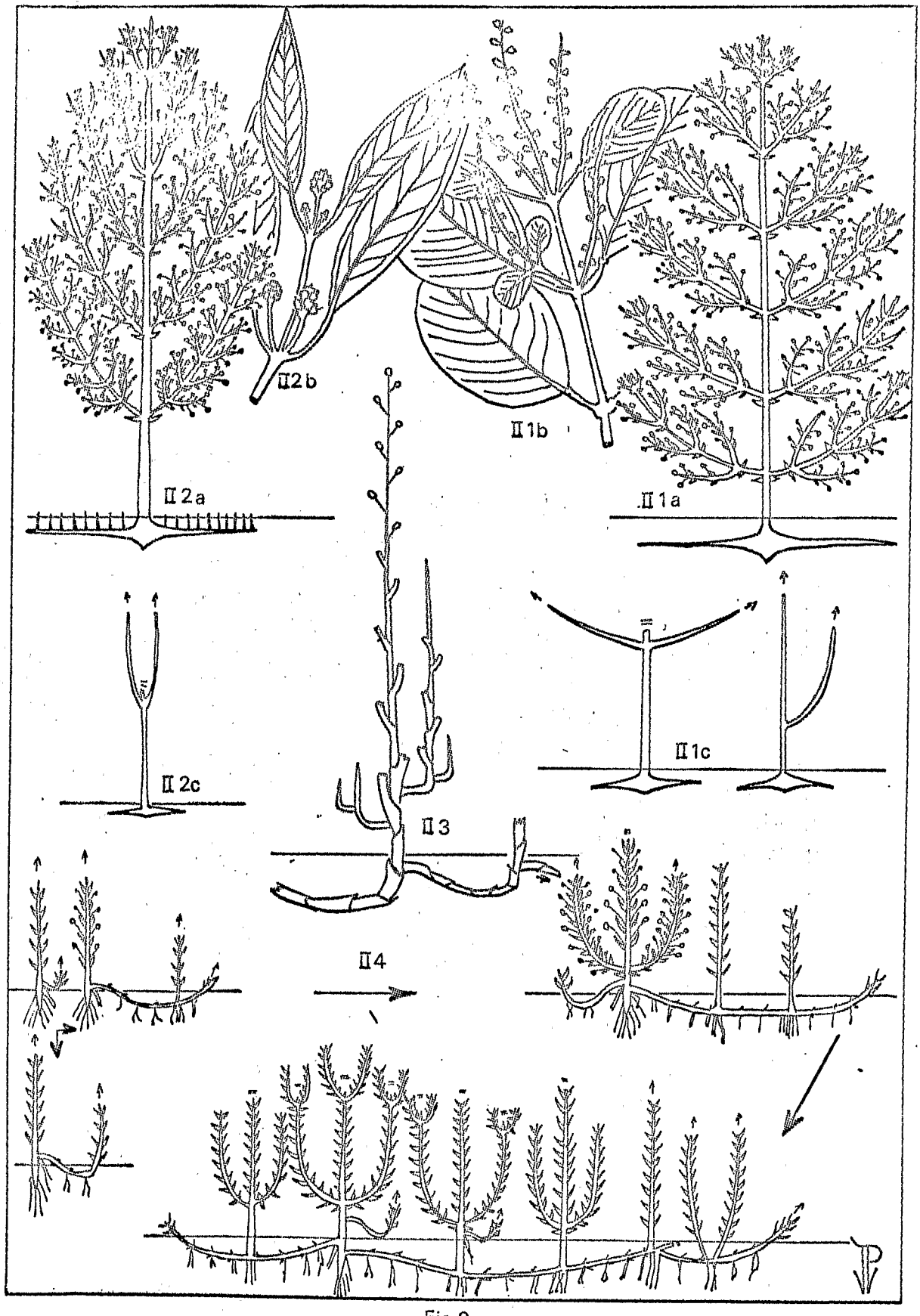

Fig 2

Spartina brasiliensis Raddi (Poaceae) (Fig. 2-3)

This plant is a grouping of branched units. Each of these units is made up of a main stem bearing alternate leaves and possessing a horizontal underground portion with small leaves void of chlorophyll. This portion has roots at each node. The aerial portion, made up of 7 to 8 internodes, has long leaves. The stem has an apical sexuality.

This main stem gives rise to two types of lateral axes :

- on the one hand, small sterile lateral axes which grow from the first two or three aerial nodes of the main stem. Each of these small axes may produce an axis of superior order, also sterile, at the first node. The main stem and these axes comprise one branched unit.

- on the other hand, a lateral axis which appears at the point where the main stem straightens up. This lateral axis then creates another branched unit.

Each of these units seems to represent a branching sequence and corresponds to the article as described by HALLE and OLDEMAN (1970). This plant corresponds to Tomlinson's model rendered more complicated by extra elements which are purely vegetative.

Crenea maritima Aubl. (Lythraceae) (Fig 2-4)

This plant is also made up of branching units. Each unit has a vertical stem with opposite, decussate leaves and axillary inflorescences. Maturity of the flower begins at the base of the plant. The apex of this stem degenerates quite quickly whilst two lateral, opposite axes appear. These axes come from buds on one of the lowest nodes of the main stem. They straighten up quickly and possess lateral sexuality. Their apexes then degenerate and axes of a 3rd order, with axillary inflorescence, appear at the last node of the 2nd order axes.

At the same time there exists an underground, caulinary morphogenesis which is neither limited by time or space. A lateral axis forms in the area of the root neck of the young orthotropic main stem and grows in a creeping manner, bearing small, opposite, decussate leaves. Small roots appear at each node. This axis may either straighten up and send out a new main aerial stem which will form a new unit, or, more often the case, grow along underground. In this case, it sends out aerial, vertical axes sideways which then branch out.

