

# Species List of Butterflies (Lepidoptera: rhopalocera) in Minh Hoa, Quang Binh

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**Abstract:** Study on butterflies of Minh Hoa was carried out in 2 communes of Thuong Hoa and Hoa Son, Minh Hoa district, Quang Binh province. The study was conducted in different habitats, from shrub and grass, secondary forest, and primary forest at the low land to the highland of the area in April and May 1999. The total 259 butterfly species was recorded; one conservation species is *Troides aeacus*; two new species to science described from the area are *Celaenorrhinus incestus* and *C. kuznetsovi*. The rare species with 1-3 individuals are 86 species consisting of 33.2% total species; the most abundant species with more than 100 individuals are 10 species consisting of 3.9% total species. The butterfly fauna of Minh Hoa is characterized by the fauna of India-Malaysia region (86.8% of species of Minh Hoa distributed in this region). The species composition of Minh Hoa butterflies is close to the species composition of butterflies in Cat Ba, Tam Dao, and Ba Be in the North of Vietnam.

**Keywords:** Butterflies, Distribution range, Forest, Similarity.

## 1. Introduction

Phong Nha - Ke Bang National Park, a huge park of Vietnam, is located in the middle of the Truong Son mountain range in two districts of Bo Trach and Minh Hoa of Quang Binh province, bordering with Nature Reserve Hin Namno of Laos in the west. Core area of the Park is 85,754 ha and 195,400 ha of buffer zone including habitats on land and water, primary and secondary forests, natural regeneration of forests, tropical forests and savanna and large cave system well known in the world.

Vietnam butterfly fauna was studied from the early twentieth century. Recently, there are many studies on butterflies carried out in the National Parks and Nature Reserves of Vietnam [1-7]. So far, more than 1,000 butterfly species are identified and recorded in Vietnam. Minh Hoa has large primary forest and an important part of the Park where biodiversity is rich but butterflies of Minh Hoa have not been studied yet. So it is essential to carry out the study on butterflies of Minh Hoa. The aim of work is to determine species list and their abundance to reveal the biodiversity of the Phong Nha - Ke Bang National Park.

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## 2. Materials and methods

Research was carried out in the communes of Hoa Son and Thuong Hoa, Minh Hoa district, Quang Binh province in April and May 1999. The study area is located in the Phong Nha - Ke Bang National Park. Habitats include primary forest, secondary forest, grassland and shrub of low to high altitude of 1000 m above sea level.

Butterfly specimens were collected by insect nets at different habitats. In addition, the presence and relative abundance of butterflies were also observed and recorded to assess the presence and abundance of butterflies of the area. Butterflies specimens were dried and put in envelopes, some of them were mounted and kept in boxes.

Nomenclature and identification of butterfly species is followed Chou [8], Devyatkin & Monastyrskii [1]; D'Abrera [9], Monastyrskii & Devyatkin [3]; Osada et al. (1999) [10].

Information on the geographical distribution range of each species was based on literature on geographical distribution of butterflies of Vietnam and in the region [1-4, 7-11]. The geographical distribution range (R) of species was categorized on a scale from 1 to 5 (smallest to largest): (R1) Endemic: East Himalayas,

South China, North Indochina; (R2) Southeast Asian mainland from northeastern India to Malaysia and Sumatra; (R3) Indo-Malayan region; (R4) Indo-Malayan and Australasian regions; and Palaeartic, extending into the Indo-Malayan region; and (R5) Old World tropics, Holarctic, or Cosmopolitan.

The similarity of butterfly species composition of Minh Hoa with other areas of Vietnam (Ba Be, Tam Dao, Cat Ba, Minh Hoa, Hon Ba, Ngoc Linh, Phu Quoc) was analyzed with Cluster Analysis using Similarity Tree software [12].

## 3. Result and discussion

Total 259 species of butterflies were identified and recorded during the survey period of April and May 1999 (Table 1). A conservation species, included in Decree 32 of the Government of the Socialist Republic of Vietnam, is *Troides aeacus* (Papilionidae family) [13]. The species is rare, with only 2 individuals recorded. Two new species for science in Minh Hoa are *Celaenorrhinus incestus* and *Celaenorrhinus kuznetsovi* (Hesperiidae) [1].

