

ANOTHER NEW *EUPHYES* FROM THE SOUTHERN UNITED STATES COASTAL PLAIN (HESPERIIDAE)

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ABSTRACT. The taxon *Euphyes dukesi calhouni* Shuey, new subspecies endemic to Florida, is described. This subspecies is amply differentiated from *Euphyes dukesi dukesi* and the two taxa are allopatric. In northeastern Florida and southeastern Georgia, where their known ranges closely approach one another, there is almost no evidence of intergradation. *Euphyes dukesi calhouni* is limited to swamp habitats that support large stands of the sedge hostplants, various *Rhynchospora* and *Carex* species (Cyperaceae).

Additional key words: biogeography, wetlands, conservation.

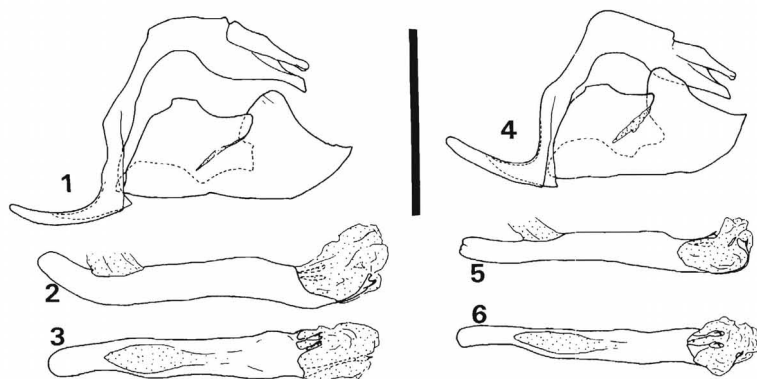
The southern Atlantic and Gulf Coastal Plains are rich regions for wetland butterflies, especially for genera such as *Euphyes*, *Poanes*, and *Problema*. For example, as currently known, eight named *Euphyes* species or subspecies occur in the wetlands of these coastal plains. Four of these taxa are restricted to the coastal plain: *Euphyes palatka palatka* (Edwards), *Euphyes palatka klotsi* Miller, Harvey and Miller, *Euphyes berryi* (Bell), and *Euphyes bayensis* Shuey.

Just as interesting as their limited coastal distributions is the presence in these wetland skippers of well differentiated peripheral populations, many of which have only recently been recognized and described. These peripheral populations are most probably the end result of allopatric differentiation. For example, *Euphyes palatka klotsi* represents its species on a few of the lower Florida Keys, separated from the nominate mainland subspecies by just tens of miles. *Euphyes bayensis*, a sister species to *Euphyes dion*, is presently known from a single locality on the extreme southern edge of the range of *E. dion*.

The purpose of this paper is to describe another distinctive peripheral *Euphyes*, to elaborate on the relationships between it and its closest relative; and to provide a summary of the ecology of the new taxon. Taxonomic methods are as described in Shuey (1988, 1993). Material examined specifically for this study included the holotype of *Euphyes dukesi* and additional specimens from Ohio, Indiana, Missouri, Louisiana, Mississippi, Alabama, Georgia, North Carolina, and Virginia as well as a series of unnamed *Euphyes* from peninsular Florida.

Euphyes dukesi calhouni Shuey, new subspecies

Description. Genitalia of both sexes typical for *Euphyes dion* Species Group (sensu Shuey 1993) (Figs. 1–14); ground color of both sexes dark brown, almost black (Figs. 15–18); male stigma typical *Euphyes* type (Shuey 1987), but surrounded by non-contrasting ground color and thus difficult to see without magnification and acute angle lighting; forewing wing fringe color identical to ground color; hindwing wing fringes slightly lighter;