Finally, it must be noted that several stolons may shoot out from an aerial stem, the oldest ones being the lowest. This architecture is not found in any models defined by HALLE and OLDEMAN (1978).

tecture of the mangrove forest

I Pioneer phases

L. racemosa facies. (Fig. 3-1)

The most elevated areas of the mud flats, which are only covered by a few decimeters of water at high tide, are colonised by small groups of L. racemosa which form small vegetative islets. On nearing the mainland, these small islets increase in size, eventually joining up to form a continuous, dense population of plants no higher than 1,50m. Beneath this canopy there are a few young A. nitida stems. This continuous stand, approximately 100m wide, gradually reaches about 5m high. It is then abruptly replaced by a pure stand of A. nitid approximately 7m high.

S. brasiliensis Raddi facies. (Fig. 3-2)

This formation differs from the previous one in that the first islets are made up purely of S. brasiliensis, only later being associated with L. racemosa. S. brasiliensis disappears when the L. racemosa canopy becomes continuous.

II Riparian vegetation

C. maritima facies. (Fig. 3-3)

This facies is found at the mouth of the river for about 100m. Following a line perpendicular to the river, one finds a pure, dense stand of C. maritima, 3m wide and 50cm high. This stand overshadows numerous young plants of L. racemosa and A. nitida. Beyond this belt of C. maritima lies a stand of L. racemosa about 12m wide, whose height reaches approximately 4m at the furthes point from the river. Under its canopy there are some young stems of A. nitida. This stand is suddenly replaced by a forest of A. nitida, as for the coastal formation.

L. racemosa facies. (Fig. 3-4)

This formation is situated upstream of the previous facies for approximately 3 kilometers. The riparian population is a pure stand of L. racemosa. Following a combination of numerous reiterations, the stand fans out over the river in a similar way to OLDEMAN's description (1972).

Rhizophara mangle facies.

This facies is found upstream of the L. racemosa one. Both species gradually mix, with L. racemosa eventually disappearing. The pure riparian stand of

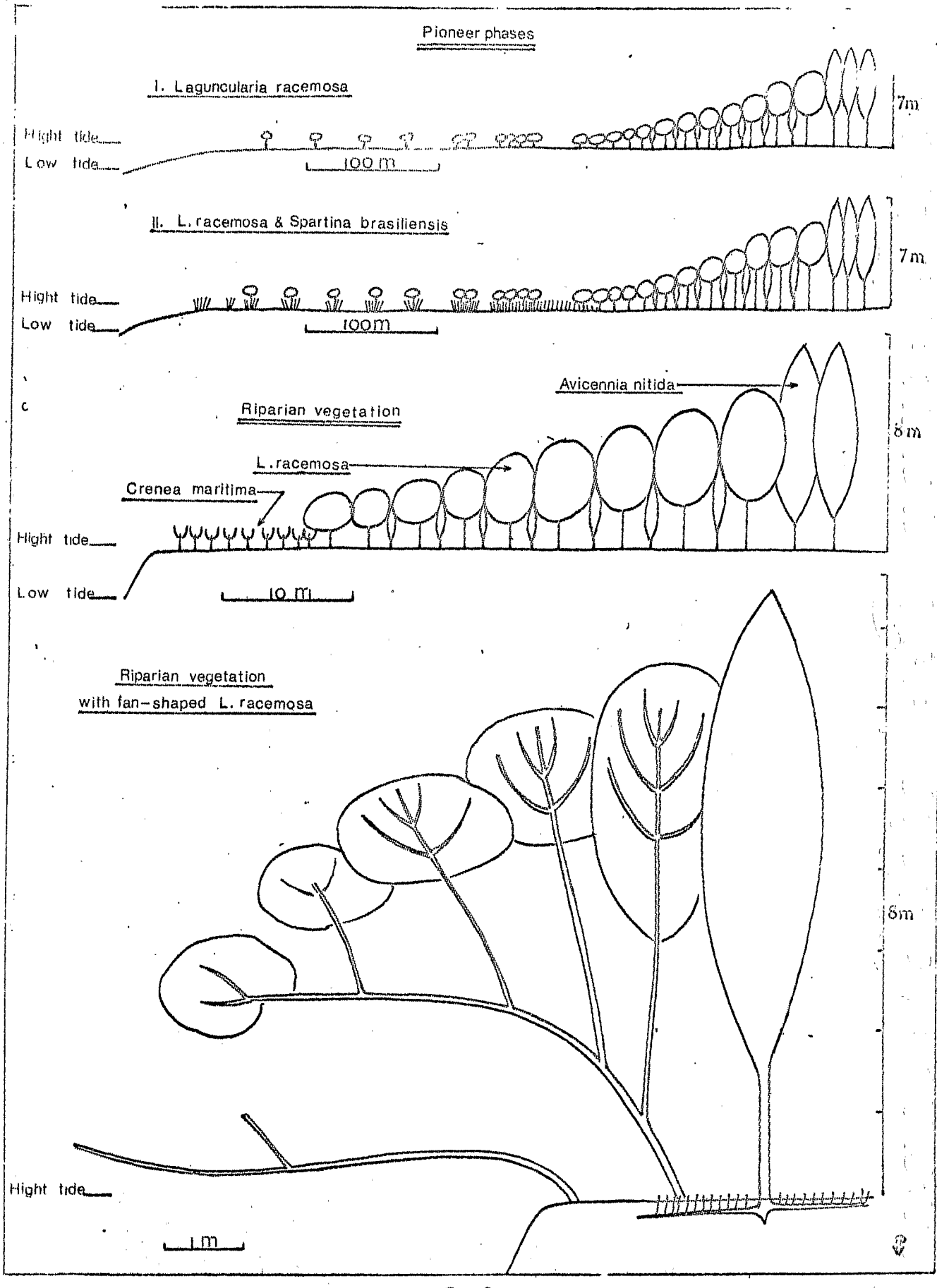
Pioneer phases
I. Laguncularia racemosa
Hight tide
Low tide
100 m
7m
II. L. racemosa & Spartina brasiliensis
Hight tide
Low tide
100m
7m
Avicennia nitida
Riparian vegetation
L. racemosa
Crenea maritima
Hight tide
Low tide
10 m
8m
Riparian vegetation
with fan-shaped L. racemosa
8m
Hight tide
1 m

Fig.3

R. mangle is characterised, of course, by the barrier of aerial roots which it constitutes. The trees are higher, reaching up to 25m. Whilst small ones reiterate stems to give a fan-shape structure, bigger ones escape this development, growing upwards and then reiterating at the crown.

