

**GRAPHIUM POLICENES (CRAMER, 1775),
GRAPHIUM POLICENOIDES (HOLLAND, 1892),
AND GRAPHIUM LIPONESCO (SUFFERT, 1904)
THREE CLOSELY RELATED TAXA (LEPIDOPTERA; PAPILIONIDAE)**

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Introduction

Graphium polices Cramer, 1775 is the common swordtail butterfly throughout the forest zone of Africa, pushing its distributional limit to drier and riverine forest bordering the main forest zone. The species is so stable that subspecies cannot be defined within its vast range from Senegal to Ethiopia and southern Africa, but throughout the range there is individual variation in the extent of green markings.

Not surprisingly, a number of individual aberrations are known, some with expanded green markings (a modest example shown by BERGER (1981) as *f. laurentia* le Cerf, 1924), others melanic, with reduced green markings (a spectacular example shown by BERGER (1981)). Some have been named, others not.

Three of the named forms are, in fact, distinct species: *G. polices*, *G. polcenoides* Holland, 1892, and *G. liponisco* Suffert, 1904. They have been the subject of much taxonomic and nomenclatural confusion, since the nomenclatural history, the taxonomic difficulties, and the rarity of one of the taxa combine to make the group genuinely complex. The purpose of this paper is to review the history of these taxa, to clear up past misunderstandings, and to stabilize future usage.

History of *Graphium polices* and related taxa

Papilio polices Cramer, 1775 was described from Suriname (*patria falsa*), but is generally considered to be of West African origin, as were so many other of Cramer's African butterflies. At various times the erroneous spelling *polices* has been used.

EIMER (1889:223) described *Papilio Polices* (*sic*) *nigrescens* after a specimen from Cameroun. He gave a detailed description, emphasizing especially the extreme reduction of the green bars in the cell and of the submarginal spots, the reduction in size of the spots of the discal band in spaces 1b and 2, but not in 3 to 6, the absence of a red spot in the tornal angle on the hindwing upperside, and - importantly - the presence of a defined green spot at the base of space 2 on the hindwing upperside. It is figured in Seitz (1920), probably based on Eimer's holotype. This name is actually invalid, as a junior homonym, but it will serve the purpose of clarity to keep it for the moment because of the way it was used in previous taxonomic discussions.

Papilio polcenoides Holland, 1892 was described from Talaguga, Upper Ogové, Gabon. The holotype is identical with the '*G. nigrescens*' figured by Seitz. HOLLAND says that he had 'a large series of specimens showing great constancy in the markings'. There are, however, only two in addition to the holotype in the Carnegie Museum, but all three are practically identical. It is obviously the same taxon, and since Eimer's name is a junior synonym, Holland's name is the valid one. HOLLAND probably did not have access to Eimer's paper at the time; I was unable to find a copy amongst Holland's reprint collection in the Carnegie Museum.

Papilio policenes liponesco Suffert, 1904 was described after three males from the 'Hinterlande von Togo', a mountainous area now constituting the Ghana/Togo border, emphasizing that the green markings are reduced to almost half those of *G. policenes*, that the red tornal spot on the hindwing upperside is absent, and that it seems closer to what is now known as *G. polistratus*. I have seen the type in The Natural History Museum, London. It also differs from *G. policenes* in having proportionately longer tails. It was figured by LE CERF (1924) who treated it as a form of *G. policenes*.

Papilio boolae Strand, 1909 was described from a single Sierra Leone male as standing between '*G. nigrescens*' and *G. policenes*. CONDAMIN & ROY (1963) consider it a straight synonym of *G. policenes*. The description places it close to *G. liponesco*, emphasizing the absence of a red tornal spot, the narrow green bars in the cell, the presence of green scales at the base of space 2 of the hindwing upperside, and a general reduction in size of the green markings. Since it is junior to all the other taxa, the exact placement is not very important, but I consider it a junior synonym of *G. liponesco* (as does Hancock (1986)).

BIRKET-SMITH's contribution

While studying the material from the Danish expedition to Cameroun, BIRKET-SMITH (1960) realized that he was faced with two distinct species, a conclusion reinforced by study of the male genitalia, which showed the type of minor differences in the shape of the harpe on the valves known to be of specific value in other closely related *Graphini*. Having reached this correct diagnosis, he proceeded to draw the wrong conclusion that one of the species in question was the elusive '*G. nigrescens*'.