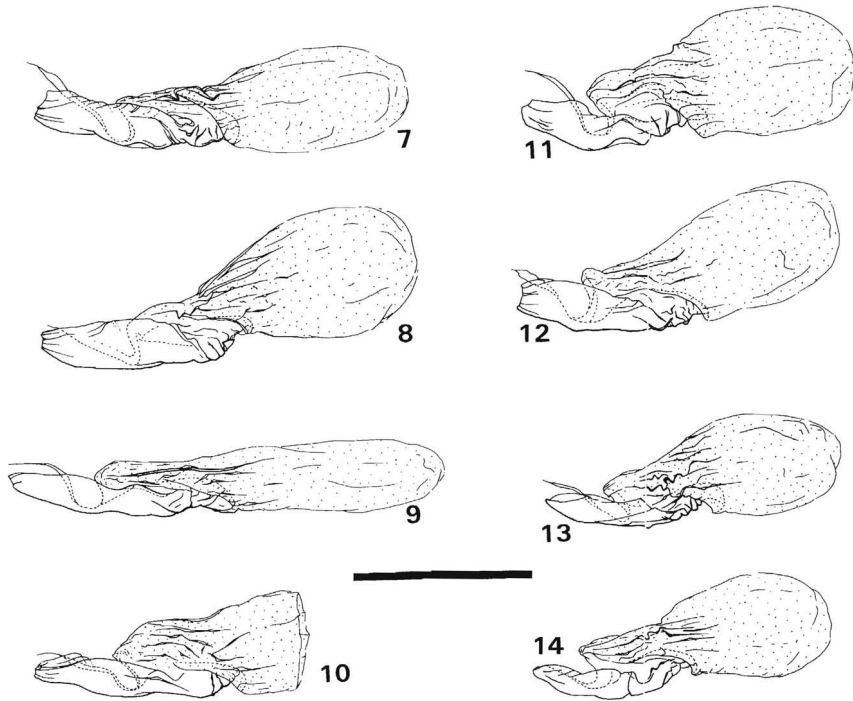
FIGS. 1-6. Male genitalia of *Euphyes dukesi* subspecies. 1-3, *Euphyes dukesi calhouni*, new subspecies, FL, Pasco Co., Cabbage Swamp 16 Sept. 1990; 1, valva, tegumen, uncus, gnathos, vinculum and saccus (lateral view); 2, aedeagus (lateral view); 3, aedeagus (dorsal view). 4-6, *Euphyes dukesi dukesi*, MO, St. Charles Co., St. Peters, 22 Aug 1982; 4, valva, tegumen, uncus, gnathos, vinculum and saccus (lateral view); 5, aedeagus (lateral view); 6, aedeagus (dorsal view). Scale line=2 mm.

both sexes with olive-brown hairs dorsally at wing bases; both sexes with dark black ground color dominating ventral forewings, but costal region with dusting of olive-brown scales of same color as in dorsal hairs at wing base; neither sex with ventral forewing discal spot present in all other species of the *dion* Species Group; ventral hindwing mostly cool brown, with diffuse yellowish dash paralleling costa, running from wing base to wing margin; ventral hindwing veins yellow.

Types. *Holotype* ♀. Florida, Pasco Co., Cabbage Swamp, 16 September 1990, leg. J. V. Calhoun. *Allotype*. ♂. Florida, Pasco Co., Cabbage Swamp, 13 September 1990, leg. J. V. Calhoun. *Paratypes* (all Florida): Alachua Co., Gainesville, 25-IX-1978 (♀), leg. J. R. Slotten; Duval Co., Jacksonville, 25-IX-1978 (2♂, ♀), 27-IX-1978 (♂), 1-X-1978 (♂), 8-X-1978 (♀), leg. H. D. Baggett; Flagler Co., Shell Bluff Landing nr San Mateo, 23-IX-1979 (♀), leg. J. R. Slotten; Hillsborough Co., I-275 at mile 57, 17-IX-1990 (2♂), leg. J. V. Calhoun; Pasco Co., Cabbage Swamp, 16-IX-1990 (♂, ♀) leg. R. A. Anderson; Pasco Co., Cabbage Swamp, 13-IX-1990 (9♂, ♀), 14-IX-1990 (♂), 16-IX-1990 (4♂, 5♀), 17-IX-1990 (2♂), 18-IX-1990 (2♀), 26-IX-1990 (2♂, ♀), leg. J. V. Calhoun; Seminole Co., Winter Springs, 5-VI-1983 (2♂, 2♀), 17-IX-1983 (♂) leg. L. C. Dow. The holotype and allotype are deposited in the Carnegie Museum of Natural History.