Table 1. Species, abundance and geographical distribution range of butterflies of Minh Hoa, Quang Binh province (April and May 1999)

No.	Family, species	Abundance	Distribution range (R)
<b>Family Papilionidae</b>			
1	<i>Troides aeacus</i> (C. Felder & R. Felder, 1860)	R	2
2	<i>Chilasa slateri</i> (Hewitson, 1857)	S	3
3	<i>Chilasa paradoxa telearchus</i> (Hewitson, 1852)	S	4
4	<i>Papilio domeleus</i> Linnaeus, 1758	U	1
5	<i>Papilio castor mahadeva</i> Moore, 1879	C	4
6	<i>Papilio helenus</i> (Linnaeus, 1758)	C	2
7	<i>Papilio nephelus chaon</i> Westwood, 1845	C	2
8	<i>Papilio polytes romulus</i> Cramer, 1775	C	3
9	<i>Papilio memnon agenor</i> Linnaeus, 1758	S	2
10	<i>Papilio alcmenor</i> Felder & Felder, 1865	C	2
11	<i>Papilio dialis doddsi</i> Janet, 1896	S	2

12	<i>Papilio bianor</i> Cramer, 1777	S	2
13	<i>Papilio paris</i> Linnaeus, 1758	C	3
14	<i>Graphium agetes</i> (Westwood, 1843)	S	1
15	<i>Graphium aristeus</i> (Stoll, 1780)	C	4
16	<i>Graphium antiphates</i> (Cramer, 1775)	C	2
17	<i>Graphium macareus</i> (Godart, 1819)	C	3
18	<i>Graphium xenocles</i> (Doubleday, 1842)	C	2
19	<i>Graphium megarus</i> (Westwood, 1844)	U	2
20	<i>Graphium sarpedon</i> (Linnaeus, 1758)	C	4
21	<i>Graphium doson</i> (C. Felder & R. Felder, 1864)	N	2
22	<i>Graphium eurypylus</i> (Linnaeus, 1758)	C	4
23	<i>Graphium chironides</i> (Honrath, 1884)	U	2
24	<i>Graphium agamemnon</i> (Linnaeus, 1758)	U	4
25	<i>Lamproptera curius</i> (Fabricius, 1787)	N	3
26	<i>Lampropter meges virescens</i> (Butler, [1870])	N	3
	<b>The family Pieridae</b>		
27	<i>Leptosia nina</i> (Fabricius, 1793)	S	3
28	<i>Prioneris thestylis</i> (Doubleday, 1842)	C	2
29	<i>Prioneris philonome</i> (Boisduval, 1836)	U	2
30	<i>Pieris rapae</i> (Linnaeus, 1758)	S	5
31	<i>Pieris canidia</i> (Linnaeus, 1768)	U	5
32	<i>Cepora nerissa</i> (Fabricius, 1775)	U	3
33	<i>Cepora nadina</i> (Lucas, 1852)	C	2
34	<i>Appias lyncida</i> (Cramer, 1777)	N	3
35	<i>Appias libythea olferna</i> Swinhoe, 1890	R	3
36	<i>Appias nero</i> (Fabricius, 1793)	R	2
37	<i>Appias albina</i> (Boisduval, 1836)	N	3
38	<i>Appias indra</i> (Moore, 1857)	N	2
39	<i>Appias lalage</i> (Doubleday, 1842)	S	2
40	<i>Appias lalassis</i> Grose-Smith, 1887	R	1
41	<i>Ixias pyrene</i> (Linnaeus, 1764)	C	3
42	<i>Hobomoia glaucippe</i> (Linnaeus, 1758)	C	3
43	<i>Dercas verhuelli</i> (van der Hoeven, 1839)	U	2
44	<i>Dercas lycorias</i> (Doubleday, 1842)	R	2
45	<i>Catopsilia pomona</i> (Fabricius, 1775)	C	4
46	<i>Catopsilia scylla cornelia</i> (Fabricius, 1787)	S	4
47	<i>Eurema hecabe</i> (Linnaeus, 1758)	C	4
48	<i>Eurema blanda</i> (Boisduval, 1836)	U	2
49	<i>Eurema andersonii</i> (Moore, 1886)	C	2
50	<i>Eurema novapallida</i> Yata, 1992	R	1
51	<i>Gandaca harina</i> (Horsfield, 1829)	C	4
	<b>Family Danaidae</b>		
52	<i>Danaus chrysippus</i> (Linnaeus, 1758)	S	5
53	<i>Danaus genutia</i> (Cramer, 1779)	C	4
54	<i>Tirumala septentrionis</i> (Butler, 1874)	U	3
55	<i>Parantica aglea</i> (Stoll, 1782)	C	2
56	<i>Parantica melaneus</i> (Cramer, 1775)	C	3

