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The synonymy of *Forsterinaria difficilis* (FORSTER) and *F. anachoreta*  
PULIDO & ANDRADE  
(Lepidoptera: Nymphalidae: Satyrinae)

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ABSTRACT. *Forsterinaria anachoreta* PULIDO & ANDRADE is recognized here as the junior subjective synonym of *F. difficilis* (FORSTER). The type locality of *F. difficilis* given by FORSTER as Bolivia is considered mistaken. The identity of *F. difficilis* and *F. pichita* PEÑA & LAMAS is evaluated.

Key words: entomology, taxonomy, Andes, *Forsterinaria difficilis*, *F. anachoreta*, Euptychiina.

#### INTRODUCTION

The neotropical montane genus *Forsterinaria* was originally described by FORSTER (1964) as *Haywardina* and comprised six species previously belonging to the genera *Satyrus*, *Euptychia* and *Taygetis*. FORSTER (op. cit.) also described two new species *Haywardina difficilis* and *H. pseudinornata*. The name *Haywardina* was replaced by GRAY (1973) who pointed out that it is a junior homonym of a genus of dipterans *Haywardina* ACZÉL (1952) and proposed a replacement name, *Forsterinaria*. PEÑA & LAMAS (2005) revised the genus *Forsterinaria*, recognized 23 species, including 12 new, and solved several cases of synonymy. They illustrated the adults and male genitalia of all the species. PULIDO & ANDRADE (2008) described a new species from northern Colombia, *Forsterinaria anachoreta*. During a revisional work on the genus *Forsterinaria* carried out by the first author, several new taxa at the specific and subspecific level were identified, and several possible synonymies determined, one of which is the subject of this paper.

Adult *Forsterinaria* are mid-sized butterflies with all brown dorsal surface of the wings and no conspicuous pattern. In some species there are androconial patches on the forewings or both, fore and hindwings. Ventral wing surface is usually slightly brighter than dorsal, with lines, dots and ocelli. In most species small white or yellow dots occur between submarginal and postdiscal line. Many species exhibit one or several white or yellowish spots in the subapical part of VF while other species display one or more white spots, which size and location are typical for particular species. Several species display one or more ocelli composed of central white spots and black rings. Fore and hindwings are rounded with a softly undulated hindwing outer margin. Sexual dimorphism is slight. Females are in most cases slightly bigger than males with ventral wing surface lighter, and more conspicuous pattern. Male genitalia are simple. Uncus is straight or slightly arched with a sharp posterior tip, ventrally curved. Gnathos is generally very small or absent. Valvae are rhomboidal, without dorsal processes, sometimes with a triangular or rounded lateral process. Aedeagus is straight or slightly curved in the middle with a scaphoid proximal opening. Female genitalia have not been studied. Immature stages are not known.

Species level taxonomy of *Forsterinaria* is demanding. The various species show little difference in head, thorax and abdomen morphology. The only noticeable differences consist of little conspicuous external features, such as the extent of the androconial patch (if present), the shape of HV lines, and genitalia. However, in several species even the genitalia provide little diagnostic characters for the immediate segregation of some allopatric or even sympatric species. Since most species are dull brown with no conspicuous color patterns, their correct identification generally has to take into consideration a set of different morphological characters supported by reliable ecological and biogeographical data.

#### MATERIAL AND METHODS

A total of 735 specimens were examined, primarily deposited at the Zoological Museum of the Jagiellonian University. Other collections, as listed below, were also consulted. The first author conducted field work in 2009 and 2011 in the Cordillera de Merida and the Cordillera de La Costa in Venezuela. The second author carried out research in the Andes from 1987-2011. Observations of natural environment in the area inhabited by *Forsterinaria* butterflies were made and preliminary data on food plants were gathered. Specimens were identified by morphological analysis of wing pattern, male and female genitalia. The following characters of wing pattern were taken under consideration: shape of VF and VH lines; size and number of VH ocelli; size and shape of VF subapical spots; the position of VH submarginal spots relative to the postdiscal and submarginal lines; presence and shape of androconial patch on DF or DH. Wing pattern terminology follows PEÑA & LAMAS (2005). Some extra terms were used to clarify descriptions (Figs. 9, 10). Male genitalia were separated from the abdomen after boiling in 10% KOH solution for five to ten minutes. In male genitalia the following characters were taken under consideration: shape of uncus; presence of gnathos; shape of valva and its length compared to uncus; presence of lateral process on valva; length