Type locality. Florida, Pasco County, "Cabbage Swamp." The type locality lies in southern Pasco County on private property and is part of a larger wetland complex that extends into northern Hillsborough County along Cypress Creek. Cabbage Swamp is a hardwood-bald cypress swamp, dominated by water ash (*Fraxinus caroliniana* Mill), southern red maple (*Acer rubrum* L.), and bald cypress (*Taxodium distichum* [L.] Rich.). The understory has extensive stands of sedges, with *Rhynchospora inundata* (Oakes) Fern. dominating. Adult *E. dukesi calhouni* are closely associated with dense stands of *R. inundata* which is distributed in patches throughout Cabbage Swamp in areas where the water level reaches up to 0.5 m.

Etymology. This taxon is named after its discoverer, John Calhoun. While John was not the first to collect this butterfly, he was the first to grasp its significance and felt that he should document its local distribution, relative abundance, habitat requirements, and hostplants (details of his observations of *E. dukesi calhouni* appear in Calhoun 1995). This curiosity and drive is what separates John, and others like him, from more philatelically inclined collectors. My proposed common name is the "Florida Swamp Skipper." This name emphasizes both the endemic nature of the taxon and its primary ecological attrib-



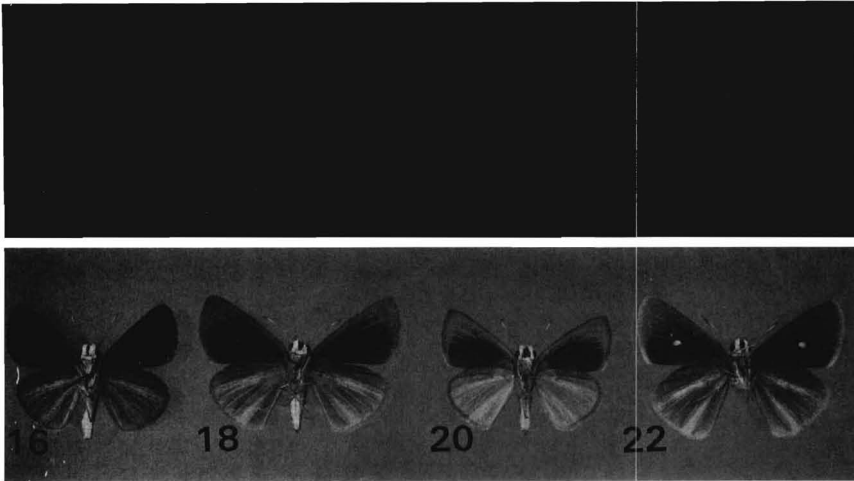
FIGS. 7-14. Variation in female genitalia of *Euphyes dukesi* subspecies, all lateral views. 7-10, *Euphyes dukesi calhouni*, new subspecies; 7, FL, Pasco Co., Cabbage Swamp, 13 Sept 1990; 8, FL, Pasco Co., Cabbage Swamp, 16 Sept 1990; 9, FL, Flagler Co., nr. San Mateo, 23 Sept 1979; 10, FL, Seminole Co., Winter Springs, 5 June 1983. 11-14, *Euphyes dukesi dukesi*; 11, OH, Logan Co., Test Track Swamp, 24 Jul 1983; 12, VA, Chesapeake, 14 Aug 1967; 13, MS, Sunflower Co., NE Moorhead, 19 Sept 1973; 14, OH, Paulding Co., Miami Canal, 9 July 1960. Scale line=2 mm.

ute. Pyle (1981) somewhat inappropriately suggested the same common name for *Euphyes berryi*, a wetland species which is not endemic to Florida and which is found in open wetlands, not swamps.

