# KOMUNIKASI PENDEK

## THE DIVERSITY OF LEPIDOPTERA (INSECTA) IN MOUNT KENDENG AND MOUNT BOTOL, GUNUNG HALIMUN NATIONAL PARK, WEST JAVA

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Lepidoptera is one of the four largest orders of insects. The total number species of Lepidoptera approaches 200,000 species, most of them are moths (Heterocera) and only about 15,000 species are butterflies (Rhopalocera) (Holloway JD, JD Bradley and DJ Carter. 1987. *Guides to Insects of Importance to Man. 1 Lepidoptera.* C.A.B International Institute of Entomology. British Museum Natural History. London, him 3). The species of Lepidoptera commonly feed on green plants and consequently can be in direct competition with man, requiring counter-measures and control, but some are beneficial and aesthetic (Holloway *et al.,* 1987).

Studies on the diversity and faunistic composition of Lepidoptera in tropical forest have almost invariably concerned themselves solely with the Macrolepidoptera. The diversity of small moths was reported in Bornean rainforest; it was higher (a = 414) in lowland forest and lower in montane forest (a = 226) and in the edge of mangrove forest (a = 47) {Robinson GS and KR Tuck 1993. Diversity and Faunistics of Small Moths (Microlepidoptera) in Bornean Rainforest. *Ecol. Entomol.* 18, 385-393}. A preliminary study in Gunung Halimun National Park (GHNP), collected 215 specimens and 77 species of butterflies. The species richness and the number of specimens collected from Mt. Kendeng (192 specimens and 75 species) were less than that in Mt. Botol (23 specimens and 5 species) (Ubaidillah MR, H. Sofyan, Kojima, S Komitani and M Yoneda. 1998. Survey on Butterflies in Gunung Halimun National Park. *Research and Conservation of Biodiversity in Indonesia* IV, 155-161).

The specimens of Lepidoptera were collected in Mt. Kendeng (1,000 - 1,500 m asl) and Mt. Botol (1,500 - 1,800 m asl) from February to June 1999, using sweep nets and light traps. Collection of specimens were conducted by a team in and around *looptrail* in each location, beginning at 08.00 until 16.00. Collection by light traps were conducted in each location too. The light traps were set up from 18.00 until next morning. The specimens were preserved in 70% ethanol or in dry preserve until observed and identified. The sorted specimens were identified to the family taxon, based on Borror DJ, CA Triplehom and NF Johnson. 1996. *Pengenalan Pelajaran Serangga.* Gadjah Mada University Press, Yogyakarta. him 727-823; Nielsen ES and IFB Common. 1996. *The insects of Australia: Lepidoptera (Moths and Butterflies).* Division of Entomology CSIRO. Australia, him 817-915; and Holloway *et al.* (1987).

The data were analized by calculating the number of species (S), total number of individuals (N), the number of family (F), Shannon's diversity index (H$^1$), Shannon's evenness (E) and Jaccard's similarity index (Cj) (Magurran AE. 1987. *Ecological Diversity and It's Measurement.* Princeton University Press, New York). The diversity of Lepidoptera were calculated by using the following equations:

$H'=-En/N \ln n_j /N$, $E = H'/\ln S$, and $C_j = j/(a+b-j)$, where $n_i$ : the number of individuals of the $i^{th}$ species, N: the total number of individuals, j : the number of families found in both locations, a : the number of families found in location A, b : the number of families found in location B.

From both locations, we found 1,653 individuals, represented by 33 families of moths and 5 families of butterflies. The number of individuals, families and the diversity of Lepidoptera were shown in Table 1.

Lepidoptera found in Mt. Kendeng and Mt. Botol were compared using Jaccard's similarity index (Cj). Based on this index, the similarity of Lepidoptera in Mt. Kendeng and Mt. Botol was 0.47. The similarity of butterfly in both locations was 0.6 (Table 2).

The relative density (%) of Lepidoptera were shown in Table 3. The Lepidoptera in Mt. Kendeng were dominated by six families, i.e. Geometridae, Lecithoceridae, Noctuidae, Pyralidae, Danaidae and Satyridae. Mt. Botol were dominated by families of Arctiidae, Geometridae, Noctuidae and Pyralidae. Although there were considerable differences in family richness at two locations, this may reflect differences in collecting effort (Ubaidillahefa/., 1998).

Table 1. The number of individuals (N), families (F) and diversity index (H') for Lepidoptera in Mt. Kendeng and Mt. Botol, GHNP, February to June 1999.

| Locations and Diversity index | February | March | June | Subtotal | Total |
|---|---|---|---|---|---|
| Mt. Kendeng | | | | | |
| N | 186 | 240 | 232 | 658 | |
| F | 18 | 17 | 17 | 27 | |
| H¹ | 2.18 | 2.23 | 2.26 | 2.37 | |
| E | 0.75 | 0.79 | 0.8 | 0.84 | |
| Mt. Botol | | | | | |
| N | 596 | 43 | 356 | 995 | |
| F | 22 | 11 | 20 | 29 | |
| H¹ | 1.81 | 1.92 | 2.26 | 2.09 | |
| E | 0.59 | 0.8 | 0.75 | 0.62 | |
| Subtotal | | | | | |
| N | 782 | 283 | 588 | | 1,653 |
| F | 29 | 20 | 22 | | 38 |
| H¹ | 2.14 | 2.27 | 2.38 | | 2.33 |
| E | 0.63 | 0.76 | 0.77 | | 0.64 |