He was faced with one having traces of a green spot at the base of space 2 on the hindwing, and seven others which were more like *G. policenes*, but differed in being smaller, having proportionately longer tails, a narrower, more falcate forewing, smaller green spots, and lacking the red tornal spot on the hindwing upperside.

He drew the conclusion that Eimer's '*G. nigrescens*' was a rare form of the commoner butterfly now before him, and redescribed the species, placing especial emphasis on the differing genitalia and the proportionately longer tails. He considered Eimer's holotype to be *Graphium nigrescens* ab. *nigrescens* Eimer (sic). One of Birket-Smith's specimens has slight red shading at the tornal spot, almost imperceptible except under high magnification. This form was named f. *intermedia* Birket-Smith, 1960.

Other authorities

Despite Birket-Smith's fairly conclusive demonstration that two species were involved, this did not meet with general acceptance.

D'ABRERA (1980) did not accept more than one member of the group, saying that he had not seen '*G. nigrescens*', that the figure in SEITZ was unsatisfactory, and that BIRKET-SMITH (1960) had only confused the issue. CARCASSON (1981), on whose manuscript D'Abrera's book was based, did accept two species; his arrangement of the material in the National Museums of Kenya, Nairobi, clearly shows that '*G. nigrescens*' was accepted *sensu* Eimer and Seitz; '*G. nigrescens*' (*sensu* Birket-Smith) were placed in geographic order with *G. policenes* without comment.

BERGER (1981) illustrates a specimen of '*G. nigrescens*' (*sensu* Birket-Smith), emphasizing that it is very scarce and in Zaïre only found in the Mayumbe and

parts of Equateur in the Cameroun/Gabon/Congo region, but having no doubts as to its specific status.

GAUTHIER (1984) described *Graphium policeses biokoensis* from the Island of Bioko (Fernando Po), from where SCHULTZE (1917) had already recorded *G. liponesco*. It is obviously a synonym of '*G. nigrescens*' (*sensu* Birket-Smith). Typical *G. policeses* is also found on Bioko.

COLLINS & MORRIS (1985) make mention of '*G. nigrescens*', but cite the reservations expressed by D'ABRERA.

HANCOCK's contribution

HANCOCK (1986) was apparently the first to recognize the taxon *liponesco* as close to, or identical with, '*G. nigrescens*' (*sensu* Birket-Smith - who actually did inconclusively discuss this possibility), based on the excellent photograph of the holotype in le CERF (1924), which compares well with the illustration in BIRKET-SMITH (1960). He therefore considered it a western subspecies in the combination *G. nigrescens liponesco*. I have not seen sufficient material to be certain that a western subspecies is definable, but I doubt it, since both species are quite variable.

However, HANCOCK obviously never saw material of '*G. nigrescens*' (*sensu* Eimer) and disregarded the illustration in Seitz on the advice of BIRKET-SMITH.

Conclusions

The conclusion drawn from the above discussion is that that *Graphium policeses*-group consists of three closely related species, with no transitional forms. Before reviewing the three species in question, it is necessary to make a change in the nomenclature used up to now. Eimer's *Papilio policeses nigrescens* was published on page 223 in a paper where he had already described *Papilio philolaus nigrescens* on page 213 in a trinomial combination that makes it available under the Code. Eimer's *Papilio policeses nigrescens* is thus a primary junior homonym. Therefore:

G. policenoides Holland = *G. nigrescens* (*sensu* Eimer)

G. liponesco Suffert = *G. nigrescens* (*sensu* Birket-Smith)

Though EIMER clearly intended both his *nigrescens* to refer to forms or aberrations (*Abänderungen*), their trinomial publication nevertheless make them available.

Graphium policeses (Cramer, 1775)

Papilio policeses Cramer, 1775

This species is common throughout Africa and is readily recognized, though for a period there was some confusion with the species now known as *G. polistratus* Grose-Smith, 1889 (usually under the name *P. sisenna* Mabille, 1890), the only other generally recognized member of the group with straight rather than S-shaped bars in the forewing cell. It is found in both forest and agricultural lands, extending well into the savannah-zone along gallery forest and riverine thickets. Masses sometimes assemble at mud-puddles (see photo in LARSEN 1993). It occasionally migrates in large numbers (LARSEN 1968).