57	<i>Euploea modesta</i> Butler, 1866	R	1
58	<i>Euploea camaralzeman</i> Butler, 1866	U	1
59	<i>Euploea core</i> (Cramer, 1780)	R	3
60	<i>Euploea algea limborgii</i> Moore, [1819]	C	3
61	<i>Euploea sylvester</i> (Fabricius, 1793)	U	2
62	<i>Euploea mulciber</i> (Cramer, 1777)	N	3
63	<i>Euploea tulliolus</i> (Fabricius, 1793)	U	3
64	<i>Euploea klugii erichsonii</i> Felder, [1865]	R	2
65	<i>Euploea eunice</i> (Godart, 1819)	C	1
66	<i>Euploea radamanthus</i> (Fabricius, 1793)	C	2
<b>Family Satyridae</b>			
67	<i>Melanitis leda</i> (Linnaeus, 1758)	C	4
68	<i>Melanitis phedima</i> (Cramer, 1780)	U	3
69	<i>Elymnias patna</i> (Westwood, 1851)	S	2
70	<i>Elymnias hypermnestra</i> (Linnaeus, 1763)	S	3
71	<i>Elymnias casiphone saueri</i> Distant, 1882	S	2
72	<i>Penthema darlisa mimetica</i> Lathy, 1900	S	1
73	<i>Lethe verma</i> (Kollar, 1844)	C	2
74	<i>Lethe confusa</i> Aurivillius, 1897	C	2
75	<i>Lethe mekara</i> (Moore, 1858)	S	2
76	<i>Coelites nothis</i> Westwood, 1850	R	2
77	<i>Orsotriaena medus</i> (Fabricius, 1775)	R	4
78	<i>Mycalesis inopia</i> Fruhstorfer, 1908	S	1
79	<i>Mycalesis deficiens</i> Fruhstorfer, 1908	R	1
80	<i>Mycalesis siamica</i> Riley & Godfrey	R	1
81	<i>Mycalesis intermedia</i> (Moore, 1892)	C	1
82	<i>Mycalesis annamitica</i> Fruhstorfer, 1906	C	1
83	<i>Mycalesis mystes</i> de Niceville	U	1
84	<i>Ragadia crisilda</i> Hewitson, 1862	R	2
85	<i>Ypthima baldus</i> (Fabricius, 1775)	C	3
86	<i>Ypthima huebneri</i> Kirby, 1871	C	2
87	<i>Ypthima imitans</i> Elwes & Edwards, 1893	U	2
<b>Family Amathusiidae</b>			
88	<i>Faunis canens</i> (Hubner, 1826)	C	2
89	<i>Faunis eumeus</i> (Drury, 1773)	C	2
90	<i>Aemona amathusia</i> (Hewitson, 1867)	U	1
91	<i>Stichphthalma fruhstorferi</i> Rober, 1903	S	1
92	<i>Thaumantis diores</i> Doubleday, 1845	R	2
93	<i>Thauria lathyi</i> (Fruhstorfer, 1902)	U	1
<b>Family Acraeidae</b>			
94	<i>Acraea issoria</i> (Hubner, 1819)	U	3
95	<i>Acraea violae</i> (Fabricius, 1793)	R	3
<b>Family Nymphalidae</b>			
96	<i>Cethosia biblis</i> (Drury, 1773)	S	3
97	<i>Cethosia cyane</i> (Drury, 1773)		
98	<i>Vindula erota</i> (Fabricius, 1793)	C	3
99	<i>Cirrochroa tyche</i> (Felder, 1861)	C	3