A. nitida forest : different phases of its architecture

The A. nitida forest was studied by taking four plots which seemed to represent different stages. Work was done according to the concepts and methods developed by OLDEMAN (1974).

Plot 1 (12m x 6m) (Fig. 4)

This plot was situated 300m from the coast.

The trees were quite small, never exceeding 7m. 42 A. nitida and 1 R. mangle were counted on $72m^2$. Of these 42 individuals, 7, of the past, were small, often with dead branches. Most individuals belonged to the set of the present as seen by their numerous reiterations, even present in small trees. 5 individuals comprised the set of the future. Devoid of reiterations, these trees far from being over-topped, were among the highest of the plot. Quite a number of seedlings were noted.

Plot 2 (17m x 5m) (Fig. 5)

This plot was situated 400m from the coast.

The population was still monospecific. Stems were 17m high. Of 30 individuals, 3 were of the past set, 7, having numerous reiterations, were of the present and the remaining 20 constituted the future set. Trees of the future set were not as high as those of the present set. It was again observed that all trees of the present set were found all along the vertical plane. Numerous seedlings were found.

Plot 3 (17m x 5m) (Fig. 6)

This plot was situated 1km from the mouth of the river.

The population was still monospecific except for a few young shoots of the climber, Rhabdadenia biflora Jacq. Hill (Apocynaceae), and for one plant of R. mangle. There were 24 individuals of A. nitida, some reaching 20m high. 6 were of the past, 5, well reiterated, were of the present and were found all along the vertical plane. 13 individuals, having no definite reiterations, were considered as trees of the future; some were very tall, four of them exceeding 15m and four others 10m.