Comparison of taxa. *Euphyes dukesi calhouni* can easily be separated from *E. d. dukesi* as follows (see Figs. 15-22):

1. *Ground color*: the ground color in *E. dukesi calhouni* is darker, almost approaching black, whereas in *E. d. dukesi* the ground color is dark brown (and in males contrasts with the black stigma).

2. *Dorsal wings*: in *E. dukesi calhouni*, the overscaling near the wing bases consists almost entirely of olive-brown hairs and extends slightly over half way across the hindwing and one-fourth of the way across the forewing; the scales covering the wings are black. In *E. d. dukesi*, the overscaling is composed of orange-brown hairs near the wing margin, but orange-brown scales predominate nearer the discal areas and extend two-thirds of the way across the hindwing and over half way across the forewing. Females of *E. d. dukesi* usually have two yellowish spots in the discal region of the forewing which are not present in *E. dukesi calhouni*. In some populations of *E. d. dukesi*, notably from Virginia and the lower Mississippi Valley, approximately 20% or more of the females lack all traces of these discal spots; these can be separated from *E. dukesi calhouni* by the presence of orange-



FIGS. 15–22. Adult *Euphyes dukesi calhouni*, new subspecies, and *Euphyes dukesi dukesi*. 15–18, *Euphyes dukesi calhouni* new subspecies; **15–16**, male, FL, Pasco Co., Cabbage Swamp, 13 Sept 1990 (dorsal and ventral); **17–18**, female FL, Pasco Co., Cabbage Swamp, 16 Sept 1990 (dorsal and ventral); 19–22, *Euphyes dukesi dukesi*; **19–20**, male, GA, McIntosh Co., Little Champy Road Waterfowl Sanct., 19 May 1979 (dorsal and ventral); and **21–22**, female, OH, Logan Co., Test Track Swamp, 16 July 1983 (dorsal and ventral).

brown scales on the dorsal hindwing and the more extensive light color of the hindwing fringes of *E. d. dukesi*.

3. *Ventral forewing*: in *E. dukesi calhouni*, the forewing of both sexes is almost black with olive-brown overscaling that follows the costa and wraps around the wing tip; the discal area is unmarked. In *E. d. dukesi*, the ground color is likewise almost black, but the overscaling is heavier, more extensive, and is orange-brown and contrasts strongly with the ground color. In *E. d. dukesi*, there is usually a well defined yellow spot in the discal region, although in some males this is reduced to a faint trace and may be entirely absent in some females. This spot is absent in *E. dukesi calhouni* (with one exception discussed below).

4. *Ventral hindwing*: in *E. dukesi calhouni*, the elongated yellow dash which extends outward from the wing base between veins M_1 and M_2 is diffuse and often dissipates before reaching the wing margin; the yellow dash between veins Cu_2 and $2A$ is usually absent. In *E. d. dukesi*, both of these yellow dashes are usually heavily scaled and extend boldly toward the margin in fresh specimens.

5. *Wing fringe*: the wing fringes of *E. dukesi calhouni* are mostly dark and match the dorsal ground color, but tend to become lighter in the anal region of the hindwing. In *E. d. dukesi*, the fringes are conspicuously lighter than the ground color.

Based on the limited material examined to date, there is essentially no evidence of intergradation between these two subspecies, and the level of differentiation suggests that the two taxa have been isolated for some time. The only *Euphyes d. dukesi* known to me from Georgia (Figs. 19–20) shows none of the pattern elements that characterize *E. d. calhouni*. The only specimen with unusual patterning is a single female *E. d. calhouni* from Seminole County, Florida, in which the two dorsal yellowish spots in the discal region of the forewing are present but very faint—there is no evidence of these spots ventrally.

