

Notes on the genus *Pirdana* Distant, 1886 (Lepidoptera: Hesperidae)

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In the Oriental genus *Pirdana* Distant, 1886, the new species *P. fusca* is described from Samar (E Philippines). The phylogeny of the genus is discussed and as a consequence the endemic Sulawesi taxon *P. hyela ismene* (Felder & Felder, [1867]) is given back its species rank, bringing the total number of species in the genus to five. A key to the species is added.

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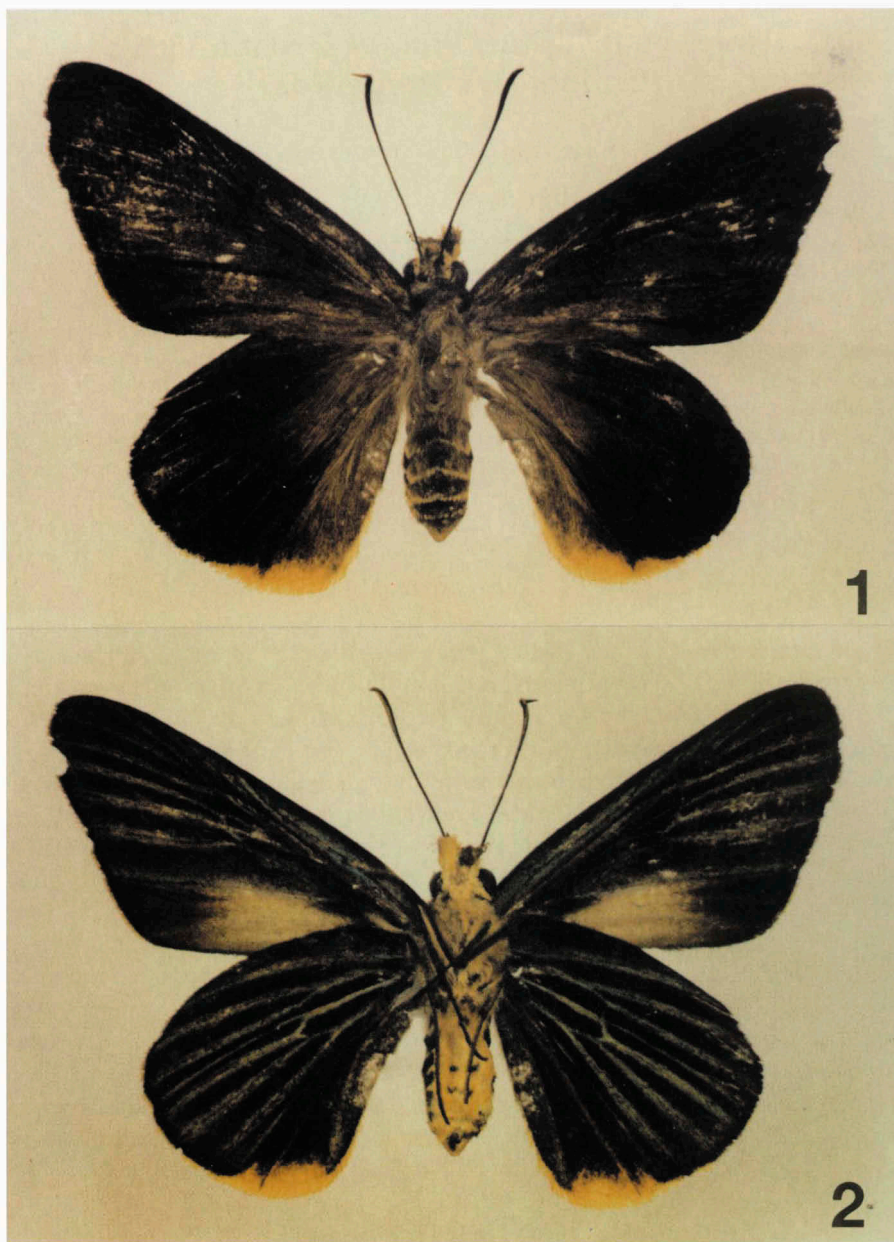
Introduction