Description: The broad green bars in the forewing cell and the prominent green submarginal spots will distinguish it from *G. policenoides*. The broader green bars

in the cell, the shorter tail, the prominent red tornal spot, and the wing-shape will tell it from *G. liponesco*. In fresh specimens the basal bar of the forewing and the two inner bars in the cell are bottle-green; in *G. liponesco* all five bars and the two costal spots beyond the cell are bottle-green. The melanic aberration of *G. policles* shown by BERGER (1981) entirely lacks the green discal band while retaining the green submarginal spots and the green bars in the cell, exactly the opposite of *G. policenoides*. I have screened more than 700 specimens from throughout Africa.

Genitalia: The distal end of the main process of the harpe on the male genitalia is narrow, its width being less than half its length (BIRKET-SMITH 1960). A Nigerian specimen that I dissected matches those illustrated by BIRKET-SMITH (SCC 199 - coll. S. C. COLLINS).

***Graphium policenoides* (Holland, 1892)**

Papilio Policines (sic) nigrescens Eimer, 1889 (invalid primary junior homonym)

As already mentioned, *Papilio policines nigrescens* is a primary homonym, so Holland's *policenoides* therefore becomes valid. The species is so rare that it might be considered a recurrent melanic aberration of *G. policles* with which it shares wing-shape and tail-length. However, it is difficult to reconcile general melanism with the presence of the additional well-defined oblong 'antheus' spot in space 2 of the hindwing upperside which is always missing in *G. policles*, though it may be indicated by a few green scales (not forming a spot) in *P. liponesco*. The spots of the discal band of the forewings are also of more equal size than in *G. policles*, rather than just being proportionately reduced in size - as was emphasized already in the original description. There are rather minor differences also in the male genitalia, which are closer to those of the long-tailed *G. liponesco*. The argument that it is not simply an aberration is strengthened by the fact that none is known from West Africa or from equatorial or eastern Africa, where *G. policles* is common, and where numerous other aberrations have been found. Finally, all specimens seen are almost identical, with no transitional forms, varying much less than the two other species. It would appear to be a rare forest butterfly, limited to the Cameroun/Gabon/Congo zone. Most material of *Graphium* consists of males which have been collected a damp patches, chiefly during drier than normal conditions. The scarcity of *G. policenoides* in collections may be related to its living in very wet habitats, and/or being more synchronized with rainy seasons, which may make it less addicted to mudpuddling.

Description: The differences from *G. policles* are as follows: On the forewing the basal green bar is much reduced in width, and the four bars in the cell are reduced to almost vanishing point. The discal spots in spaces 1a and 1b are somewhat smaller than in *G. policles* but the remainder of the band is of normal size. The whole band thus has a more even size throughout. The green submarginal spots are much reduced, those in apical area being smaller and those in spaces 1b to 3 usually missing entirely. On the hindwing the submarginal green spots tend towards obsolescence. There is a distinct, well-defined oblong green spot at the base of space 2 which is absent in both *G. policles* and *G. liponesco*, but present in *G. antheus*. The green bar in the hindwing cell is triangular, narrowing strongly towards the costa, rather than being squared off. The usual red tornal spot of *G. policles* is missing (some red scales can be seen under magnification). The underside is darker, and especially the white spot between the discal markings and the tail is missing. The tail is half the length of the forewing costa, as in *G. policles*. BIRKET-SMITH

(1960) thought that the figure in Seitz seemed 'in all to be painted by eye'. Far more probably, it is an accurate portrayal of the holotype; I know of no other records at the time except for Holland's *G. policensoides* and the *Papilio*-section in Seitz is generally accurate. It would appear that the ground-colour is less green, tending to cream, than in the two others, but it is difficult to be sure in the absence of freshly caught specimens.

Genitalia: I dissected one specimen from the Carnegie Museum (CM/TBL 001); it is close to that of the long-tailed *G. liponesco*.

Distribution: All known specimens are from the Cameroun, Congo, Gabon area (including Bas Fleuve and Equateur in Zaïre) which constitutes a well-defined biogeographical subregion of the Afrotropical forest zone.

Records: I have seen 19 as photographs or in collections: The holotype from southern Cameroun (probably the same as in Seitz); three in the Carnegie Museum from Cameroun and Talaguga-Gabon; one from Mvouti-Bas-Zaïre, tails missing (SCC); one figured by MATHOT (1990); two from M'Vouti, Bas Fleuve-Zaïre, one from Kelle-Congo in the National Museums of Kenya, Nairobi; one each from Lolodorf-Cameroun, Tschobo-Zaïre, Mayumbe-Gabon, Kaila-Manbou-Gabon, Banana-Bas-Zaïre in Tervuren; five from Mouilla, Gabon in MNHN, Paris; there is none in The Natural History Museum, London.