100	<i>Vagrans egista</i> (Cramer, 1780)	C	3
101	<i>Cupha erymanthis</i> (Drury, 1773)	C	3
102	<i>Phalanta phalanta</i> (Drury, 1773)	R	3
103	<i>Symbrenthia lilaea</i> (Hewitson, 1864)	C	2
104	<i>Junonia iphita</i> (Cramer, 1779)	R	2
105	<i>Junonia atlites</i> (Linnaeus, 1763)	C	2
106	<i>Junonia almana</i> (Linnaeus, 1758)	C	3
107	<i>Junonia lemonias</i> (Linnaeus, 1758)	R	4
108	<i>Junonia hierta</i> (Fabricius, 1798)	S	3
109	<i>Hypolimnas bolina</i> (Linnaeus, 1764)	U	4
110	<i>Deleschallia bisaltide</i> (Cramer, 1777)	U	3
111	<i>Cyrestis themire</i> Honrath, 1884	N	1
112	<i>Cyresthis cocles</i> (Fabricius, 1787)	R	2
113	<i>Cyrestis thyodamas</i> Boisduval, 1836	C	3
114	<i>Chersonesia risa</i> (Doubleday, 1848)	C	2
115	<i>Neptis clinia</i> (Moore, 1872)	C	3
116	<i>Neptis sappho astola</i> Moore, 1872	S	5
117	<i>Neptis hylas</i> (Linnaeus, 1758)	C	4
118	<i>Neptis soma</i> Moore, 1858	S	2
119	<i>Neptis nata</i> Moore, 1858	C	3
120	<i>Phaedyma columella</i> (Cramer, 1780)	U	4
121	<i>Pantoporia sandaka davidsoni</i> Eliot, 1969	R	3
122	<i>Lassipa heliodore</i> (Fabricius, 1787)	S	2
123	<i>Lassipa monata</i> (Weyenbergh, 1874)	S	1
124	<i>Athyma selenophora</i> (Kollar, 1844)	R	3
125	<i>Athyma cama</i> Moore, 1858	S	2
126	<i>Athyma nefte</i> (Cramer, 1780)	S	3
127	<i>Athyma ranga</i> Moore, 1857	S	3
128	<i>Cynitia cocytus</i> (Fabricius, 1787)	S	2
129	<i>Cynitia telchinia</i> (Menetries)	S	2
130	<i>Euthalia monina</i> (Moore, 1859)	S	3
131	<i>Stibochiona nicea</i> (Gray, 1846)	R	2
132	<i>Pseudergolis wedah</i> (Kollar, 1844)	R	2
133	<i>Lexias dirtea</i> (Fabricius, 1793)	S	3
134	<i>Lexias cyanipardus</i> (Butler, 1869)	S	2
135	<i>Rohana tonkiniana</i> Fruhstorfer, 1906	S	1
136	<i>Eulaceura osteria</i> (Westwood, 1850)	S	1
137	<i>Herona marathus</i> (Doubleday, 1848)	S	2
138	<i>Euripus nyctelius</i> (Doubleday, 1845)	U	3
139	<i>Hestina nama</i> (Doubleday, 1844)	U	2
140	<i>Polyura nepenthes</i> (Grose-Smith, 1883)	S	1
141	<i>Charaxes bernardus</i> (Fabricius, 1793)	S	3
142	<i>Charaxes aristogiton</i> Felder, 1867	R	2
143	<i>Charaxes marmax</i> Westwood, 1848	S	2
144	<i>Charaxes kahruba</i> (Moore, 1895)	S	2
	<b>Family Libytheidae</b>		
145	<i>Libythea myrrha</i> Godart, 1819	C	3