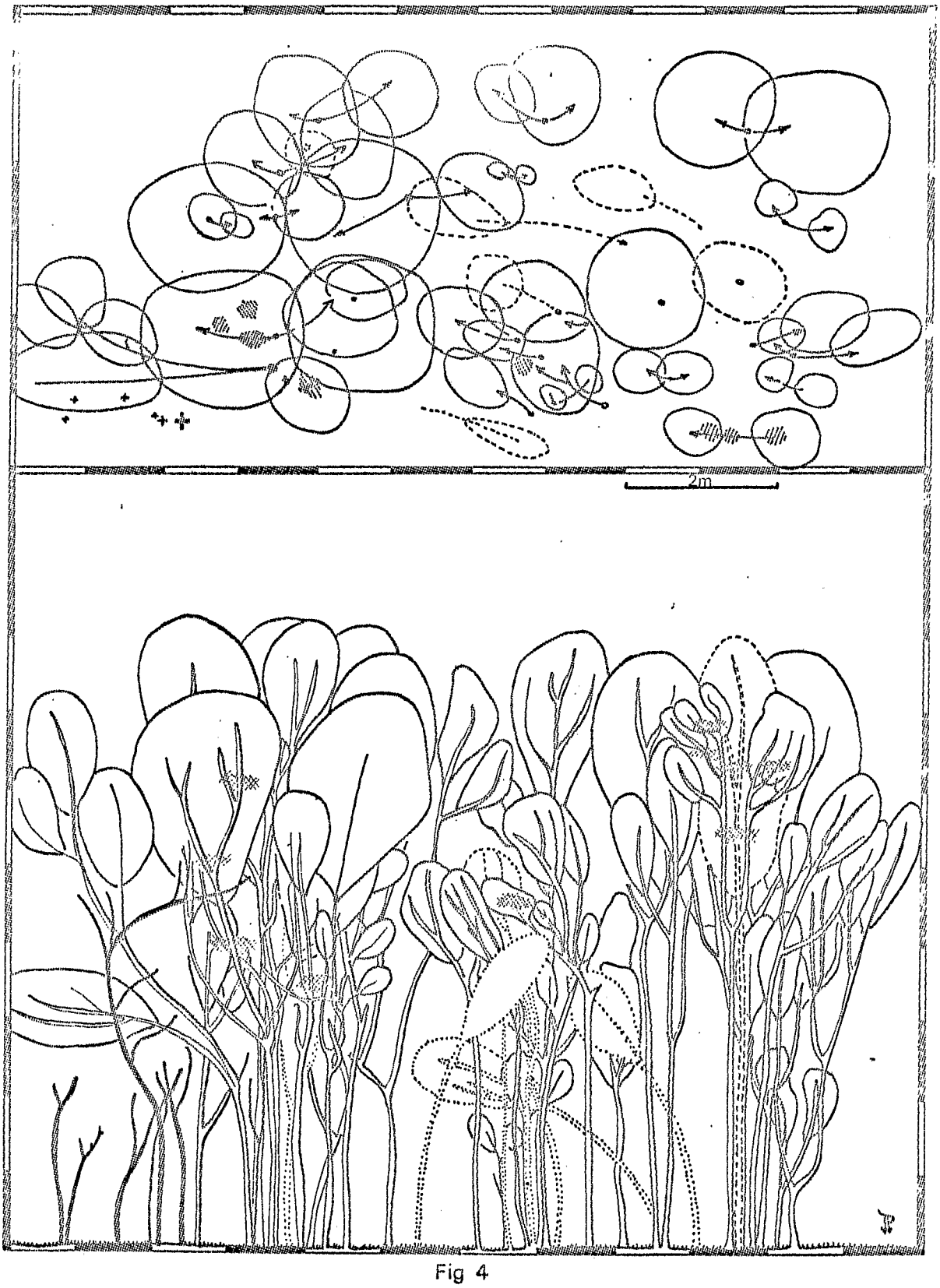

Fig 4

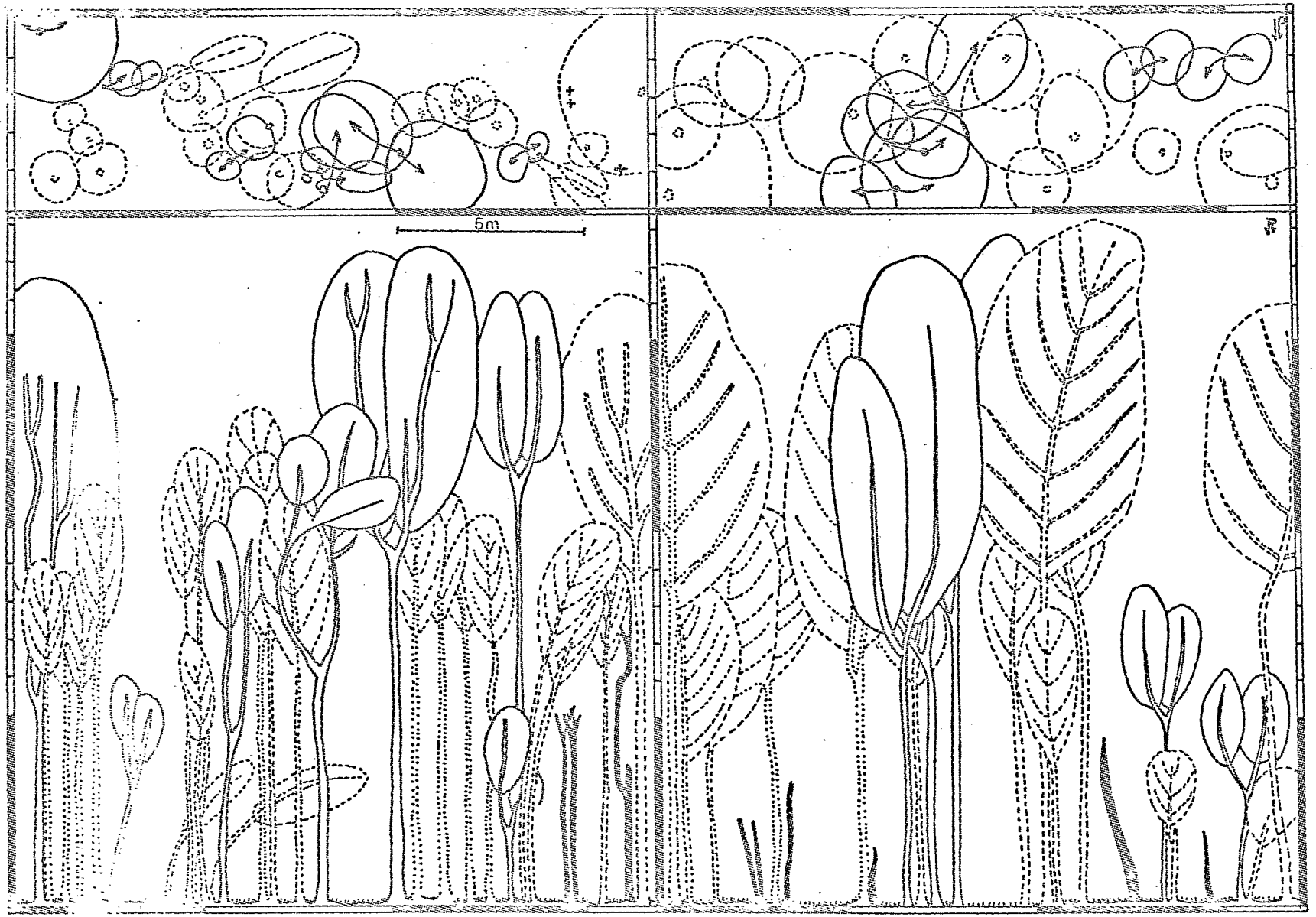

Fig 5

Fig 6

Fig 7

Plot 4 (20m x 18m) (Fig. 7)

This plot was situated 3km from the mouth of the river. The A. nitida population was considerably sparser than in the previous plots : 35 individuals only, reaching 25m high. Some small plants of R. mangle and R; biflora were found in the understorey; seedlings were quite numerous, A. nitida predominating by far. The arborescant population of A. nitida was clearly marked by the set of the past comprised of 15 degenerate individuals, that is, 40% of the population. 9 individuals, well reiterated, found all along the vertical plane, represented the set of the present and 11 individuals, six being among the highest trees of the plot, were considered to be in the future set.

Discussion on the genesis of the mangrove forest

It therefore appears that in French Guiana, sedimentation conditions permitting, L. racemosa and S. brasiliensis are the colonisers. Once the L. racemosa population has developed a dense, continuous canopy which happens very rapidly due to its way of reiterating, numerous seedlings of A. nitida grow up but always remain over-topped by L. racemosa. Suddenly, for reasons which escape us, the L. racemosa population is replaced by a pure stand of A. nitida.