The Oriental genus *Pirdana* Distant, 1886, as defined by Evans (1949), consists of three species only: *P. hyela* (Hewitson, 1867) (N India to Java, Sulawesi and the Philippines; fig. 8), *P. distanti* Staudinger, 1889 (Burma to Java and Borneo; fig. 9), and *P. albicornis* Elwes & Edwards, 1897 (Borneo; fig. 10). The wide-spread *P. hyela* is easily distinguished from the other two species by the underside of the wings where the veins are outlined in blue or pale green against a dark brown or blue ground. Evans (1949) distinguished four subspecies, as follows: subspecies *major* Evans, 1932, from Sikkim and Assam, subspecies *rudolphii* (Elwes & de Nicéville, 1886) from Burma, Thailand and Malaya, subspecies *hyela* (Hewitson, 1867) from Sumatra, Java, Borneo and the Philippines, and subspecies *ismene* (Felder & Felder, [1867]) from Sulawesi. In the Philippines *P. hyela* is only known from Palawan and Luzon. Recent collections made in Samar (eastern Philippines) have yielded a short series of a form that is similar to *P. hyela* in the pale veins on the underside of the wings, but differs in a number of other characters. It is described as a new species here. Re-examination of the variation in *P. hyela* has further prompted us to re-establish the species rank of the endemic Sulawesi taxon *ismene*, bringing the total number of species in the genus to five.

Pirdana fusca spec. nov.

Material.— Holotype, ♂, Philippines, E. Samar, San Rafael, 150 m, 22.iv.1992, leg. Th. Borromeo. Paratypes: 5 ♀♀, as holotype, but 200 m, and 24.vii, 28.vii, 30.vii, 31.vii and 1.viii.1992. Holotype and two paratypes in Coll. C.G. Treadaway, two paratypes in Nationaal Natuurhistorisch Museum (formerly Rijksmuseum van Natuurlijke Historie), Leiden.

External characters (figs. 1, 2).— Length of forewing, male 23.6 mm, female 24.5-26.9 mm. Upperside forewing dark brown, unspotted, indistinct yellow hairs in basal third, especially along radius and vein 1. Upperside hindwing dark brown, yellow hairs in



Figs. 1, 2. Upper (1) and underside (2) of *Pirdana fusca* spec. nov., female paratype.

basal third and in space 1b; narrowly yellow at tornus, extending along margin to vein 2, in female yellow scales penetrating some way into space 1b. Underside forewing dark violet brown, pale bluish along veins and in costal area, large pale ochreous area from dorsum to vein 2. Underside hindwing dark violet brown, veins outlined in pale bluish colour, including the lost median vein in the cell, the bluish colour diffusely spreading between the veins in spaces 1c, 2 and 3; tornal area as on upperside.