146	<i>Libythea geoffroyi alompra</i> Moore, [1901]	C	2
	<b>Family Riordinidae</b>		
147	<i>Zemerus flegyas</i> (Cramer, 1843)	C	2
148	<i>Abisra fylla</i> (Westwood, 1851)	C	2
149	<i>Abisra echerius</i> (Stoll, 1790)	S	2
150	<i>Abisara neophron</i> (Hewitson, 1861)	R	2
151	<i>Paralaxita dora</i> (Fruhstorfer, 1904)	R	1
152	<i>Stiboges nymphidia</i> (Butler, 1876)	U	2
	<b>Family Lycaenidae</b>		
153	<i>Miletus ancon</i> (Doherty, 1889)	S	1
154	<i>Allotinus substrigosus</i> (Moore, 1884)	S	2
155	<i>Curetis bulis</i> Westwood, 1851	U	2
156	<i>Caleta elna</i> (Hewitson, 1876)	S	3
157	<i>Caleta roxus</i> (Godart, 1823)	R	3
158	<i>Pithcops fulgens</i> Doherty, 1889	N	2
159	<i>Megisba malaya</i> (Horsfield, 1828)	R	3
160	<i>Acytolepis puspa</i> (Horsfield, 1828)	U	3
161	<i>Udara dilecta</i> (Moore, 1879)	U	3
162	<i>Udara placidula</i> (Druce, 1895)	C	2
163	<i>Celastrina lavendularis</i> (Moore, 1877)	C	3
164	<i>Neopithecops zalmora</i> (Butler)	C	3
165	<i>Zizeeria maha</i> (Kollar, 1844)	S	2
166	<i>Catochrysops panormus</i> (Felder)	U	4
167	<i>Jamides bochus</i> (Stoll, 1782)	U	4
168	<i>Jamides celeno</i> (Cramer, 1775)	R	4
169	<i>Jamides elpis</i> (Godart, [1824])	R	1
170	<i>Jamides alecto</i> (Felder, 1860)	U	3
171	<i>Nacaduba kurava</i> (Moore, 1857)	C	3
172	<i>Nacaduba beroe gythion</i> Fruhstorfer, 1916	U	4
173	<i>Nacaduba berenice</i> (Herrich-Schaffer)	U	3
174	<i>Nacaduba hermus</i> (Felder, 1860)	C	4
175	<i>Prosotas nora</i> (Waterhouse & Lyell, 1914)	U	3
176	<i>Prosotas pia marginata</i> Tite, 1963	U	4
177	<i>Petrelaea dana</i> (de Niceville)	U	3
178	<i>Anthene emolus</i> (Godart, [1824])	R	4
179	<i>Heliophorus kohimensis delacouri</i> Eliot, 1963	N	2
180	<i>Arhopala khamti</i> Doherty, 1891	S	2
181	<i>Arhopala ammonides</i> (Doherty, 1891)	S	2
182	<i>Arhopala aida</i> de Niceville, 1889	S	2
183	<i>Thaduka multicaudata</i> Moore, [1879]	S	2
184	<i>Mahathala ameria burmana</i> (Talbot, 1936)	S	2
185	<i>Surendra quercetorum</i> (Moore, [1858])	S	3
186	<i>Amblypodia anita</i> Hewitson, 1862	S	3
187	<i>Spindasis syama</i> (Horsfield, 1829)	R	2
188	<i>Spindasis lohita</i> (Horsfield, 1829)	S	2
189	<i>Yasoda tripunctata</i> (Hewitson, 1863)	C	2
190	<i>Ticherra acte</i> (Moore, 1857)	S	2