and shape of saccus. Genital terminology follows RAZOWSKI (1973) and KLOTS (1970). Pictures of genital dissections were taken with Canon C5050Z camera mounted on an Olympus SZX9 stereomicroscope. Photographs were processed using Combine ZP and Corel PHOTO-PAINT X3 programs to improve focus and quality. All male dissections are kept in glycerol vials pinned under the specimens. Each preparation and specimen is provided with a label with its number, dissection date and locality.

#### Abbreviations and collection acronyms:

DF: dorsal surface of the forewing;

DH: dorsal surface of the hindwing;

VF: ventral surface of the forewing;

VH: ventral surface of the hindwing;

BMNH: Natural History Museum, (formerly British Museum (Natural History)), London, UK;

ICN-MHN: Instituto de Ciencias Naturales, Colección de Lepidoptera, Universidad Nacional de Colombia, Colombia;

MIZA: Museo del Instituto de Zoología Agrícola de la Universidad Central de Venezuela, Maracay, Venezuela;

MZUJ: Muzeum Zoologiczne Uniwersytetu Jagiellońskiego, Kraków, Poland;

PBF : private collection of Pierre BOYER, Le Puy Sainte Réparate, France;

ZSBS: Zoologische Sammlung des Bayerischen Staates, Munich, Germany.

#### RESULTS

##### *Forsterinaria difficilis* (FORSTER, 1964)

*Haywardina difficilis* FORSTER, 1964: 114, fig. 118, pl. 32, figs. 9-10, [HOLOTYPE No. ♂ Haywardina difficilis FORSTER Zoologische Staatssammlung München, präparat No. SA86, ♂ Eupt. rustica Bolivia, Zoolog. Staatssammlung München].

*Forsterinaria difficilis* (FORSTER) GRAY, 1973: 171; LAMAS, 2004: 219; PEÑA & LAMAS, 2005: 34, figs. 10E, 11C; GARECA et al., 2006: 51.

*Forsterinaria anachoreta* PULIDO & ANDRADE, 2008: 192, figs. 4-5. syn. nov.; [HOLOTYPE of *Forsterinaria anachoreta* PULIDO & ANDRADE, 2008, ICN-MHN-L, COLOMBIA, Cesar, Manaure Balcón del Cesar, Vereda El Cinco, 10°21'46,4" north, 72°56'58,9" west, 2650 m, 27.II.2007, H. PULIDO-B. leg., HP 0954, Gen. No. 1043].