Table 2. The Jaccard's similarity index (Cj) for Lepidoptera in Mt. Kendeng and Mt. Botol, GHNP.

| Locations | | Mt. Kendeng | | Mt. Botol | | Mt. Botol | |
|---|---|---|---|---|---|---|---|
| | | I | II | I | II | Butterfly | Moth and Butterfly |
| Mt. Kendeng | I | 1 | | | | | |
| (Moth) | II | 0.41 | 1 | | | | |
| Mt. Botol | I | 0.45 | 0.32 | 1 | | | |
| (Moth) | II | 0.43 | 0.39 | 0.38 | 1 | | |
| Mt. Kendeng (Butterfly) | | | | | | 0.6 | |
| Mt. Kendeng (Moth and Butterfly) | | | | | | | 0.47 |

Table 3. The number of individuals and relative density (%) of Lepidoptera in GHNP.

| Suborder | Number of individuals | | Relative densities (%) | |
|---|---|---|---|---|
| Family | Mt. Kendeng | Mt. Botol | Mt. Kendeng | Mt. Botol |
| Heterocera | | | | |
| Agonoxenidae | 0 | 7 | 0 | 0.7 |
| Apatelodidae | 2 | 0 | 0.3 | 0 |
| Arctiidae | 21 | 137 | 3.19 | 13.77 |
| Batracedradidae | 0 | 1 | 0 | 0.1 |
| Blastobasidae | 0 | 1 | 0 | 0.1 |
| Cossidae | 1 | 0 | 0.15 | 0 |
| Epiplemidae | 2 | 6 | 0.3 | 0.6 |
| Eriocottidae | 1 | 0 | 0.15 | 0 |
| Eriocraniidae | 3 | 1 | 0.46 | 0.1 |
| Gelechidae | 4 | 18 | 0.61 | 1.81 |
| Geometridae | 118 | 239 | 17.93 | 24.02 |
| Gracillaridae | 4 | 0 | 0.61 | 0 |
| Hesperiidae | 0 | 1 | 0 | 0.1 |
| Lasiocampidae | 1 | 12 | 0.15 | 1.21 |
| Lecithoceridae | 33 | 12 | 5.02 | 1.21 |
| Limacodidae | 0 | 5 | 0 | 0.5 |
| Lymantriidae | 13 | 22 | 1.98 | 2.21 |
| Megalopygidae | 4 | 0 | 0.61 | 0 |
| Noctuidae | 50 | 203 | 7.6 | 20.4 |
| Notodontidae | 2 | 6 | 0.3 | 0.6 |
| Oecophoridae | 25 | 27 | 3.8 | 2.71 |
| Palaephatidae | 0 | 1 | 0 | 0.1 |
| Plutelidae | 0 | 3 | 0 | 0.3 |
| Pyralidae | 149 | 235 | 22.64 | 23.62 |
| Saturniidae | 1 | 0 | 0.15 | 0 |
| Thyrididae | 1 | 1 | 0.15 | 0.1 |
| Tineidae | 1 | 0 | 0.15 | 0 |
| Totrichiidae | 0 | 6 | 0 | 0.6 |
| Zygaenidae | 0 | 1 | 0 | 0.1 |
| Agathiphagidae | 0 | 3 | 0 | 0.3 |
| Uraniidae | 2 | 1 | 0.3 | 0.1 |
| Drepanidae | 0 | 1 | 0 | 0.1 |
| Bombicydae | 2 | 2 | 0.3 | 0.2 |
| Rhopalocera | | | | |
| Danaidae | 79 | 18 | 12.01 | 1.81 |
| Lycaenidae | 22 | 10 | 3.34 | 1.01 |
| Pieridae | 20 | 0 | 3.04 | 0 |
| Satyridae | 87 | 15 | 13.22 | 1.51 |
| Nymphalidae | 10 | 0 | 1.52 | 0 |
| Total | 658 | 995 | | |

During this study, 1,653 individuals of Lepidoptera represented by 38 families were found. Most of those families was moth (33 families) and the other was butterfly (5 families). The number of individuals of Lepidoptera in Mt. Kendeng (658 individuals) was less than that in Mt. Botol (995 individuals). Mt. Botol also has a higher family richness (29 families) than that in Mt. Kendeng (27 families). Based on Shannon's diversity index, the diversity of Lepidoptera in Mt. Kendeng (H' = 2.37) was higher than that in Mt. Botol (H' = 2.09). One of the factors that affected to the higher

diversity of the Lepidoptera in Mt. Kendeng was altitude {Gaasch CM, J Pickering and CT Moore. 1998. Flight Phenology of Parasitic Wasps (Hymenoptera: Ichneumonidae) in Georgia's Piedmont. *Environ. Entomol.,* 606-730}.

A light trap is effective method to collect the moths. By light traps, we collected more number of moths from Mt. Kendeng and Mt. Botol. Light traps offer an effective way of creating a moth list for a site over a long period of time, and may provides valuable information on population trends, but the relative abundance data they provide is distorted by interspecific variability in attraction to light sources (Birkinshaw, N and CD Thomas 1999. Torch-Light Transect Surveys for Moths. *Journal of Insect Conservation* 3, 15-24).

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