191	<i>Tajuria maculata</i> (Hewitson, [1865])	S	2
192	<i>Zeltus amasa</i> (Hewitson, 1865)	U	2
193	<i>Sinthusa nasaka amba</i> (Kirby, 1878)	C	2
194	<i>Rapala manea schistacea</i> (Moore, 1879)	S	2
	<b>Family HesperIIDae</b>		
195	<i>Bibasis jaina margana</i> (Fruhstorfer, 1911)	S	3
196	<i>Hasora chromus chromus</i> (Cramer, [1780])	C	4
197	<i>Hasora taminatus bhavara</i> Fruhstorfer, 1911	U	2
198	<i>Hasora malayana</i> (C. & R. Felder, 1860)	U	1
199	<i>Hasora vitta vitta</i> (Butler, 1870)	C	3
200	<i>Badamia exclamationis</i> (Fabricius, 1775)	C	4
201	<i>Choaspes stigmatus stigmatus</i> Evans, 1932	S	2
202	<i>Celaenorrhinus incestus</i> Devyatkin, 2000	U	2
203	<i>Celaenorrhinus kuznetsovi</i> Devyatkin, 2000	S	1
204	<i>Celaenorrhinus putra sanda</i> Evans, 1941	C	2
205	<i>Celaenorrhinus nigricans nigricans</i> (de Niceville, 1885)	S	2
206	<i>Celaenorrhinus vietnamicus</i> Devyatkin, 1998	C	2
207	<i>Darpa pteria dealbata</i> (Distant, 1886)	S	3
208	<i>Darpa striata minta</i> Evans, 1949	S	2
209	<i>Pseudocoladenia dan fabia</i> Evans, 1949	U	2
210	<i>Coladenia agni sundae</i> de Jong, 1992	R	2
211	<i>Seseria</i> sp.	S	2
212	<i>Tagides menaka menaka</i> (Moore, [1866])	U	3
213	<i>Tagiades litigiosa litigiosa</i> Moschler, 1878	U	3
214	<i>Abraximorpha davidii elfina</i> Evans, 1949	U	2
215	<i>Mooreana trichoneuma pralaya</i> (Moore, [1866])	U	2
216	<i>Odontoptilum angulata angulata</i> (Felder, 1862)	S	3
217	<i>Pintara pinwilli pinwilli</i> (Butler, 1877)	S	1
218	<i>Astictopterus jama olivascens</i> Moore, 1878	C	2
219	<i>Ochus subvittatus subvittatus</i> (Moore, 1878)	R	2
220	<i>Arnetta atkinsoni</i> (Moore, 1878)	C	2
221	<i>Halpe porus</i> (Mabile, [1877])	S	2
222	<i>Halpe pelethronix pagaia</i> Evans, 1932	S	1
223	<i>Pithauria murdava</i> (Moore, [1866])	S	2
224	<i>Iambrix salsala salsala</i> (Moore, [1866])	U	3
225	<i>Koruthaialos rubecula hector</i> Watson, 1893	C	3
226	<i>Koruthaialos sindu sindu</i> (C.&R. Felder, 1860)	U	3
227	<i>Koruthaialos butleri</i> de Niceville, [1884]	S	2
228	<i>Stimula swinhoei swinhoei</i> (Elwes & Edward, 1897s)	S	2
229	<i>Ancistroides nigrita diocles</i> (Moore, [1866])	S	3
230	<i>Notocrypta clava theba</i> Evans, 1949	S	1
231	<i>Notocrypta curvifascia curvifascia</i> (C.&R.Felder, 1862)	R	3
232	<i>Notocrypta feisthamelii alysos</i> (Moore, [1866])	U	3
233	<i>Notocrypta paralysos asawa</i> Fruhstorfer, 1911	S	3
234	<i>Scobura cephaloides kinka</i> Evans, 1949	R	2
235	<i>Suastus minuta aditia</i> Evans, 1943	R	3
236	<i>Cupitha purreea</i> (Moore, [1877])	S	3