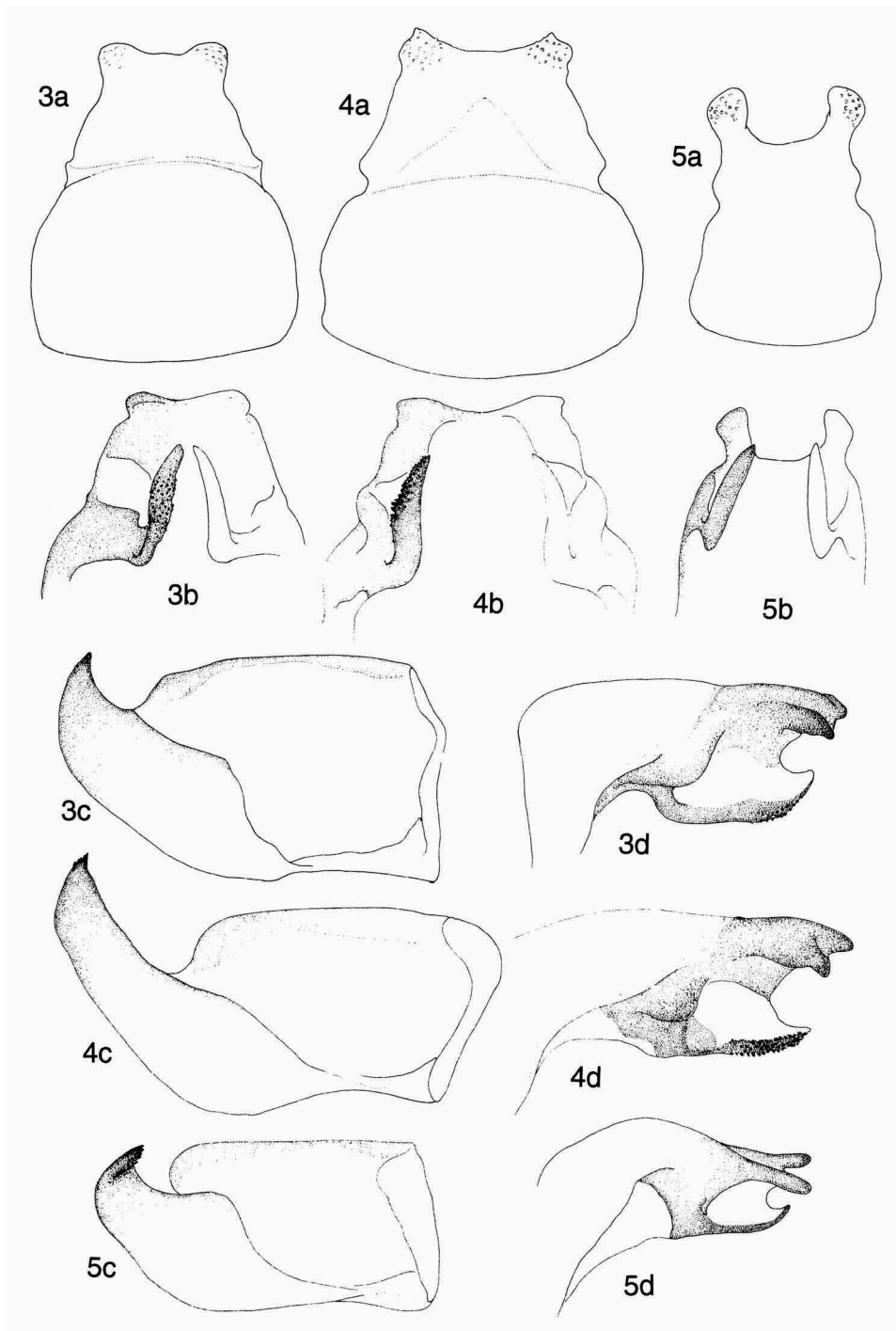
Genitalia.— Male (fig. 3). Tegumen rounded, length:width = 3:4, demarkation with uncus well-marked. Uncus narrowing towards apex, apex broad, about $\frac{2}{3}$ of width at base, with rounded, slightly protruding corners. Gnathos narrow, ventrally finely spinulose, left and right parts separate but approaching, at apex about their own width apart. Valva with costa hardly developed, distally a slight bump; cucullus with dorsal and ventral sides almost parallel, apex slightly curved in, free part of cucullus (beyond junction with costa) about $\frac{1}{4}$ of entire length of cucullus.— Female (fig. 6). Eighth abdominal sternite centrally broadly membranous with wide ostium; narrow antevaginal sclerotization that laterally extends caudad without entirely reaching the distal margin of the segment; postvaginal sclerotization along distal margin, much broader centrally than laterally, not joined to lateral sclerotization; antevaginal sclerotization, lateral sclerotization along inner margin, and postvaginal sclerotization along distal margin with numerous microtrichia. Eighth tergite free from sternite (i.e. only membranously connected). Ductus bursae a slender membranous tube, soon broadening into elongate, entirely membranous, rather short bursa, that is about as long as length of eighth sternite plus papillae anales.

Discussion.— The new species differs from *P. hyela* in the dark brown upperside of the female (hence its name), while in all forms of the latter the female always has a bluish gloss. For further differences, see discussion below.