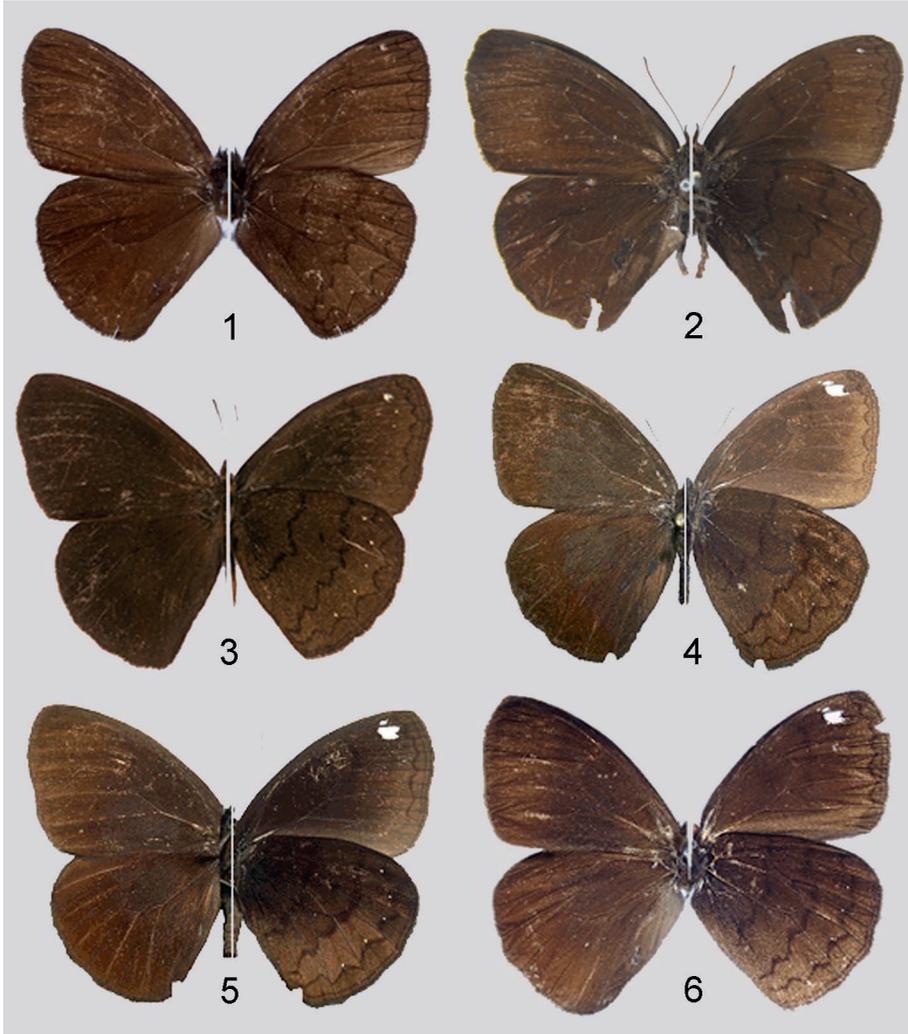
#### MATERIAL EXAMINED

VENEZUELA: 1 ♂: Estado Táchira, Betania, P. N. El Tamá, 2200 m, 08.VIII.1987, F. Rey leg.; 2 ♂: Estado Táchira, Betania, P. N. El Tamá, VIII.1987, T. PYRCZ leg.; 1 ♂: same data, [prep. genit. 08/19.03.2009/A.Zubek]; 2 ♂: same data but 2300 m, 13.II.2008; 1 ♂: same data but 2700 m, VIII.1987, [prep. genit. 10/30.XI.2009/A.Zubek], [MZUJ]; 1 ♂: Estado Táchira, Sierra del Tamá, vía a Páramo de la Línea, 2600 – 2800 m, 16.II.2008, P. Boyer leg., [PBF]; COLOMBIA: 1 ♂: Departamento Caldas, Manizales, Res. Río Blanco, 2300 – 2400 m, 23.VII.2007, T. Pycrz leg., [prep.

genit.10/20.01.2010/A.Zubek], [MZUJ]; 1 ♂: Cañón del Tolima, 2500 m, XII.1909 (A. H. Fassl), [BMNH].

#### REDESCRIPTION

MALE: Head: eyes dark brown and densely hairy; antenna slightly shorter than the half of costal FW margin, dorsally brown, ventrally slightly lighter brown, with scales covering the basal half of the antenna, club elongated, composed of 11 segments; labial