237	<i>Zographetus satwa</i> (de Niceville, [1884])	R	2
238	<i>Zographetus doxus</i> Eliot or <i>ogygia</i> (Hewitson, [1866])	R	1
239	<i>Hyarotis adrastus praba</i> (Moore, [1866])	S	3
240	<i>Isma bononia idyalis</i> de Niceville, 1897	S	1
241	<i>Pyronura margherita miriam</i> (Evans, 1941)	R	2
242	<i>Lotongus sarala chinensis</i> Evans, 1932	S	2
243	<i>Erionota torus</i> Evans, 1941	S	2
244	<i>Erionota thrax thrax</i> (Linnaeus, 1767)	S	3
245	<i>Pirdana hyela rudolphii</i> Elwes & de Niceville, [1887]	S	3
246	<i>Potanthus trachala tytleri</i> (Evans, 1941)	R	2
247	<i>Potanthus mingo ajax</i> (Evans, 1932)	U	3
248	<i>Potanthus pava pava</i> (Fruhstorfer, 1911)	S	3
249	<i>Potanthus ganda ganda</i> (Fruhstorfer, 1911)	R	2
250	<i>Potanthus pallida</i> (Evans, 1932)	U	3
251	<i>Telicopta besta</i> Evans, 1949	S	2
252	<i>Telicopta ohara jix</i> Evans, 1949	R	4
253	<i>Parnara bada bada</i> (Moore, 1878)	R	4
254	<i>Borbo cinnara</i> (Wallace, 1866)	S	4
255	<i>Pelopidas agna agna</i> (Moore, [1866])	C	4
256	<i>Pelopidas assamensis</i> (de Niceville, 1882)	S	2
257	<i>Polytremis lubricans lubricans</i> (Herrich-Schaffer, 1869)	C	2
258	<i>Baoris penicillata chapmani</i> Evans, 1937	S	2
259	<i>Caltoris cormasa</i> (Hewitson, 1876)	S	3

Note: N: more than 100 individuals; C: more than 50 - 100 individuals; U: more than 10 - 50 individuals; R: 4 - 10 individuals; S: 1 - 3 individuals.

Geographical distribution range: (R1) endemic to Indochina region including Eastern Himalayas, South China, North Indochina; (R2) Southeast Asia mainland from northeastern India to Malaysia and Sumatra; (R3) The India, China to Malaysia; (R4) India - Malaysia and Australia region - Asia, and Palaearctic, extending to the India - Malaysia region; and (R5) Old World tropics, Holarctic, or Cosmopolitan.

Species with least individuals, from 1 to 3 individuals, are 86 species, accounting for 33.2% total species. Species with 4 to 10 individuals are 45 species (17.4%). The most species are single and rare (131 species, accounting for 50.6% total species) (Table 2). Species with the most individuals more than 100 are 10 species (3.9%). This result is entirely consistent with results on butterfly studies tropical regions that the majority of species have low individual number (rare species) [5, 14]. Temperate regions, where have low species diversity, but individuals of each species are high, whereas, in the tropics there are many species, but the individual number of each species is low [15]. It can be seen as an ecological rules on the relationship between

species diversity and abundance of species, the diversity of species increases, the abundance of each species decreases and vice versa.

Number of species by geographical distribution range is presented in Table 3. The most species number is in the Southeast Asia mainland (R2) with 112 species (representing 43.24% total species); followed by India-Malayan region (R3) with 81 species (31.27%). There are 4 species (1.54%) in Old World tropics, Holarctic, or Cosmopolitan. Species with the smallest geographical distribution range species (Indochina) (R1) are 32 species (12.36%).

The total species distributed inside India - Malaysia region (including species in the Indochina, Southeast Asian mainland, and Indo-



Malayan region) is 225 species (accounting for 86.8% total species). Thus, Minh Hoa butterfly

fauna is characterized for the butterfly fauna of India - Malaysia.

Table 2. Number of butterfly species and their percentage by abundance levels

No.	Abundance	Number of species	Percentage %
1	1-3 individuals (S)	86	33.2
2	4-10 individuals (R)	45	17.4
3	More than 10-50 individuals (U)	50	19.3
4	More than 50-100 individuals (C)	68	26.2
5	More than 100 individuals (N)	10	3.9
	Total	259	100.0

Table 3. Number of species by geographical distribution range

Species number and percentage	Geographical distribution range (smallest to widest)				
	R1	R2	R3	R4	R5
Species number	32	112	81	30	4
Percentage %	12.36	43.24	31.27	11.58	1.54

Note: The geographical distribution range as in the Table 1.

The similarity of species composition of Minh Hoa is compared with species compositions of National Parks and Nature Reserves from North to South Vietnam (Figure 1). Data on species composition are taken from statistic work (Vu Van Lien, 2010) [6]. The species composition of Minh Hoa (MH) is rather similar to the species composition of Cat Ba (CB) with 51%, 52% with Tam Dao (TD), and 58% with Ba (BB). The butterfly species composition of Minh Hoa is quite different

from the species composition of Ngoc Linh and Hon Ba (central mountain area) with 45%, lower with the Hoang Lien (HL) 36% and Van ban 37 %, and Phu Quoc (PQ) 36%.