Recognizing *Pirdana hyela*, *P. ismene* and *P. fusca*

Pirdana ismene (Felder & Felder, [1867]) was originally described as a separate species, and also regarded as such by Seitz (1927). Apparently Evans (1932, 1949) synonymized it with *P. hyela* because of the shared possession of veins being outlined in a lighter colour on the underside of the wings. Since this character was not found in the other species of the genus nor in any of the related genera, the inclusion of *P. ismene* seemed justified, at least from a typological point of view, even though the latter, with its restricted range, differs in a number of characters from the wide-spread former species. With the discovery of *P. fusca*, however, a close relationship between *P. hyela* and *P. ismene* is no longer self-evident, and taking other characters into account as well, it is even uncertain if not improbable that the three taxa together form a monophyletic group. The phylogenetic relationships between the species (and the conclusion to be drawn from them) will be dealt with in the next section. Here we list diagnostic characters for the three species (see also figs. 3-5):

- upperside wings: brown in both sexes, *P. fusca*; male brown, female blue, *P. hyela*; both sexes blue, *P. ismene*;
- groundcolour underside wings: dark violet brown, *P. fusca* and *P. hyela*; bluish, *P. ismene*;
- underside forewing pale area in space 1a-c: conspicuous, *P. fusca*; variable, *P. hyela*; absent, *P. ismene*;
- uncus: apically indented, forming two arms, *P. hyela*; apically broad with rounded shoulders, *P. fusca* and *P. ismene*;
- junction of tegumen and uncus: well-marked, *P. fusca* and *P. ismene*; indistinct, *P. hyela*;
- gnathos ventrally: smooth, *P. hyela*; finely spinulose, *P. fusca* and *P. ismene*;



Figs. 3-5. Male genitalia of *Pirdana fusca* spec. nov. (3), *Pirdana ismene* (Felder & Felder, [1867]) (4) and *Pirdana hyela* (Hewitson, 1867) (5). a, dorsal view of uncus and tegumen; b, ventral view of gnathos and uncus; c, inside of left valva; d, left lateral view of uncus, gnathos and tegumen.

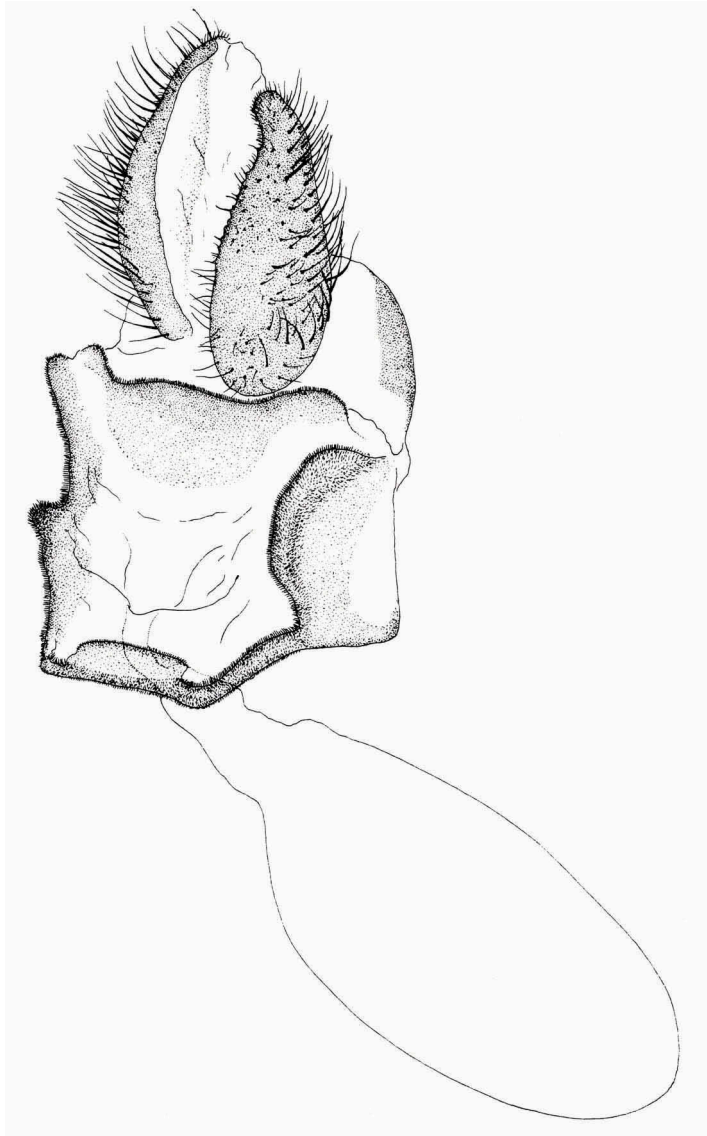


Fig. 6. Female genitalia of *Pirdana fusca* spec. nov., ventral view.

