Diversity of Indonesian Insects:  
Perspectives from Population Dynamics and Evolutionary Biology  

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PREFACE  

This volume of the TROPICS contains a collection of articles produced on our research in Indonesia since 1990. It was carried out as a series of Indonesia-Japan joint projects by a team composed of many researchers and students from various universities and institutions from both countries.  

Indonesia has environmental conditions that are extremely diversified both physically and biologically. It has wide areas of tropical rainforest that harbor the world's richest and most diverse fauna and flora. Going eastwards from central Java to the Lesser Sunda Islands, however, the rainfall decreases and becomes distinctly seasonal, and vegetation changes correspondingly. Although air temperature is very constant in tropical environments, temporal fluctuation of rainfall is no more stable than that in temperate zones. In Indonesia, moreover, El Niño brings drier seasons and has occurred at an average interval of 4-5 years, but its periodicity and intensity have greatly changed from time to time (Inoue & Nakamura, 1990; Inoue et al., 1993 and literature cited). In recent decades, the impact of severe droughts associated with the 1982-1983 and 1997-1998 El Niños were extremely strong (Nakagawa et al., 2000).  

Thus, Indonesia has drastically diverse environments in space and time, so that: (1) the results obtained in one location cannot be applied to others with different environmental conditions, and (2) long-term ecological studies are required to cover whole episodes of environmental changes in order to understand their impact. Only such long-term studies can detect the influence of rare disturbances on animal populations and the adaptive traits associated with them. The responses of insects to environmental change may be different in various taxa due to different adaptive traits.  

Our goal was to contribute to knowledge of the speciation, population dynamics and evolution of life history strategies of insects in Indonesia. Since 1990 we have carried out studies at sites with distinctly different rainfall conditions and elevations, e.g. Padang has a typical tropical rainforest climate without a clear alternation of wet and dry seasons, while Purwodadi has a strong dry season of 6-7 months. Sukarami is located at an elevation of 928 m, while Padang and Bogor, Purwodadi are at 5 m, 260 m and 300 m, respectively.  

This volume consists of four parts: The first part deals with the fauna and biology of the phytophagous ladybird beetles Epilachna (Coleoptera: Coccinellidae: Epilachninae). These beetles include notorious pests of various solanaceous and cucurbitaceous crops, but their taxonomy still remains insufficient and their speciation in the tropics is poorly understood. We recorded 26 species from Sumatra and Java and provided notes for their food plants (Katakura et al.), described and
compared the oviposition patterns of some species (Nakano et al.), examined the diapause and heat tolerance of a pest species, *E. vigintioctopunctata* (Kahono et al.) and determined the survivorship and fertility schedules of a wild cucurbit-feeding species, *E. pythe* under laboratory conditions (Nakano et al.). The second part deals with ants. They are most diversified in species number and social systems in the tropics, and play important roles in ecological communities in Indonesia as in other tropical areas. We recorded a total of 216 ant species, including two that are newly described, in the Bogor Botanic Garden using seven collection methods (Ito et al.). We further reported the specialized predation behavior of a myrmicine ant, *Calyptomyrmex* sp. (Ito), the inter-nest relationship of a *Mirmecina* sp. (Tsui et al.) and the ecology of two army ant species, *Dorylus laevigatus* and *Pheidologeton affinis* (Ohkawara). The third part deals with population dynamics of several herbivorous insects including three epilachnine species studied at four different localities for up to nine years (Nakamura et al.), a bug, *Melanphaeus faber* (Heteroptera: Pyrrhocoridae) (Nishida et al.) and three *Lymantria* spp. (Lepidoptera: Lymantriidae) attracted by the pheromone traps (Kamata et al.). Temporal dynamics of the ground arthropod communities on Sumatran high land revealed by a pitfall study (Sota et al.) is also included here. The fourth part covers three articles on diverse topics, dealing with the species composition of lepidopterous pests in *Shorea* nurseries (Sakai et al.), territoriality of a fruit fly, *Drosophila elegans* (Kimura & Hirai), and description of macrochelid mites associated with scarabaeid beetles (Takaku), respectively.

One of the major purposes of our project has been to foster young staff and students of both Indonesia and Japan. We consider that this strategy has been successful as demonstrated by the following examples. Mr. S. Kahono and Ms. W. A. Noerdjito who joined this project from Puslitbang Biologi, LIPI, received doctoral degrees, funded by a scholarship from the Ministry of Education, Science, Sports and Culture of Japan and from the Ronpaku program of the Japanese Society for the Promotion of Science, respectively. Mr. N. Hasan is now completing his doctoral thesis supported by the Ronpaku program. Dr. F. Ito, who was a post-doctoral student of Hokkaido University when he joined this project, was awarded the Kira Prize (an encouragement prize) in 2000 for his contribution extending knowledge of Indonesian ant biology.

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