From then on, the forest is a pure stand of A. nitida. Over its whole expanse seedlings were found but no young plants. Between the canopy and the seedling layer there was a leafless space. This leads one to believe that the trees comprising this forest are all contemporaries. As time goes on, they grow but decrease in number as seen in Fig. 8. Beyond this phase, one can but think like Richards (1952) : "The trees are not rapidly replaced by natural regeneration and as they die the forest becomes more and more open." In fact, while the old A. nitida trees, covered in Araceae epiphytes, die, vast open spaces appear colonised by the fern Acrostichum aureum. It therefore seems that there is no regeneration in this forest after its establishment. However, it must be noted that due to the sequence of choking up and clearing of silt caused by the sedimentation conditions, the coastal edge of the mangrove forest is constantly renewed : an area heavily attacked by waves later builds up into a mud flat which is soon colonised as already described.

According to the different types of vegetation, one discovers various wildlife communities dwelling in the mangrove forest.

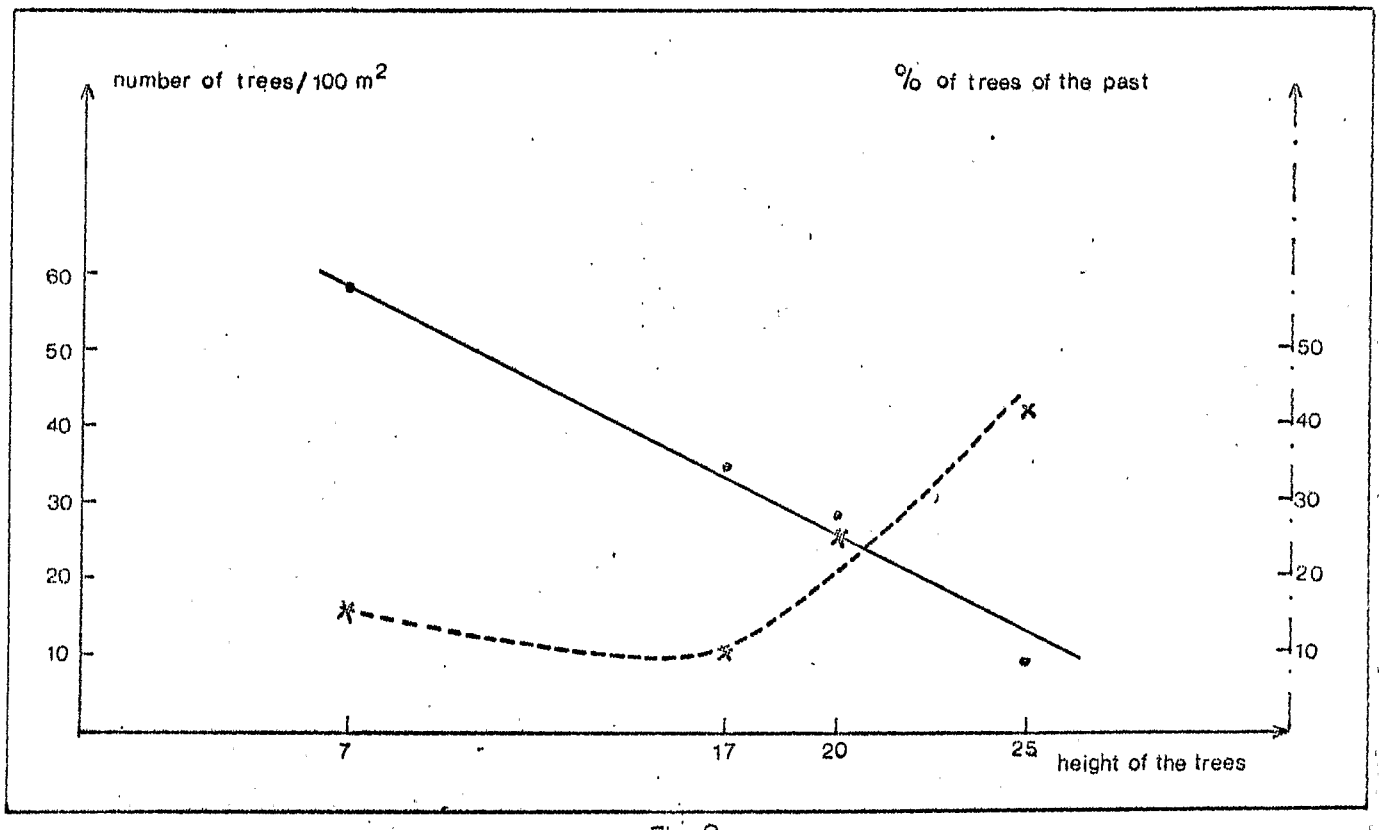
number of trees/100 m²
% of trees of the past
60
50
40
30
20
10
50
40
30
20
10
7
17
20
25
height of the trees

Fig. 8

I. No vegetation

1. Permanently submerged area

This area is the habitat of a glow-worm, Chaetopterus cf variopedatus (polychete spiomorphe) and the crab, Callinectes bocourti. Associated with these two species are a large number of estuary fish capable of tolerating extreme variations of salinity. Among the Siluridae are found Arius luniscutis, A. albicans, A. proops, A. rugispinis, Selenapsis passany and Bagre marinus; among the Centropomidae are found Centropomus ansiferous (snooks) and C. undecimalis.

Occasionally one comes across other species of fish, for example Cynoscion acoupa (Scianidae), Mugil cephalus and M. incilis (Mugilidae).

Shrimp and prawn also dwell in this area, among others may be mentioned the "sea bob", Xyphopenaeus kroyeri, which is found both in the sea and the estuaries, as well as other estuary species such as Palaemon schmitti and Macrobrachyum amazonicum (Palaemonidae), Hippolysmata oplophozoides (Hippolytidae) and Accetes cf Americanus (Sergestideae).

Of course, this area is also the hunting ground of a large number of sea birds; for example, numerous Laridae such as the Laughing gull, Larus atricilla and various species of terns (Sterna).