BIOLOGICAL AND DISTRIBUTIONAL NOTES

The recognition of *Euphyes dukesi calhouni* increases to five the number of *Euphyes* that are restricted to the southern coastal plain of eastern North America. A summary of the ecology of *Euphyes dukesi calhouni* is presented here; see Calhoun (1995) for a more extensive account.

The life history of *Euphyes d. calhouni* is similar to that of *E. d. dukesi* throughout its range (Mather 1963, Opler & Krizek 1984, Iftner, Shuey & Calhoun 1992, Calhoun 1995). The hostplants in central Florida are the sedges, *Rhynchospora inundata*, *R. miliacea* (Lam.) and an unidentified *Carex* species (Cyperaceae) (Calhoun 1995). Females have been observed ovipositing on these sedges, and pupal exuviae have been found attached to them. As in most *Euphyes*, other sedge species which grow in appropriate habitats are probably exploited as well.

Euphyes dukesi calhouni is a swamp inhabitant, preferring areas where its hostplant forms dense stands in small clearings (Calhoun 1995). Most of the known habitats that support this species are similar to the type locality. *Euphyes dukesi calhouni* has been observed feeding at the flowers of pickerelweed (*Pontederia cordata* L.), smartweed (*Polygonum punctatum* Elliot), and buttonbush (*Cephalanthus occidentalis* L.). Other butterflies found in these swamps include *Problema byssus* (Edwards), *Wallengrenia egeremet* (Scudder), *Cyllopsis gemma* (Hübner), and *Satyroides appalachia* (Chermock). Interestingly, the habitat requirements and hostplants for *Satyroides appalachia* in central Florida are nearly identical to those of *E. dukesi calhouni*, and they share both at several sites. The relationship noted between *S. appalachia* and *E. d. dukesi* in the Great Lakes region (Iftner, Shuey & Calhoun 1992) thus parallels that in central Florida with *E. dukesi calhouni*. As in the lower Great Lakes region, *S. appalachia* is the more tolerant species, occurring in several swamps that do not support *E. dukesi calhouni*.

Population densities vary from site to site. At Cabbage Swamp, *E. dukesi calhouni* is common, and several dozen individuals can be seen in the course of a day during peak emergence. However, at other nearby sites this skipper can be uncommon, and usually few adults are sighted. Low densities would appear to be the rule in northern Florida, given the rarity with which *E. dukesi calhouni* is collected.

There are two annual broods with no obvious phenotypic differences between them. Extreme dates of capture for the spring brood range from 9 May to 16 June. Extreme dates of capture for the summer brood ranged from 18 August to 13 October. There is a single record from July.

