

## DISTRIBUTIONAL RESUME OF COASTAL FLORISTIC ELEMENTS IN THE ANDAMAN AND THE NICOBAR ISLANDS

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### ABSTRACT

The geomorphology and soils of the coastal biotopes of the Andaman and the Nicobar Islands have been briefly discussed as a background to the nature and alliance of their floras. The coastal biotopes are very impoverished in species of flowering plants and have no endemic genera. The existing floristic species have revealed that they are mostly very widely ranging strand/mangrove species. Further, the recorded floristic elements: Pan-tropical, Indo-Pacific, Indo-Malesian, Indo-Burmese, Western Indian Ocean and Caribbean are described along with examples.

The coastal flora as a whole is composed of widely dispersed littoral plants. However, there are significant differences between the strand flora of the Andaman and the Nicobar groups of Islands. These are caused by differences in habitat, orography, salinity and man-made disturbances.

### INTRODUCTION

THE coastal areas of the Andaman and Nicobar Islands have irregular outlines, with spits and partially enclosed bays with numerous tidal creeks which often penetrate the Island areas. These tidal creeks often form the outlets to the rain-fed streams that flow from the interior and carry silt to the shore to form muddy flats facilitating the spread and regeneration of mangroves. Enclosing the mangrove areas in the island are the elevated sandy beaches varying from island to island in their spread along the coastline.

Coastal vegetation is classified under two main heads: mangroves and strand types. They are found on specific soil types. Mangroves are found on specific coastal sedimentation composed of medium to fine particles of poorly drained mud in preference to elevated sandy beaches where strand vegetation is a common occurrence. The muddy shore is often invaded by the tide twice daily, but the adaptive features of mangroves especially the pneumatophores and the stilt roots trap sediments to build up the shore seaward at a rapid rate. The sand particles in the beaches with traces of organic parts and broken shells support strand plants. In certain beaches there is a concentration of serpentinites with high iron, magnesium and low silica contents. The presence of phytotoxic elements, notably nick-

el, cobalt and chromium, is often reported along the sandy beaches.

### Floristic features

The study of patterns of distribution of organisms in space and time is called biogeography. Biogeography discovers the environmental factors that determine or limit the distribution of the species studied. In view of the increasing attention on coastal plant communities in relation to their management, it was felt that an analysis of coastal geographical elements would be the first step to understand their alliance or differences they show up from other far and near areas of the world. Further, only a few dominant species are listed under broad-based phytogeographical divisions (figures 1-14).