2. Area which emerges at low tide : mud flats without vegetation.

At high tide the same animals are found as in the previous area. However, the mud flats are also inhabited by numerous small crustaceans of the Tanaidaceae family, fish and crustacean larvae and burrowing worms, Annelides polychetes. At low tide, these mud flats are the domain of numerous waders, the most striking one being the Scarlet Ibis, Endocima ruber (Threskiornithidae). Several Ardeidae are also seen, for example, the small, snowy egret, Egretta thula thula, the little blue heron, Florida caerulea, the tri-coloured heron, Hydranassa tricolor and the white-necked heron, Ardea cocoi. One also finds Charadriidae, among others the grey plover, Pluvialis squatarola, the semi-palmated plover, Charadrius semipalmatus, as well as Scolopacidae which are particularly numerous : the whimbrel, Numenius phaeopus, the greater yellowlegs, Tringa melanoleuca, the spotted sandpiper, Actitis macularia, the ruddy turnstone, Arenaria interpres, the common dowitcher, Limnodromus griseus and several other species of sandpiper of the Calidris genera.

As well as being a feeding ground for the waders, these open mud flats are used as a resting ground by the black skimmer, Rynchops nigra (Rynchopidae) and the sea birds mentioned above, especially in the more elevated, drier areas.

II Area covered with vegetation

1. Mud flats with sparse pioneer vegetation

The marine organisms mentioned above are found at high tide. There are also two crabs, Uca macacaoni and Clibanarius vittatus and a shrimp, Alpheus heterochaclis. The vegetation is also used as a resting ground for some waders of the Scolopacidae family : the whimbrel, Numenius phaeopus hudsonicus, the lesser yellowlegs, Tringa flavipes, T. melanoleuca, Actitis macularia and Catoptrophorus semipalmatus. All these birds perch on the lower branches of very young Laguncularia stems. Other birds seem to treat it as a feeding and resting ground : the pied water tyrant, Fluvicola pica (Tyrannidae) and the yellow-hooded blackbird, Agelaius icterocephalus (Icteridae).

2. Mud flats with continuous pioneer vegetation : dense canopy of L. racemosa, overshadowing A. nitida stems.

Being difficult to penetrate, only the outer edge is used by Ardeidae as a resting ground.

3. Riparian vegetation with L. racemosa and C. maritima.

At low tide, Ardeidae come to roost on the lower branches of Laguncularia, which are also the resting ground for numerous sandpipers, Calidris pusilla and C. mauri, near the mouth of the river. Further upstream, these branches are covered with the white-winged swallow, Tachycineta albiventer (Hirundinidae). Very occasionally one comes across an osprey, Pandion haliaetus (Pandionidae), muscovy ducks, Cairina mochata (Anatidae) and the ringed kingfisher, Ceryle torquata (Alcedinidae) on the branches of Laguncularia.

One often sees the curious fish, Anableps tetraphtalmus at the very edge of the water.

4. Avicennia forest : young stems betwenn 7 and 10m high.

This area is the nesting ground for the Scarlet Ibis. Covering approximately 7 hectares (CONDAMIN), this area holds about 6,000 nests. Associated with the Ibis nests, by far the most numerous, are nests of the snowy egret, E[illegible]a

thula, the little blue heron, Florida cerulea and the tri-coloured heron, Hydranassa tricolor, as well as, very occasionally, the common egret, Egretta alba, the boat-billed heron, Cochlearius cochlearius (Cochlearidae), the white-necked heron, Ardea cocoi, the yellow-crowned night heron, Nycticorax violacea and the black-crowned night heron, N. nycticorax (Ardeidae).

5. Avicennia forest : Older stems.

One often sees the greater ani, Crotophaga major (Cuculidae) and the Rufous crab hawk, Buteogallus acquinoctialis (Accipitridae). Among the nocturnal birds are found one Butorides, the Nycticorax nycticorax and the spectacled owl, Pulsatrix perspicillata (Strigidae).

Two fish are seen at high tide in these two areas : Anableps tetraphtalmus and Selenaspis passany. They are also the biotope of four crabs : Uca rapax (Ocipodidae) and Ucides cordatus (Gacarcuridae) with which Goniopsis cruentata and Pachygapsus gracilis (Grapsidae) are associated.

Mammals are rare in these two areas; one may see the crab-eating rat, Procyon cancrivorous, little monkies, Saimiri semreas and the mangrove deer, Odocorleus gymnotis.

Finally, these two areas are literally infested with mosquitos, Dipteres culucidae, the commonest being Coquillettidia venezuelensis and Anopheles aquasalis, with which numerous Ceratopogonidae are associated.

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KEY TO FIGURES

Fig. I — Distribution of plants in the mangrove forest of French Guiana.

Fig. II — Morphogenesis of the main plants in the mangrove forest of French Guiana.

Fig. III — Pioneer and riparian populations in the mangrove forest of French Guiana.

1 — Pioneer facies with Laguncularia racemosa.

2 — Pioneer facies with Spartina brasiliensis.

3 — Riparian vegetation with Crenia maritima.

4 — Fan-shaped riparian vegetation with Laguncularia racemosa.

Fig. IV — Avicennia nitida forest. Plot I.

Thick line : trees of the past.
Continuous line : trees of the present.
Dotted line : trees of the future.

Fig. V — Avicennia nitida forest. Plot II.
Same designations as in Fig. IV.

Fig. VI — Avicennia nitida forest. Plot III.
Same designations as in Fig. IV.

Fig. VII — Avicennia nitida forest. Plot IV.
Same designations as in Fig. IV.

Fig. VIII — Avicennia nitida forest. Evolution of the number of stems and percentage of trees of the past in terms of population height.

COMPTE RENDU DE MISSION A CALI COLOMBIE

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Botaniste au Centre ORSTOM
de Cayenne

Le but de cette mission était de présenter une communication au Symposium latino americain sur l'étude scientifique et sur l'impact humain sur l'écosystème des mangroves, symposium organisé par le Bureau régional de l'UNESCO à Montevideo, représenté par le Dr. VEGAS VELEZ. Je me suis donc rendu à Cali sur invitation de l'UNESCO qui me payait l'aller et retour en avion ainsi que cinq jours de frais de déplacement. L'indemnité de tournée correspondant aux jours de voyage m'a été versée par le Centre de Cayenne.