- left and right parts of gnathos: several times their own width apart ventrally, *P. hyela* and *P. ismene*; approaching ventrally, hardly their own width apart, *P. fusca*;
- valva with costa: slightly elevated above junction with cucullus, *P. fusca* and *P. ismene*; well-elevated above junction with cucullus, *P. hyela*;
- cucullus: elongate, dorsal and ventral edges subparallel or gradually approaching towards apex, *P. fusca* and *P. ismene*; irregular, dorsal edge with a big bump before junction with costa, *P. hyela*;
- ductus bursae: tube-like. *P. fusca*; more funnel-like (i.e. wider at ostium), *P. hyela*, *P. ismene*;

— bursa: short, about as long as eighth sternite and papillae anales together, *P. fusca*; considerably longer, *P. hyela*, *P. ismene*.

Phylogeny of the genus

Before turning to the internal relationships of the genus, we must make sure, or at least acceptable, that the genus is monophyletic. Evans (1949) placed *Pirdana* in the *Unkana* subgroup of the *Plastingia* group of genera. The *Unkana* subgroup is characterized by the forewing cell being longer than the inner margin of the forewing, and the inner margin of the hindwing generally being longer than the inner margin of the forewing. It remains to be established if this justifies the recognition of the *Unkana* subgroup, but for the moment the assumption of the *Unkana* subgroup as a monophyletic group is a reasonable hypothesis and starting point for a discussion of the phylogeny of *Pirdana*. In the analysis the *Unkana* subgroup less *Pirdana* will be taken as outgroup of *Pirdana*.

Three characters support the monophyly of *Pirdana*:

(a) wings unspotted; this loss character is rather weak, as it occurs in a very scattered way throughout the HesperIIDae, but since the wings are always spotted in the outgroup, we list it here as supporting the monophyly of *Pirdana*;

(b) apex of cell of forewing acutely produced;

(c) veins 4 and 5 of forewing strongly bowed.

In the absence of evidence to the contrary we will assume the monophyly of *Pirdana*.

For an analysis of the phylogeny of *Pirdana*, there are not very many characters to go by (tables 1 and 2), but enough to make a phylogenetic exercise worthwhile. The low number of taxa makes it feasible to examine (or to have a computer programme examine) all possible trees. With six taxa (five *Pirdana* species and an outgroup) there are 105 possible trees. With PAUP version 3.0s, running on a Macintosh Classic, it took only 3.13 seconds to examine all trees with the branch-and-bound search option, five times as fast as with the exhaustive search option. Faster still was the heuristic search/branch swapping option. It took only 1.40 seconds to yield the same three equally parsimonious trees (length 13, CI = 0.769, RI = 0.625, RI = 0.481) as the other options. The trees are given in fig. 7. It demonstrates that in the parsimony analysis no support can be found for conspecificity of *P. hyela*, *P. ismene* and *P. fusca*. Instead, *P. ismene* seems more closely related to *P. distanti* and *P. albicornis* than to any of the other two species, and *P. fusca* seems to be sister to the rest of the genus.

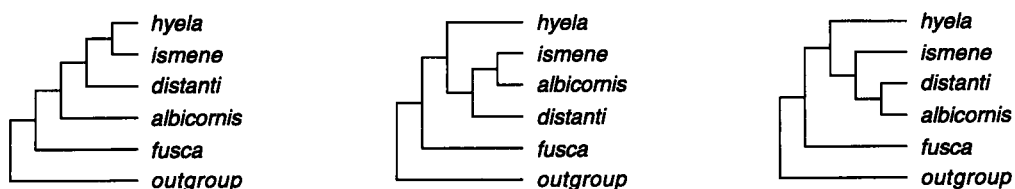


Fig. 7. The shortest phylogenetic trees for *Pirdana*. See text for explanation.

Table 1. Character list for *Pirdana* as used for phylogenetic analysis.