### Pan-tropical elements:

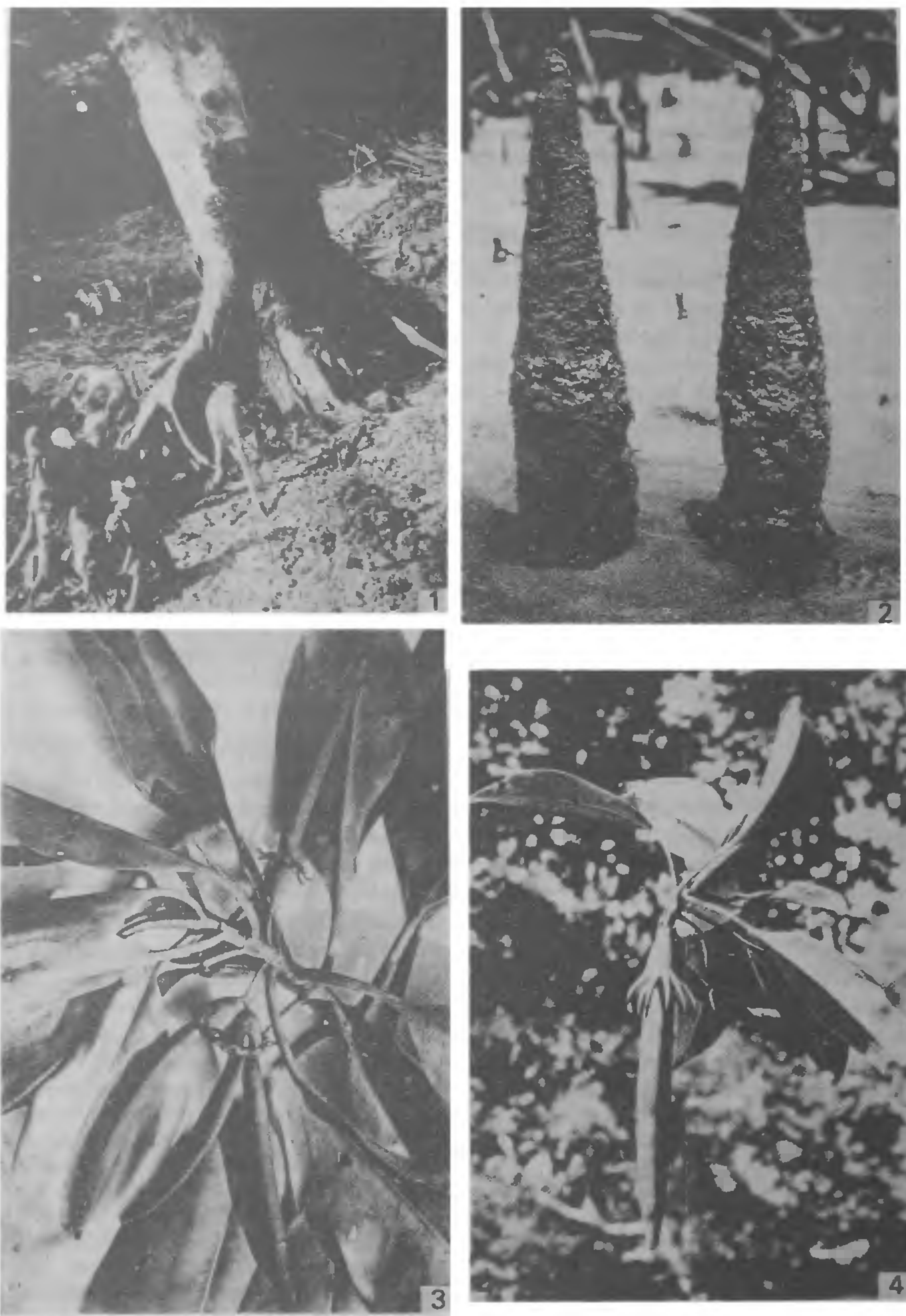
#### Paleo and neo-tropical taxa

The species grouped under this category are found to have extensive distribution and will be of some importance in planning future use of these resources. These pan-tropical elements are found in all the specific habitats to which they have fidelity to a great extent.

### Strand flora

Sandy strand: Creepers & Climbers: *Ipomoea pes-caprae*, *Vigna lutea*, *Canavalia rosea*, *Clitoria*

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**Figures 1-4.** 1. *Ceriops tagal*—Bizarre-shaped pneumatophores; 2. Conical pneumatophores of *Sonneratia apetala*; 3. Co-occurrence of seedlings of *B. cylindrica*; 4. Viviparous hypocotyl of *B. gymnorrhiza*.



Figures 5–8. 5. Buttressed trunk of *B. gymnorrhiza*; 6–8. Geniculate pneumatophores of *B. gymnorrhiza*.

*ternatea*, *Ipomoea macrantha*, *Cassytha filiformis* (Semi-parasite); Herbs and shrubs: *Desmodium umbellatum*, *Sophora tomentosa*, *Mucuna gigantea*, *Caesalipinu bonduc*, *Fimbristylis cymosa*; Trees:

*Hibiscus tilliaceus*, *Thespesia populnea*, *Ximenia americana*; Endemic: *Phaeanthus andamanicus*; Coral sand: *Suriana maritima*, *Guettarda speciosa*.



**Figures 9–13.** 9. *Manilkara littoralis*; 10. *Cycas rumphii*; 11. *Acrostichum aureum*; 12. *Heritiera littoralis*; 13. *Nypa fruticans*.