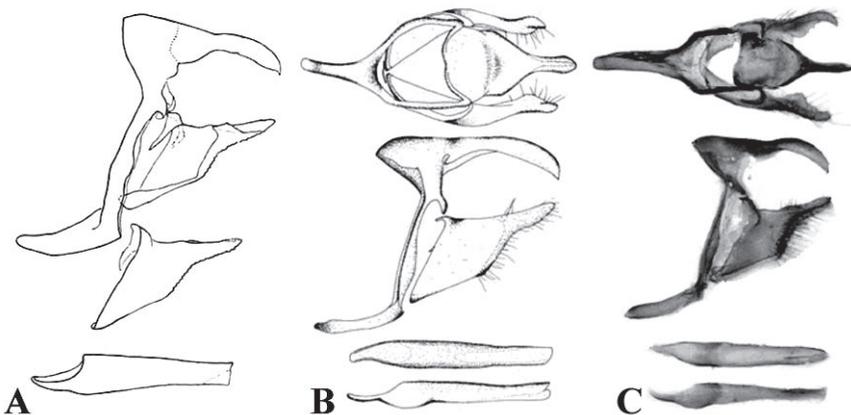
1-6. Adults (males): 1 – *Forsterinaria difficilis*, Tamá, Venezuela, MZUJ; 2 – *F. difficilis*, Holotype, „Bolivia”; 3 – *F. difficilis* (*Forsterinaria anachoreta* Holotype), Perijá, Colombia; 4 – *F. pichita?* (*Forsterinaria difficilis* in PEÑA & LAMAS), no locality; 5 – *F. pichita*, Holotype, Mina Pichita, Peru; 6 – *F. pichita*, Valladolid, Ecuador, MZUJ

palpi covered with long, dark brown scales and shorter, yellowish scales, concentrated on the inner side of palpi. Thorax: dorsal surface covered with long, copper-brown, hair-like scales; all segments of legs hairy with additional short black bristles; hair on tibia generally brighter than those on femur and tarsus, tibial spurs present. Abdomen: densely covered with brown scales, similar to those on thorax. Wings: DF: dark brown, no androconial patch; DH: same as on DF; VF: color same as on DF; one white, distinct subapical dot, sometimes with smaller additional dots below; postdiscal line, if present, disappears in the discal wing area; submarginal line irregularly undulated; VH: color same as on VF; discal line almost straight with very subtle undulation, postdiscal and submarginal lines irregularly zigzagging; submarginal dots close to the submarginal line or touching it. Male genitalia (Fig. 8): valva rhomboidal, slightly shorter than uncus, with a lateral process, apex elongated posteriorly, aligned with dorsal margin of the valva; uncus long, thin and softly arched; tegumen more or less triangular with a semicircular or triangular cut in ventral margin; saccus long, thin and slightly curved dorsally; gnathos in a shape of an irregular, lobe-like process, or reduced.

FEMALE: Unknown.