1 antenna	0 club and shaft plain brown
	1 club white-ringed and shaft white centrally
2 colour upperside wings in male	0 brown
	1 blue
3 colour upperside wings in female	0 brown
	1 blue
4 groundcolour underside wings	0 brown
	1 greenish or bluish
5 colour veins underside wings	0 not different from rest of wing
	1 outlined in paler colour
6 uncus	0 broad
	1 narrow
7 apex uncus	0 not or hardly indented
	1 deeply and widely indented
8 junction tegumen and uncus	0 invisible
	1 well-marked
9 gnathos	0 ventrally spinulose
	1 ventrally smooth
10 gnathos parts ventrally	0 close
	1 far apart

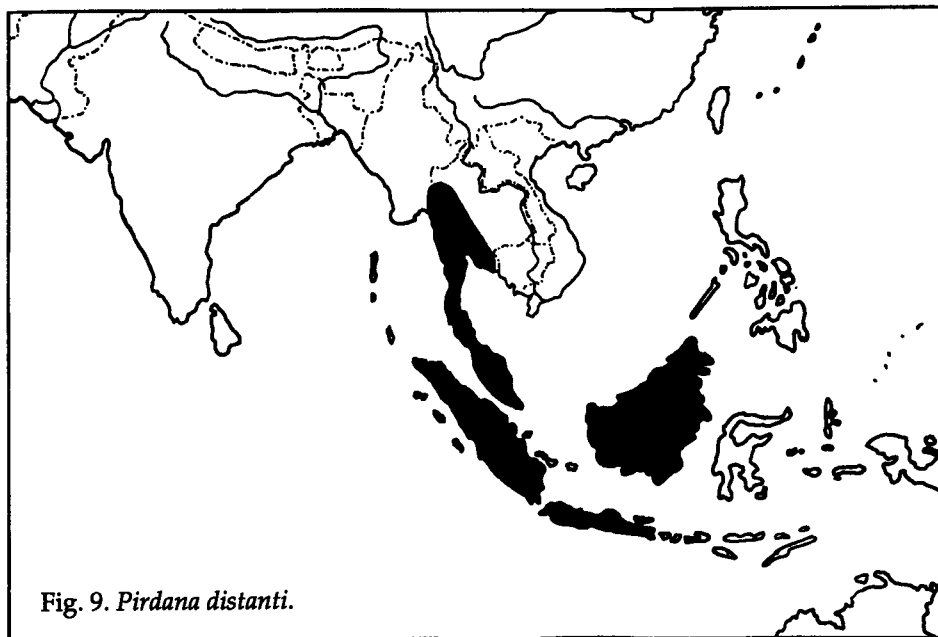
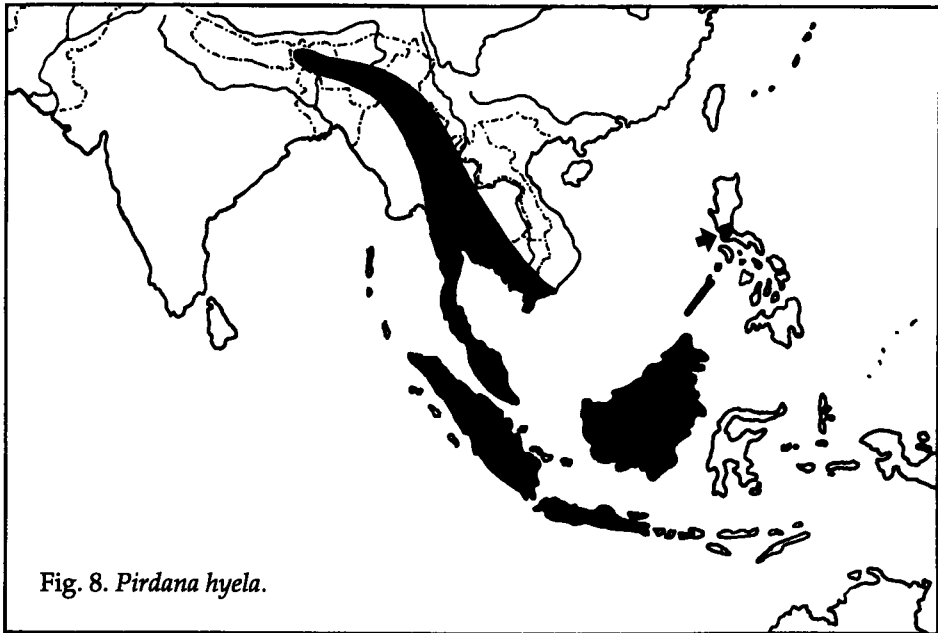
Table 2. Character matrix for *Pirdana*, based on table 1. ? stands for 'uncertain'.