The result indicates that the species composition of Minh Hoa is rather similar to the species composition Ba Be, Tam Dao, and Cat Ba. The reason is because this area is not far from each other geographically. In additional, these areas are not much different in altitudes [6].

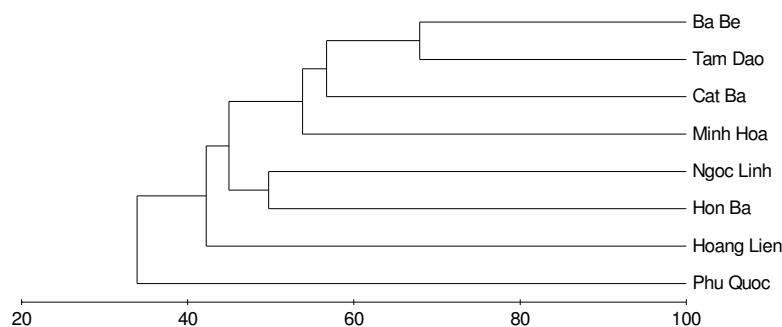


Figure 1. Similarity of butterfly species composition between Minh Hoa and other areas of Vietnam.

Note: NL: Ngoc Linh Nature Reserve (Kon Tum), HB: Hon Ba Nature Reserve (Khanh Hoa), BB: Ba Be National Park (Bac Can), TD: Tam Dao National Park (Vinh Phuc), CB: Cat Ba National Park (Haiphong), MH: Minh Hoa (Quang Binh), VB: Van Ban Nature Reserve (Lao Cai), HL: Hoang Lien National Park (Lao Cai), PQ: Phu Quoc National Park (Kien Giang).

#### 4. Conclusion

Total 259 butterfly species are recorded in Minh Hoa, Quang Binh in April and May 1999. This is the first species list of butterflies in the area. One conservation species is *Troides aeacus*; two new species to science described from Minh Hoa are *Celaenorrhinus incestus* and *Celaenorrhinus kuznetsovi*. Butterfly species of Quang Binh is close to butterfly composition species of North Vietnam (Cat Ba, Ba Be, and Tam Dao National Parks). Butterfly fauna of Minh Hoas is characterized by India-Malaysia with 86.8% of total species distributed in this region.

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## Thành phần loài bướm (Lepidoptera: Rhopalocrea) ở Minh Hóa, Quảng Bình

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**Tóm tắt:** Nghiên cứu thành phần loài bướm Minh Hóa được tiến hành ở 2 xã Thượng Hóa và Hóa Sơn, huyện Minh Hóa, tỉnh Quảng Bình trong tháng 4 và tháng 5 năm 1999. Nghiên cứu ở các loại sinh cảnh khác nhau: từ cây bụi, trảng cỏ, rừng thứ sinh khu vực thấp đến rừng nguyên sinh khu vực cao. Tổng số 259 loài bướm đã được ghi nhận; trong đó, một loài có giá trị bảo tồn là *Troides aeacus*, hai loài mới cho khoa học được mô tả từ Minh Hóa là *Celaenorrhinus incestus* và *C. kuznetsovi*. Loài hiếm gặp có số cá thể từ 1-3 là 86 loài chiếm 33,2% tổng số loài, loài phong phú nhất có số cá thể trên 100 là 10 loài chiếm 3,9% số loài bướm ghi nhận ở khu vực nghiên cứu. Khu hệ bướm Minh Hóa mang tính chất của khu hệ Ấn Độ - Mã Lai với 86,8% tổng số loài phân bố ở khu vực này. Thành phần loài bướm Minh Hóa khá gần gũi với thành phần loài bướm ở Cát Bà, Ba Bể và Tam Đảo ở miền Bắc Việt Nam.

*Từ khóa:* Bướm, Rừng, Tương đồng, Vùng phân bố.