

# Introductory Remarks to the Symposium on Island Ecosystems in the Pacific

M. NUMATA

*Department of Biology, Chiba University, Japan*

As the convenor of the symposium, in the Pacific Science Congress, I intended it to be well discussed along the guidelines of analysing the structure and function of the island ecosystem, and of how to preserve it better. At the end of last year (1965), the late Dr. H. Graham visited our country on the way home from the IBP-CT Conference at Bangkok, and he recommended that I construct the symposium particularly in relation to nature conservation.

In the Pacific there are many islands, large and small. Our country (Japan) also consists of four main islands, Hokkaido, Honshu, Shikoku and Kyushu. However, the strict definition of an island is somewhat difficult, as stated by J. D. Hooker (1866).<sup>1)</sup> There is a minimal area for establishment of a unique flora and fauna in islets from the standpoint of population genetics, and on the other hand; the continental factor increases according to the enlargement of area of islands. Sato (1960)<sup>2)</sup> indicated the difference between large and small islands in Japan by the occurrence of the lichen *Usnea diffracta*. He writes that *Usnea diffracta* does not occur in small islands where the sea wind blows directly throughout, but occurs on large islands such as Kunashiri of the South Kuriles, Sado and Dagelet on the Japan Sea where there are suitable localities for this lichen, sheltered by hills and mountains from any direct sea wind. These localities of occurrence are situated at about 2.5 km from the sea shore. If this assumption is adopted, the small island is restricted to less than about 5×5 sq. km. and macroislands such as the Japanese main islands are not islands in this narrower sense.

According to my experience (Numata 1965,<sup>3)</sup> 1966<sup>4)</sup>), *Cynodon dactylon* is a dominant in widespread pastures in low altitudes in Nepal Himalaya. Nevertheless, this grass is distributed only in the coastal zone in Japan. This fact indicates that a plant species distributed in a continent or inland in the central part of its distribution grows in the oceanic climate of islands in the margin of a species distribution. There are many species showing such a distribution pattern in Japan, e.g. *Pittosporum Tobira*, *Quercus dentata*, *Q. crispula* and *Pinus densiflora*. Then the mode of distribution mentioned above will give us a key to discriminate "island" from "continent". Dr. Jackson referred to the nature of islands from the viewpoint of the species-area curve. This is considered too, in Williams' paper (1943).<sup>5)</sup>

Characteristics of the environment of islands in the Pacific will be firstly the close relationship to the sea, the particularly strong sea wind (including typhoons), salt spray, the so-called oceanic climate, etc. Dr. Hosokawa has tried to elucidate the climatic indicators of island ecosystems by the life-form system. Wind, moisture, distance from the coast, altitude, etc. will be important as environmental gradients in islands.

One more important characteristic of island nature is "endemism" as mentioned

by Dr. Sachet. The oceanic island flora is characterized by possessing a smaller number of species than a continental island flora, and further in having fewer species in the various genera present (Ridley 1930).<sup>6)</sup> Sinnott and Bailey (1914)<sup>7)</sup> pointed out that an isolated insular flora tends to contain few annual herbs, while arborescent forms tend to be predominant in such insular endemic genera. This fact is closely related to the restriction of population size and the effects of random genetic drift (Wright 1931).<sup>8)</sup> Willis' age and area hypothesis (Willis 1922)<sup>9)</sup> has also been suggested for interpreting the island ecosystem, but it does not explain the richness of tree species in an endemic insular flora.

Major ecosystems in a continent, particularly the plant matrices, are not necessarily limited as a discrete unit and there is an idea of vegetational continuum. But the island ecosystem is very clearly limited by sea as a discrete unit and there is an interspecific balance based on the trophic-dynamic relationships. And such a balance is disturbed or destroyed by human impact and the introduction of exotic species as mentioned by Dr. Jackson, Dr. Uchida, Dr. Balasingam, and Dr. Chapman. The disturbance of the balance of nature in an island ecosystem is closely related to nature conservation. Biological control is really an idea for excluding pests, but it must be done carefully so as not to destroy the original biota and vegetation.

The islands are natural laboratories as mentioned by Dr. Sachet and Mr. Nicholson. However there are vulnerable species and habitats and irreversible ecosystems. Here we must deeply consider the methodology of nature conservation of island ecosystems, on "where, what, why and how" according to Mr. Nicholson and Dr. Holdgate.

#### Literature cited

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