Graphium liponesco (Suffert, 1904)

Papilio policens liponesco Suffert, 1904

Papilio boolae Strand, 1909

Papilio policens var. *liponesco* Schultze, 1917

Papilio policens f. *indiv. liponesco* le Cerf, 1924

Papilio nigrescens Birket-Smith, 1960

Papilio nigrescens f. *nigrescens* Birket-Smith, 1960

Papilio nigrescens f. *intermedia* Birket-Smith, 1960

Graphium policens biokoensis Gauthier, 1984

Graphium nigrescens nigrescens Hancock, 1986

Graphium nigrescens liponesco Hancock, 1986

This species is readily recognized by its reduced green bars in the forewing cell, the more falcate forewing, the proportionately longer tails, and the lack or near lack of a red tornal spot on the hindwing upperside. It occurs in collections from Cameroun/Congo at a ratio of about 10 or 15 per 100 *G. policens*, but as a species of dense forest, it may be locally more frequent, as was the case in the BIRKET-SMITH sample (17 *G. policens*, 7 *G. liponesco*). In Ankasa and Kakum, Ghana in January, 1994 I found five among perhaps thirty *G. policens*. Schultze (1917) encountered the species only once during his extensive travels, but this was in some numbers in a peculiar wetland habitat. The records clearly show it to be much more of a strict forest species than *G. policens*. There is none from the drier forests where *G. policens* also occurs, lending further support to its specific status.

Description: The differences from *G. policens* are as follows: The forewings are narrower and more falcate, and the tail is proportionately longer (about 0.57 of the forewing length instead of just about 0.50 (fig. 2)). The green markings are somewhat reduced in size, most consistently the very narrow green bars in the forewing cell. However, both species vary in the size of green markings. The red spot

in the anal angle is missing or reduced to a few red scales. In fresh specimens it is unmistakable, since the basal bar, the four bars in the cell, and two costal spots beyond the cell are bottle-green; in *G. policenes* only the basal bar and the two inner bars in the cell are bottle-green. HANCOCK (1986) thought that the presence of some green scales (not a defined green spot) at the base of space 2 of the hindwing was a significant feature (it is mentioned in the description of *G. boolae*), but this appears to be relatively rare, especially in the Cameroun/Gabon area. It is possible that West African material is consistently smaller and with more reduced green markings than in Cameroun, but I have not seen sufficient material; if this were the case, a new subspecific name would be needed for the Cameroun/Gabon population. However, the size and the width of the green markings is variable also in *G. policenes*.

Genitalia: The distal end of the main process of the harpe on the male genitalia is broad, its width being more than half its length. There is a fair amount of variation in the exact shape, but the figures of five *G. policenes* and six *G. liponesco* look convincing (BIRKET-SMITH 1960). A specimen that I dissected matches those illustrated by BIRKET-SMITH (SCC 206, coll. S. C. COLLINS).

Distribution: The range stretches from Sierra Leone, via Côte d'Ivoire, Ghana, Togo, Nigeria, Cameroun, Congo, and Gabon to the Equateur and Mayumbe areas of Zaïre. It is also found on Bioko (Fernando Po) (SCHULTZE 1917). There are no records from the equatorial forest zone proper or from eastern Africa, though *G. policenes* is common there. It seems considerably scarcer in West Africa than in Cameroun, and is again scarce in Congo and Bas-Zaïre.

Records: I have seen three dozen specimens from Sierra Leone, Côte d'Ivoire, Ghana/Togo and Nigeria, as well as about forty from Cameroun, Congo, Gabon, and the Mayoumbe Region of Zaïre. I have also inspected the BIRKET-SMITH series in the Zoological Museum, Copenhagen, as well as photographs of three from Cameroun and one from Zaïre.

It is not possible to mistake *G. policenoides* for any other species. Once attuned to the differences between *G. policenes* and *G. liponesco*, it is easy to screen a large material and pick out the *G. liponesco*. I have seen no intermediate material.

I had almost finalized this paper without ever encountering *G. liponesco* in nature, but during a visit to Ghana in January, 1994 I caught five males on three occasions in the Kakum and Ankasa National Parks. On the first occasion, at Ankasa, three *Graphium* were lazily flying in circles around a patch of damp sand. It was immediately apparent that one was *G. liponesco*. I caught it in the same sweep of the net as a perfect *G. policenes*, and on killing them saw the different extent of bottle-green on the forewings. A few days later I came across a large assemblage of whites and swordtails on a urine-drenched log. One was immediately seen to be *G. liponesco*. A week later, at Kakum, three *Graphium* were seen sitting quite still next to each other on damp sand. Two were obviously *G. liponesco*, the third a larger *G. policenes*; I lowered my net over all three specimens, which were perfect.