In flight, the adults appear dark and are reminiscent of large *Ancy-*

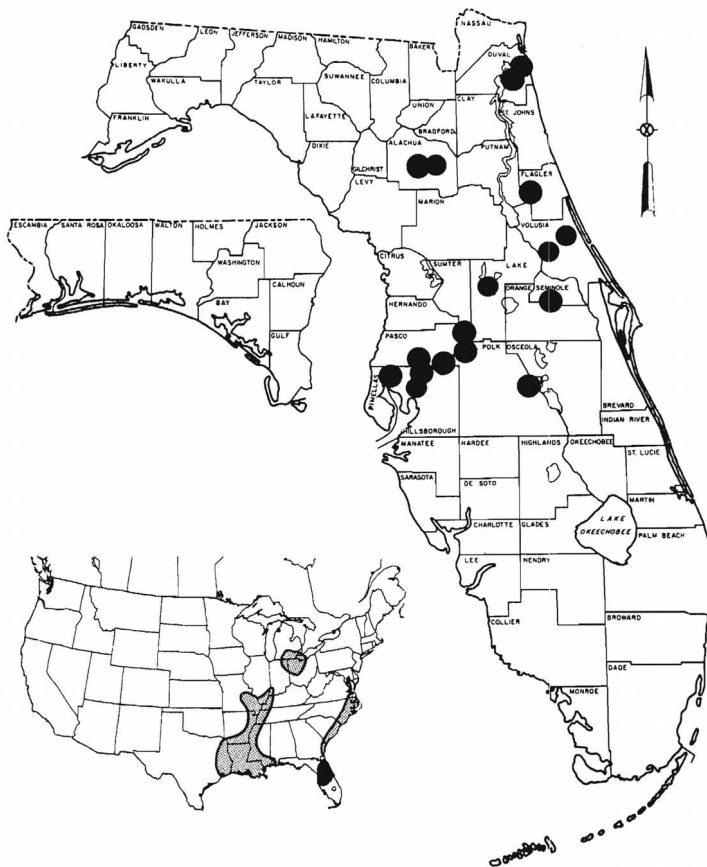


FIG. 23. The distribution of *Euphyes dukesi*. Solid dots and shading represent known localities and the generalized known range of *Euphyes dukesi calhouni*, new subspecies. Gray shading represents the generalized known range of *Euphyes dukesi dukesi*. Distributional data are derived from the material examined, Holmes et al. (1991) and from information provided by John V. Calhoun and Paul A. Opler.

loxpha numitor (Calhoun 1995). Like many wetland skippers, they are active under a variety of weather conditions ranging from sunshine to cloudy skies, and even to brief thunderstorms. Males often perch on blades of the hostplant in sunlit patches. Males also fly rapidly over and around patches of the hostplant (they occasionally fly slowly through the sedges, apparently in search of females). Females fly slowly and deliberately through the sedges, often at ground level. Males are more active and more readily observed than are females. Females are most often flushed from stands of the hostplant or found at flowers. Both sexes have been found in upland forests adjacent to Cabbage Swamp,

and one female was observed in a pasture at least 100 meters from the nearest suitable habitat (Calhoun 1995).

The number of known *E. dukesi calhouni* populations is at least 17, with over half of those discoveries coming since 1990 (see Calhoun 1995). Given that there were relatively few searches for populations prior to 1990, the increase in findings probably indicates that populations of *E. dukesi calhouni* are numerous. However, populations are quite localized and, given the intense pressure on wetlands from development in Florida, the species could be at risk if wetland alteration is not curtailed. Because populations of *E. dukesi calhouni* are localized and difficult to locate, and because the habitat is generally inhospitable to humans, I do not believe that limited collecting poses a significant threat to this taxon.

To date, *Euphyes dukesi calhouni* has been recorded only from peninsular Florida (Fig. 23). The known distributions of *Euphyes dukesi calhouni* and *E. d. dukesi* do not overlap—all specimens examined from Florida represent the new taxon, whereas all specimens from elsewhere are referable to *E. d. dukesi*. The two taxa approach each other in northeastern Florida and coastal Georgia, and in the material examined show virtually no intergradation. Additional field work and collecting along the eastern Georgia/Florida border and the Florida Panhandle would clarify potential distributional gaps, and help determine the status of populations in areas of potential sympatry.

The many morphologic differences between the two differentiates of *E. dukesi* in conjunction with the distribution and ecology of *E. dukesi calhouni* have convinced me that this taxon deserves at least subspecific status. The accumulation of so many differences between these two taxa suggests that they have been isolated for a considerable length of time and it is likely that they function as independent species if their ranges overlap. Thus, my decision to describe the Florida populations as a subspecies rather than as a full species is both conservative and arbitrary, and future investigations may well indicate that my decision is too conservative.

Most importantly, the recognition of *Euphyes dukesi calhouni* reveals yet another jewel in the collection of unique and highly endemic flora and fauna of Florida. This recognition increases the number of southern coastal plain restricted wetland *Euphyes* taxa to five, and adds another piece to the puzzle of wetland butterfly distribution and evolution in eastern North America.

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