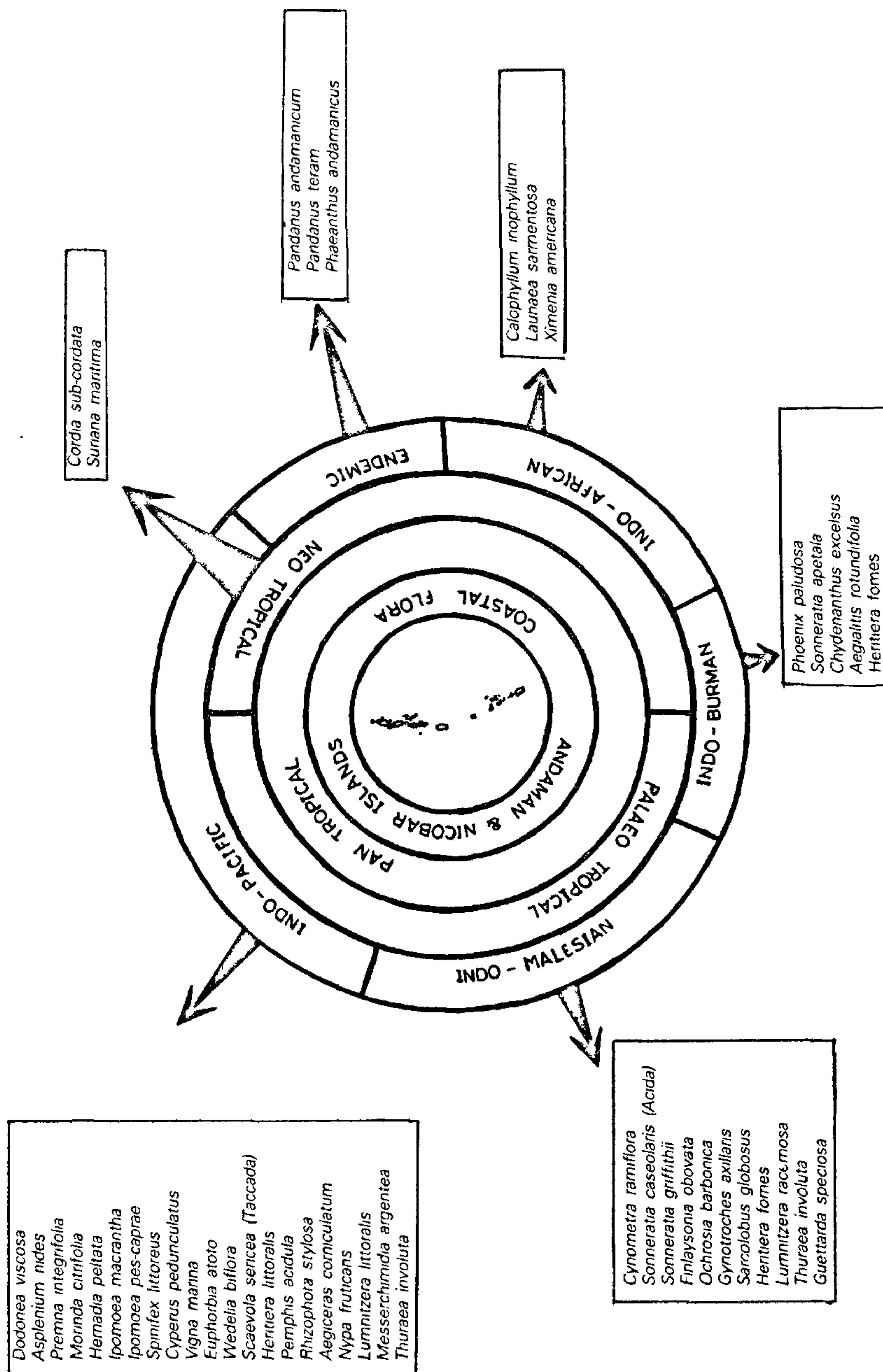


Figure 14. A chart depicting a few dominant taxa listed under main phytogeographical divisions.

### Indo-Pacific Elements:

This sector is confined to Indo-Pacific region around East-Indian Archipelago extending to Polynesian islands in one direction and towards East African Coast in the opposite direction. The concentration of floristic elements decreases in both the directions. The Indo-Pacific elements more or less dominate along the coastal areas of these islands. However, there is a definite or near absence of Indo-Pacific floristic elements around the coasts of a few islands.

*Indo-Pacific Species*—Sand strand: (in sequential order along the belt transects).

*Spinifex littoreus*, *Boerhavia repens*, *Triumfetta procumbens*, *Vigna marina*, *Euphorbia atoto*, *Wedelia biflora*, *Scaevola serecea*, *Caesalpinia nuga*, *Clerodendrum inerme*, *Crinum asiaticum*, *Asplenium nidus*, *Dodonea viscosa*; Trees: *Pandanus tectorius*, *Azelia bijuga*, *Premna integrifolia*, *Dolichandrum rheedii*, *Morinda citrifolia*, *Hernandia peltata*; Coral strand: *Pemphis acidula*, *Thuraea sarmentosa*, *Tournefortia argentea*, *Cordia sub-cordata* and *Guetarda speciosa*; Mangrove taxa: *Rhizophora stylosa*, *R. mucronata*, *Bruquiera cylindrica*, *B. gymnorrhiza*, *B. parviflora*, *Lumnitzera racemosa*, *L. littoralis*, *Avicennia marina*, *Ceriops candolleana*, *Sonneratia alba*, *Excocaria agallocha*, *Aegiceras croni-ciatum*, *Strongylodon ruber*, *Nypa fruticans*.

### Indo-Malesian Elements

The elements of this sector are invariably found more often in coastal habitats. Taxa common to coasts in other areas might have invaded the coastal areas of these islands. The wide ranging genera and species under this category are: *Cyanometra ramiflora*, *Entada scandens*, *Sonneratia acida*, *S. griffithii*, *Aegialitis rotundifolia*, *Finlaysonia obovata*, *Gluta coractata*, *Ochrosia babonica*, *Alangium ebanacium*, *Gynotroches axillaries*, *Cycas rumphii*, and *Sarcolobus globosus*.