Discussion

The three species in question are obviously closely related, but they are sympatric, readily recognizable, and do not form intermediates.

Their specific status is supported by the fact their respective distributions and ecology differ. *G. policenes* is found throughout the Afrotropical Region, including much drier environments than the two others. *G. liponesco* is found only in the

wetter forests of West Africa and the Cameroun/Gabon/Congo zone, a distribution pattern shared with numerous other species. *G. policenoides* is only known from the wettest parts of the Cameroun/Gabon/Congo zone, a compact biogeographical region with many endemics. There is also great complexity in a number of other *Graphium*-groups in this region. Were the three simply aberrations of a single species it would be statistically quite improbable that only *G. policenes* has been found in the main equatorial zone and all of eastern Africa.

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Fig. 1. Top left: Typical *Graphium policeses* from Kakum, Ghana, Jan. 1994 (the red tornal spot is not evident); Top right: *Graphium liponesco* from Kakum, Ghana, Jan. 1994 (the tip of the left tail is broken; there are green scales at the base of space 2 of the hindwing); Bottom: *Graphium policensoides* paratype from Talaguga, Gabon (note the defined green spot at the base of space 2 on the hindwing). The Ghana specimens are recent; the Gabon specimen is more than 100 years old.

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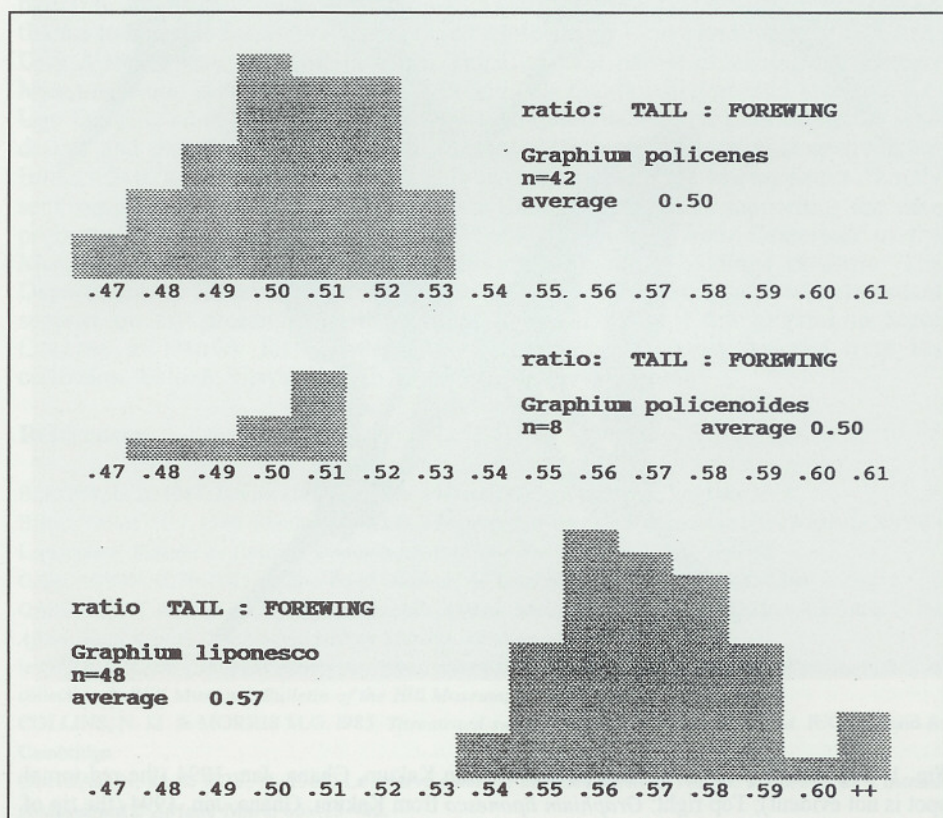


Fig. 2. The ratio of length of tail to length of forewing in *Graphium polices*, *G. policesoides*, and *G. liponesco*. The tail is much longer in *G. liponesco* and there is no actual overlap. All specimens included as *G. liponesco* differ from *G. polices* also in the lack of a red tornal spot on the hindwing and in the narrower green markings of the forewing cell.