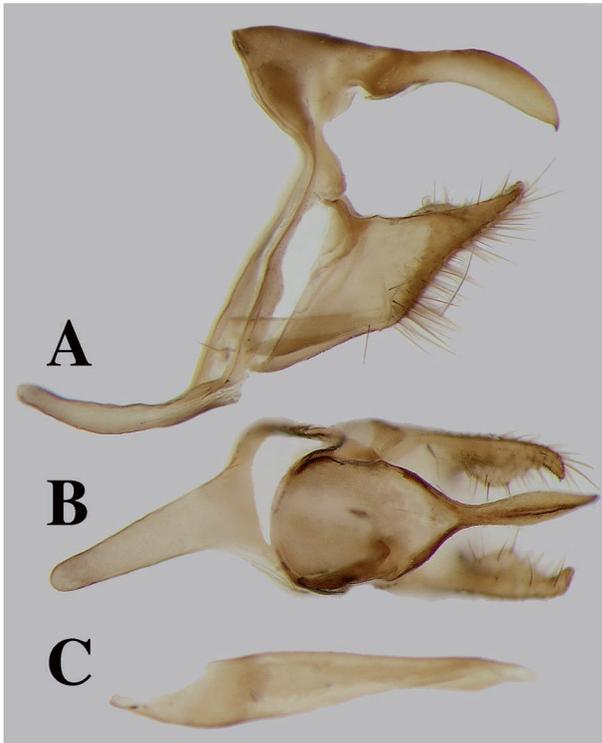
#### DISCUSSION

PULIDO & ANDRADE (2008) described *F. anachoreta* from the Perijá mountains on the Venezuela – Colombia border. This species was later found by us in the Tamá range slightly southwards and in the Colombian Central Cordillera. A comparison of wing pattern and male genitalia morphology of the types of *Haywardina difficilis* (Figs. 2, 7A) and *Forsterinaria anachoreta* (Figs. 3, 7C), show they are identical. The two taxa represent the same species. *F. anachoreta* is considered here as the subjective junior synonym of *H. difficilis*.



7. Male genitalia: A – *Haywardina difficilis*, “Bolivia” (copied from FORSTER 1964); B – *F. difficilis?*, no locality (copied from PEÑA & LAMAS 2003); C – *F. anachoreta*, Manaure (copied from PULIDO & ANDRADE 2008)

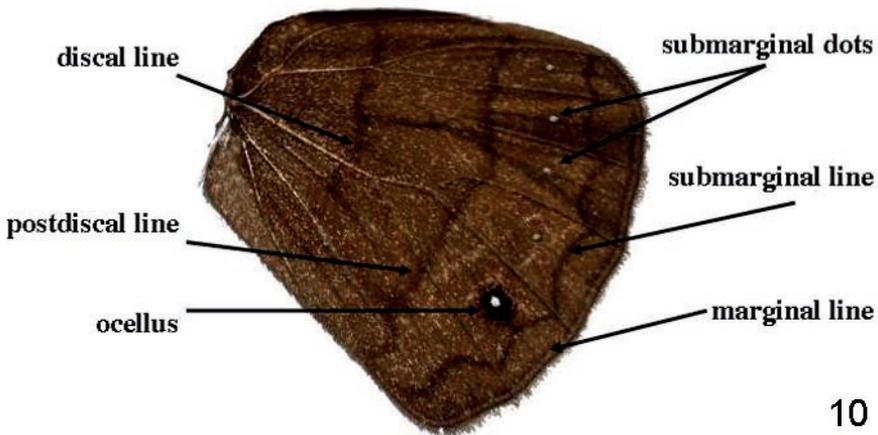
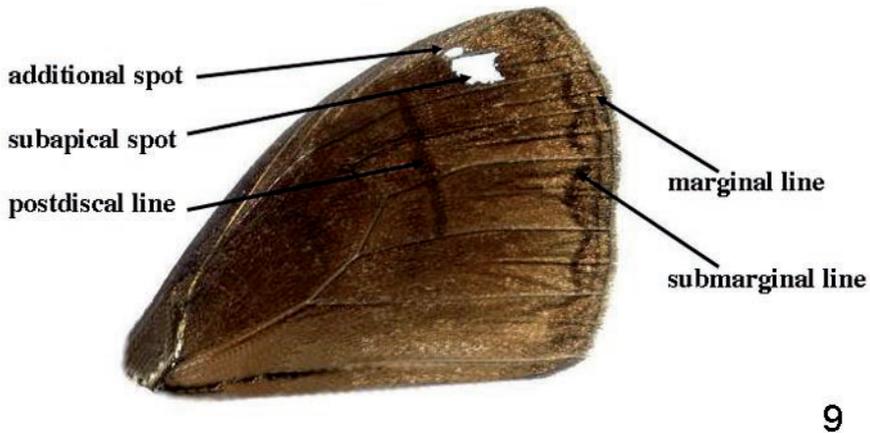
PEÑA & LAMAS (2005) claimed having examined several specimens of *F. difficilis* from Colombia (Tolima), Ecuador (Ambato, Loja) and Peru (Tabaconas, Abiseo). There are however doubts whether their Ecuadorian and Peruvian specimens actually represent *F. difficilis*. First of all, the specimen they illustrated as *F. difficilis* (11C) (Fig. 4) is identical in both the DW and HW to the holotype of *F. pichita* (8F) (Fig. 5), a species described in the same paper. In particular the two specimens possess similar DF subapical white spot and VH bands. PEÑA & LAMAS (2005) observed that Peruvian “*difficilis*” have the VF white subapical spot somewhat larger and more diffuse than in the holotype, but claimed that “this character is very variable in *Forsterinaria*, this difference is not regarded as of subspecific value”. Although admittedly subject to some individual variation, the subapical patch was found by us to be quite stable at the subspecific level in *Forsterinaria*, and proved to be a valuable taxonomic character. In fact, bona fide *F. difficilis* displays only a very small, milky white subapical dot (Figs. 1-3), instead of a conspicuous white subapical spot (Figs. 4-6). Also, the HWV submarginal dots of *F. difficilis* are situated between postdiscal and submarginal lines, whereas in *F. pichita* and in the specimen figured by PEÑA & LAMAS (op. cit.) as such they are placed on the submarginal line. Importantly, there is an androconial patch clearly visible on the 8F and 11C specimens on both the FW and HW. This is one of the diagnostic features