Mon itinéraire a été le suivant :

Vendredi 24 Novembre : Cayenne Manaus
Lundi 27 Novembre : Manaus - Bogota - Cali
Vendredi 1er Décembre au soir : Cali - Bogota - Manaus
Mardi 5 Décembre : Manaus - Cayenne.

Ceci représente 5 jours de voyage pour cinq jours de congrès, ce qui souligne l'isolement géographique de Cayenne par rapport au continent Sud Americain.

Le Symposium débutait le 27 Novembre mais je n'y suis arrivé que l'après midi. Il s'est achevé le 1er Décembre à 16 heures. Trente six communications y ont été présentées dont la liste, ainsi que les adresses des auteurs se trouvent en annexe. Ces communications portaient sur les thèmes suivants : Sédimentologie, hydrologie, Botanique et Phytosociologie, Zoologie et pisciculture, Medecine, Conservation, Exploitation. Les orateurs étaient essentiellement Colombiens (12) Brésiliens (6), Venezueliens (3), Mexicains (2). La France était représentée par un archéologue en mission et par moi même. Les langues officielles étaient l'Espagnol et l'Anglais.

A l'issue du Symposium, un certain nombre de projets ont été dégagés :

- 1 Création d'une "Associacion Latinoamericana de Investigadores de Manglares (ALIM) dont les statuts ont été exposés par le Dr. PANNIER (Venezuela).

- 2 Création d'un projet pilote d'étude sur les mangroves, pouvant être financé par l'UNESCO. La Colombie a présenté cette idée, ainsi que son projet. La réunion est devenue houleuse du fait que les représentants des autres pays latino americains, et spécialement les brésiliens n'étaient pas prêts d'accepter le fait que la Colombie mène le jeu sur ce terrain. Le projet a donc été momentanément écarté.

- 3 Réunion d'un nouveau Symposium dans deux ans. De plus un certain nombre de recommandations ont été faites à l'attention des Gouvernements et des aménageurs. Ces recommandations soulignent les faits suivants :

  - La mangrove joue un rôle essentiel dans la reproduction de nombreuses espèces animales d'importance économique considérables : pêche côtière, crevettes.

  - La mangrove est un écosystème fragile.

  - L'élevage de poissons et de crevettes peut être envisagée pour développer la mangrove, mais de vastes zones doivent être mises en réserve.

Profitant de mon escale à Manaus, j'ai pris contact avec le Dr. RODRIGUEZ, directeur du laboratoire de botanique à l'INPA (Instituto Nacional de Pesquisas da Amazônia). Ce laboratoire abrite 16 botanistes, dont les activités se répartissent comme suit :

Phanérogames	4
Champignons	2
Bryophytes	1

Anatomie	2
Anatomie des feuilles	1
Palinologie	2
Flore sur ordinateur	4

De plus une cinquantaine de prospecteurs ramassent du matériel pour le laboratoire à travers toute l'Amazonie.

L'Herbier de l'INPA contient 80000 numéros, soit quatre fois plus que celui de Cayenne. Il est lié à l'Herbier du Museo Goeldi à Bélem qui contient 120000 numéros.

Un programme de banque de donnée concernant la flore a été mis en place à travers le Brésil. Chaque échantillon d'herbier en actuellement fiché. Je joins un modèle de fiche en annexe.

Le Dr RODRIGUEZ m'a assuré que l'INPA pourrait déterminer un certain nombre de nos échantillons. Parmi les taxons qui les intéressent, il faut noter les Myristicaceae et les Caryocaraceae, et les genres Dimorphandra - Peltogyne - Couratari - Micrandra.

J'avais demandé au Dr. RODRIGUEZ de m'emmener, au cours de mon escale de retour, sur le site étudié par KLINGE et Al. (étude de Biomasse sur 1 ha). Malheureusement, toutes les voitures de l'INPA étaient immobilisées et je n'ai donc pas pu me rendre sur ce terrain.

En conclusion, je soulignerai 3 points qui me semblent les plus importants.

- Il est de plus en plus évident qu'une grande quantité de littérature est produite en Amerique du Sud sur la biologie des néotropiques. Cette littérature n'est malheureusement pas très accessible et n'apparait pas souvent dans les revues, plutôt Anglosaxonnes, lues couramment. Un effort de documentation mérite d'être fait dans ce sens. Si

l'ORSTOM envisage une extension en Amérique du Sud, il serait souhaitable que les services de documentation se penchent sur ce problème. Il est en effet paradoxal de travailler en zone néotropicale en sachant sans trop de difficultés quels sont les sujets abordés par tel Américain ou tel Hollandais, mais en ignorant totalement ce que font les Latino Américains eux mêmes.

- Il me semble aussi, et de plus en plus, qu'en ce qui concerne la recherche fondamentale sur la forêt néotropicale, qu'elle relève de la botanique, de l'ethnobotanique ou de l'écologie humaine, c'est de Cayenne qu'ont peut la pratiquer avec le plus d'éfficacité : Cayenne, c'est un Centre avec des moyens matériels réels, une forêt vierge à quelques kilomètres, un assortiment de populations tribales proches exploitant des écosystèmes différents, des collègues d'autres branches facilement consultables. Il ne semble pas que Manaus, par exemple offre toutes ces possibilités.

- Il faut cependant signaler que la plupart des collègues latino Américains rencontrés ont manifesté un réel intérêt pour la France tout en regrettant généralement le faible développement de la Coopération Culturelle Française en Amérique du Sud.