### Indo-Burmese Elements

A few species are confined to the Bengal coasts of India and Burma coasts, and the frequently spread species of limited ranges are confined to estuarine banks, sand strands and muddy coasts. They are *Phoenix paludosa*, *Sonneratia apetala*, *Chydenanthus excelsus*, *Ardisia littoralis*, *Atlantia monophylla*, *Alangium ebanum*, *Terminalia citriana*, *Pluchea indica* and *Manilkara littoralis*.

### Indo-African Elements

This sector comprises areas adjacent to the Indo-African region. Species common to these areas are *Calophyllum inophyllum*, *Launaea sarmentosa* and *Ximenia americana*.

### Indo-Atlantic Elements

Species common to Indo-Atlantic areas are not of considerable number. They are represented here only by two plants: viz *Cordia sub-cordata* and *Suriana maritima*.

### Endemic

A floristic analysis of the flora confined to coasts and its vicinity in these groups of islands has revealed that there are a few endemic species among them: *Phaeanthus andamanicus*, *Pterocarpus dalbergeoides*, *Pandanus andamanicum* and *P. teram*. Amongst these, *P. dalbergeoides* has internal inland distribution also. Therefore, it is obvious that its presence along the coast is more or less due to local edaphic disturbances.

### CONCLUSION

The floristic analysis of the coastal elements of the Andaman and the Nicobar islands has revealed that there is no deviation in their composition but they show distinct alliance to those wide ranging genera and species common to different geographical sectors. The flora has been made up of infiltration both from nearby and far off areas. In the pattern of their range they show distinct ecological preferences to distinct niches in the coastal areas. This is well observed in their distribution in sand strand, muddy coasts and coral strand of the main groups of islands. As a result, they can be arranged into two patterns: Sand/Coral strand and muddy open or hypo/hyper estuarine creeks. Irrespective of the underlying edaphic feature, it is evident that the distribution of plants is a response to salinity which is graded from the foreshore to backshore. This feature is the guideline for the choice of classifying the distribution pattern. In certain instances a few inland species of different ecological and habitat categories get mixed up among the coastal plants. It is no wonder that more inland plants can be observed in such ecologically heterogeneous groups. It is obvious that this is more or less due to man-made disturbances. The pan-tropical elements also dominate along the coastal habitats. However, there is a definite or near absence of certain widely ranging

genera along the coast of a few islands. The presence of stray species of a few endemic genera belonging to distinct areas is in all probability due to successful means of sea or seed dispersal.

#### ACKNOWLEDGEMENT

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## NEWS

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### ASTOUNDING DISCOVERY IN SOLID STATE PHYSICS

A discovery made by scientists from the Institute of Solid-State Physics, a body of the USSR Academy of Sciences has achieved a breakthrough in exacting evaluations of the quality of superpure metals. The new find was entered in the catalogue of discoveries.

It was believed so far that the law of mirror reflections under which the angle of incidence is equal to the angle of reflection, is effective for the reflection of the surface of light and of all known elementary particles. However, a group of Soviet scientists have established that on the verge of ordinary metals and superconductors; the particles returned to the same place irrespective of the direction of their trajectory in respect to the reflecting surface.

In the course of the reflection process which looks rather simple some elementary particles are turned

into others. When being reflected off the surface, electrons turn into other elementary particles and change the polarity of their charge.

The discovery explained the results of experiments on the study of thermal and electric characteristics of pure superconductors that defied explanation so far, and the significance of the discovery goes beyond the horizon of superconductor physics. It is important for cryogenic physics for the study of liquefied helium. It could be instrumental for explaining the characteristics of superconductors at room temperature because the superconductivity effect under 250° K (–23°C) has not been explained so far. (*Soviet Features*, Vol. XXVI, No. 69, June 19, 1987; Information Department, USSR Embassy in India, P.B. 241, 25 Barakhamba Road, New Delhi 110 001.)

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### NITROUS OXIDE 'HOLE' IN THE STRATOSPHERE

Scientists have found a nitrous oxide 'Hole' in the stratosphere over Antarctica, says Robert de Zafra of the State University of New York at Stony Brook. Although the nitrous oxide (N<sub>2</sub>O) hole probably is linked to that of ozone, it is not yet known whether the decline in N<sub>2</sub>O levels poses any danger, N<sub>2</sub>O is formed mainly by biological activity, and its stratospheric concentration normally is approximately uniform worldwide. That is why de Zafra characterises its absence as very strange. "Any theory for

the oxone 'hole' must accommodate the absence of nitrous oxide", he says. Declines in stratospheric ozone appear to occur over the Arctic in May and October, but they are much smaller than those of the Antarctic. Maximum declines are found over Spitsbergen (Norway) and minimum declines occur southern Alaska. (*Environment Science and Technology*, Vol. 21, No. 7, p. 616, 1987; American Chemical Society, 1155, 16th Street, N. W. Washington, D.C. 20036, USA.)