8. Male genitalia of *Forsterinaria difficilis*, Tamá: A – lateral view, B – dorsal view, C – aedeagus in lateral view

of *P. pichita*, whereas bona fide *F. difficilis* (Figs. 1-3) has no apparent androconial patch. PEÑA & LAMAS (op. cit.) illustrated the genitalia of a specimen identified as *F. difficilis* (10E) (Fig. 7B). Unfortunately, they provided no information on its origin. These genitalia resemble indeed quite closely *F. difficilis*, except for some differences in tegumen and uncus. Considering the generally little extent of infrageneric variation of male genital structure of *Forsterinaria*, the importance of the observed similarity cannot be overemphasized. Furthermore, PEÑA & LAMAS (op. cit.) claim that the specimen figured by D'ABRERA (1988: 779) as *Euptychia anophthalma* represents *F. difficilis*. In our opinion it clearly shows, again, all the characters of *F. pichita*.

*F. difficilis* was described by FORSTER (1964) based on a specimen from the private collection of ERHARD labeled "Bolivia". It was however personally not found by



9, 10. Wing pattern and terminology: 9 – Ventral surface of the forewing of *Forsterinaria pichita*; 10 – Ventral surface of hindwing *Forsterinaria* sp. n. cf. *stella*

FORSTER in that country. The presence of *F. difficilis* in Bolivia was not confirmed ever since. GARECA et al. (2008) listed it from Bolivia on the strength of FORSTER's record. PEÑA & LAMAS (2005) first expressed their doubts about the veracity of FORSTER's type Bolivian origin. We examined bona fide specimens of *F. difficilis* from the Sierra de Perijá, Colombian Central Cordillera, and Eastern Cordillera, so far reported only from its northernmost extremity, the Tamá range but most probably widespread across this range. It was not reported from the well sampled Cordillera de Mérida, so apparently it does not extend across the Táchira depression. Despite rather intensive collecting during the last two decades by numerous lepidopterists *F. difficilis* was not reported from Ecuador, which indicates that it is effectively restricted to the northern Andes. Considering this, and the discussed above morphological discrepancies, we regard the list of examined Peruvian and Ecuadorian specimens of *F. difficilis* presented by PEÑA & LAMAS (2005) as unreliable, as they could apply to other species. In the light of the above, there is strong evidence to consider the type locality given by FORSTER (1964) as Bolivia as mistaken. The case of *F. difficilis* is not the only one which involves the confusion between Bolivian and Colombian origins of the specimens coming from the commercial collections of the late XIX and early XX century, especially STAUDINGER's (LAMAS 2003; PYRCZ et al. 2011). Our data strongly suggest that the type locality of *F. difficilis* is Colombia, possibly Eastern Cordillera.

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