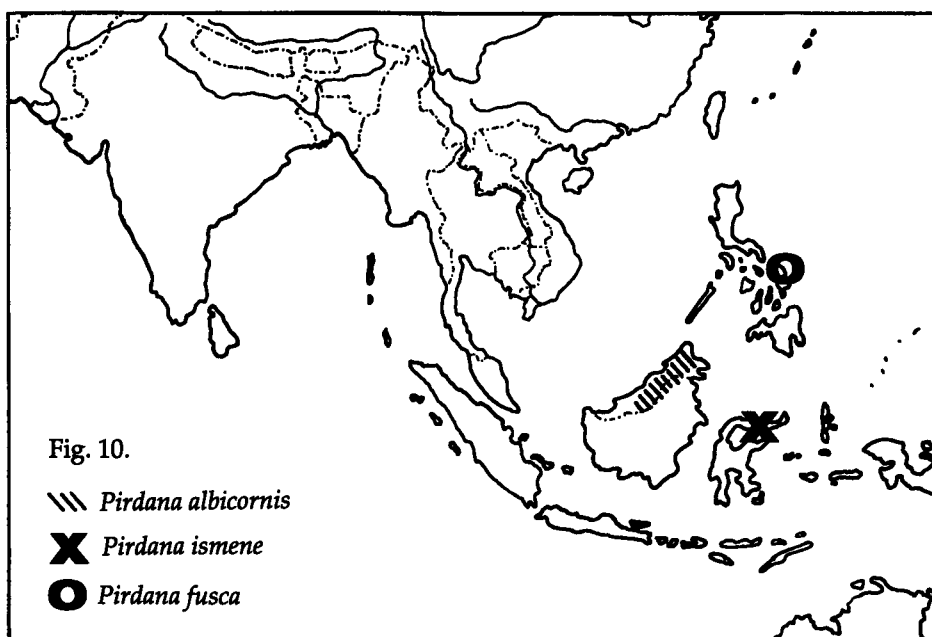
hyela	0010101011
ismene	0111100101
fusca	0000100100
distanti	0011000101
albicornis	1111010?00
outgroup	0000000?00

Taxonomic consequences

Translating the discussion above into taxonomic decisions, we conclude that the species rank of *P. ismene* should be re-instated and that also *P. hyela* and *P. fusca* are separate species. Further it can be remarked that there is morphological support for the concept that all species less *P. fusca* are monophyletic (character 3). For the monophyly of *P. ismene*, *P. distanti* and *P. albicornis*, however, found in two of the three most parsimonious trees, no support in the form of a character unique to these species has been found so far.

The distributions of the five species (figs. 8-10) do not give a further indication of relationship. If *P. fusca* is indeed an early off-shoot of the *Pirdana* lineage, its isolated occurrence in Samar must be considered a relic. A geographic sistergroup relationship Samar – rest of SE Asia is most likely





Key to the *Pirdana* species

1. Veins on underside of wings outlined in paler shade than groundcolour 2
 - Veins on underside of wings not contrasting with groundcolour 4
2. Groundcolour of underside of wings dark violet brown; male upperside brown ... 3
 - Groundcolour of underside of wings bluish; male upperside with blue gloss *P. ismene*
3. Upperside, wing bases with yellow hairs; female, upperside brown *P. fusca*
 - Upperside, without yellow hairs at wing bases; female upperside blue .. *P. hyela*
4. Antennal club white-ringed and shaft centrally whitened; male and female blue above *P. albicornis*
 - No white on antenna; male brown, female blue above *P. distant*

Acknowledgements

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