LISTE DES PARTICIPANTS ET TITRE DE LEUR TRAVAUX

L'adresse de chaque participant est reportée en face du numéro lui correspondant.

BACON, P. (2)	Methodology for decision making in the management of Neotropical mangrove ecosystems.
BAEZ, R.E (3) et GONZALEZ, O.A	Tabla de volumenes pora manglares
BOUCHARD, J.F. (4)	Las culturas precolombinas del litoral pacifico Ecuatorial y sus relaciones con el ecosistema.
CANTERA KINTZ, J.R (5) et Al.	Historia natural del Gasteropodo del mangle, Thais kiosquiformis Duclos 1832, en la costa Pacifica Colombiana.
CARRERA-RODRIGUEZ, C.J	Contribution al estudio de los manglares de Puerto Rico, inventario presiones actuales, manejo y conservation.
CAVALCANTI, L. (7) et Al.	Conditiones ecologicas del área de Suape (Pernambuco - Brasil) utilisation de zonas manglares en el Estado de Pernambuco para fines de Acuicultura
CHAPMAN, JV.J (8)	Inventarios de las zonas de manglares
CHAVEZ, E.A (9)	Estudio de una comunidad de Albufera de la costa sur occidental de Mexico
CINTRON MOLERO, G. (10) et GOENAGA, C.	Observaciones sobre el desarollo del manglar en costa aridas
CINTRON MOLERO, G. (10) LUGO, A. (19) POOL, D.J.	Mangrove of arid environments in Puerto Rico and adjacent islands.
COUTINHO, P. (11)	Cambios en la sedimentologia en relacion con los manglares en Pernambuco.
De LACHICA BONILLA, F.(12)	Diversidad espacial y temporal de la Bentocenosis del Estuario del Rio Coatzacoalcos, Veracruz.

De MORAIS, J.M	Intertidal flat sedimentation of Bacanga River Estuary.
De OLIVEIRA, A.M (14)	Distribution of estuarine fishes in the Northeast Brasil in relation to salinity
ESPINOSA G., M.E. (15)	La fauna Sésil intermareal del manglar relacionada con algunos parametros ambiantales en la laguna de Terminos, campeche.
FLORES, C. (16)	El manglar como refugio y sustrato de componentes jaunisticos.
HORNA ZAFATA, R.R (17)	Relacion suelo-mangle (Rhizophora mangle Conocarpus erectus, Laguncularia racemosa, Avicennia nitida).
LESCURE, J.P	Architectural aspects of the mangrove forest in french Guiana.
MIZRACHI, D. (20) et RANNIER, R. (22)	Infeccion Lorantaceas agentes disturbadores equilibrio manglar estrategias establecimiento Conocarpus erectus.
PALACIO, J. (21)	Variacion de los invertebrados de la raiz de mangle (Rhizophora mangle) en la Cienaga Grande de Santa Marta.
PASCUAS BASTIDAS, N. (23)	Caracteristicas fitosociologicas de los manglares en el Parque Natural Tayrona.
PEREZ, M.E (24) et VICTORIA, C.H.	Aspectos de la comunidad de invertebrados de la raices sumergidas del mangle rojo en la Bahia de Cartagena
POLI, C.R. (25) et SNEKI, F.	La acuicultura de manglares en le Universidad Federal de Santa Catarina, Criacion de Mugil curema en tangues.
QUIROS MERCADO, C.A (26)	Cultivo de langostinos en el Peru. Estados actual e incidencias en el ecosistema de manglares
QUIROZ, H. J (27) et VERNETTE, G. (29)	Los Foraminiferos bentonicos en areas de manglar, su relacion con el ecosystema (Tierra Bomba - Cartagena).
ROJAS BELTRAN, R. (28)	Diferencias estacionales en la productividad de un criadero natural de camarones peneidos del manglar de Guadelupe (Antillas Francescas).

SERRANO, F. (30)	Uso de compartimientos sistematicos en el estudio de manglares como ecosistema.
TORRES, J.H. (31)	Contribucion al conocimiento de plantas tanantes y colorantes que proliferan en colombia.
VILLALOBOS, C. (32)	Recursos bioticos en lagunas costeras, manglares y areas adyacentes.
VON HILDEBRAND, P. (33) et ALVAREZ, R. (1)	Algunas apreciaciones sobre la problematica y el manejo de manglares con especiales referencias al Sector de la Cienaga grande de Santa marta Colombia.
VON PRAHL, H. (34)	Importancia del manglar en la biologia de los camarones peneidos.

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30 - Parques Nacionales y Vida Silvestre M.A.G., Canton El Matasano, Soyapango San Salvador, El Salvador.

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CONSELHO NACIONAL DE DESENVOLVIMENTO CIENTIFICO E TECNOLÓGICO
SUPERINTENDÊNCIA DE IMPLEMENTAÇÃO DE PROGRAMAS-SIP

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00 NÚMERO DE ARQUIVAMENTO

02 MOVIMENTO
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NOME CIENTÍFICO

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09 CÓDIGO | ESPÉCIE | 10 CÓDIGO | AUTOR
11 CÓD. | SUBESPÉCIE | 12 CÓDIGO | AUTOR
13 CÓD. | VARIEDADE | 14 CÓDIGO | AUTOR
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NOMES VULGARES

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9 OBSERVAÇÕES

Herbier ≃ 80000

INPA. 15 Botanists

Systematiques. 4 plantes à fleurs
2 champignons
1 bryophytes
2 anatomists
1 leaves anatomy
palinology - 2.

Flore computer 4 personnes.

4 gros herbier à l'IPEAN Belem 12000 specimens
+ Museu Goeldi..

7 - 24

7 - 22 samedi 7 . 16 . Dim.

Myristicaceae
Dimorphandra
Petaloma
Caryocaraceae
Lecythidaceae - comentar
Euphorbiaceae Hiranthra

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