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J. Mark Scriber
University of Wisconsin

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PUDDLING BY FEMALE FLORIDA TIGER SWALLOWTAIL BUTTERFLIES, *PAPILIO GLAUCUS AUSTRALIS* (LEPIDOPTERA: PAPILIONIDAE)

J. Mark Scriber [1]

Many species from all families of Rhopalocera have been reported to drink water (Norris 1936). Bates (1863) noted that, in the Amazon, 80 species from 22 genera flocked about the damp edges of water and, with very few exceptions, all of these individuals were males. Adler (1982) reported that of 3417 known individuals of night-puddling moths (representing 93 genera from 10 families), 1.3% were represented by female individuals from only 16 species. A distinction between "puddle-butterflies" (which assemble together at puddles) and "roadside-butterflies" (which are often seen drinking, but not in groups) was made by Clark (1932). This individual puddling has been described by Berger and Lederhouse (1985).

Assemblages of butterflies have also been reported on dung, urine, perspiration, saliva, salt, blood, campfire ashes, aphid honeydew, tree sap, and animal carrion (Scudder 1889, Norris 1936, Sevastopulo 1974, Downes 1973, Adler 1982). Aggregation of butterflies is often catalyzed by the use of dead specimens or yellow "decoy" substrates (Denton 1889, Clark 1932), and these have been successfully used in puddling experiments with the eastern tiger swallowtail butterfly, *Papilio glaucus* L. (Arms et al. 1974). While the choice of the puddling spot by the initial male butterfly may be made largely by chemical attraction (Couper 1873, Norris 1936), it has been shown that duration of puddling behavior is extended on moist sand containing sodium ions regardless of the anion present (Arms et al. 1974). Furthermore, while male tiger swallowtail butterflies ingest amino acids during puddling, Arms et al. (1974) concluded that ingestion of amino acids is less likely to be the major function of puddling than is ingestion of sodium. Adler and Pearson (1982) postulated that the reduction of sodium in male butterflies may be a consequence of mating (spermatophore transfers). Why sodium would be significantly more important for male butterflies than females has not been entirely resolved because females are known to lose up to 75% of their sodium via oviposition (Adler and Pearson 1982). Moreover, it has not been resolved to what degree female tiger swallowtail butterflies actually engage in such "puddling" behavior.

To my knowledge, no published records existed until recently (Berger and Lederhouse 1985) of puddling by females of any populations of *Papilio glaucus*. No females were observed puddling at any time during the Arms et al. (1974) study, nor have I observed any female of *P. glaucus glaucus* L. or *P. glaucus canadensis* Rothschild & Jordan amongst the hundreds (probably several thousand) of puddling males I have seen in the subsequent nine years (Scriber and Lintereur 1983, Lederhouse 1982, Wagner 1978). My recent observations of single puddling females of *P. glaucus australis* Maynard in Highlands County, Florida, during 1–4 August 1983, are here reported.

I observed four different *Papilio glaucus australis* females individually engaged in brief, but definite, puddling behavior. These observations ranged from 10 to 25 sec in duration. Three of these females were of the yellow morph phenotype and one was a dark morph (Scriber et al., in press). On 2 August 1983, each of the three yellow females was first observed in slow gliding flight along the sand and muck drainage ditches adjacent to

[1]Department of Entomology, University of Wisconsin, Madison, WI 53706. Present address: Department of Entomology, Michigan State University, East Lansing, MI 48824.

Hall Road and route 29 S, near the McClellan Bulb Farm south of Lake Placid, Florida (Highlands County). At 1136, 1146, and 1626 h, each of these single females alighted on the ground and began to probe the moist soil with its extended proboscis. The dark morph female was observed slowly flying over the muck field and at 1345 h alighted on the muck soil and probed about with its proboscis on a moist clod of muck. All four females were eventually captured and are currently preserved in our *Papilio* research collection at Michigan State University. No additional puddling observations of any type were made during the following two days of continuous collecting, perhaps because the ground had dried considerably and insignificant rainfall had occurred compared to that which occurred on 1 August. The total numbers of captures for females and males of *P. glaucus* at this site were not significantly different during 2 August (23 males, 4 dark morph females, 13 yellow morph females) and 3 August (20 males, 1 dark and 10 yellow females). No male *P. glaucus* butterflies were observed puddling at any time. One perfect (apparently newly eclosed) *Papilio troilus* L. male was observed to settle on the sandy road to probe on the morning of 4 August 1983.

The question of why puddling behavior in female butterflies is rare as has been assumed, has not been adequately resolved. Perhaps it is not really as rare as generally believed. Among the various explanations of the scarcity of female puddling observations could be the apparently brief duration of the behavior (less than 30 sec) relative to that for males. Hundreds of male *P. glaucus* may sit in dense aggregations for extended periods of time (Couper 1873, Scudder 1889). It is also possible that the females never aggregate as do males, and therefore the individual behavior is much less obvious in the case of females. Thirdly, the time and (or) location of puddling behavior may be generally different than males. For example, it is generally the newly eclosed (i.e. very fresh looking) males which predominate (almost to exclusion) in any puddling aggregation (Lederhouse 1982), whereas two of the females I observed in Florida were obviously worn and likely to be many days old. Similarly, a single female *Papilio polyxenes* Fabricius observed puddling in 1973, in New York State, was extremely worn. Finally, the specific reasons for puddling behavior remain uncertain, and it is possible that these are very different in magnitude and (or) type for female than for male Lepidoptera (e.g. mate location). Berger and Lederhouse (1985) have suggested that individual puddling behavior by females may be to avoid harassment by males.

The degree to which females of the different subspecies of the *Papilio glaucus* complex engage in puddling behavior may be of ecological interest, but must await further study. This report of female puddling represents the first for *P. g. australis*; that of Berger and Lederhouse (1985) represented the first for New York *P. glaucus* (*P. g. glaucus* or *P. glaucus canadensis*). New York is a likely hybrid zone for these two subspecies (Scriber 1982, Ritland and Scriber 1985). The suggestion that introgressive hybridization might account for the origin of puddling behavior in some Lepidoptera has been made (Clark and Clark 1951), but still needs additional study (Shapiro 1979).

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LITERATURE CITED

Adler, P. H. 1982. Soil- and puddle-visiting habits of moths. J. Lepid. Soc. 36:161–173.

Adler, P. H., and D. L. Pearson. 1982. Why do male butterflies visit mud puddles? Canadian J. Zool. 60:322–325.

Arms, K., P. Feeny, and R. C. Lederhouse. 1974. Sodium: Stimulus for puddling behavior by tiger swallowtail butterflies, *Papilio glaucus*. Science 185:372–374.

Bates, H. W. 1863. pp. 227–228 *in* The Naturalist on the River Amazons Vol. 2.

Berger, T. A., and R. C. Lederhouse. 1985. Puddling by single male and female tiger swallowtails, *Papilio glaucus* L. (Papilionidae). J. Lepid. Soc. 39:339–340.

Clark, A. H. 1932. The butterflies of the District of Columbia and vicinity. Bull. U.S. Nat. Mus. 157:1–357.

Clark, A. H., and L. F. Clark. Butterflies of Virginia. Smithsonian Inst. Misc. Coll. 116(7):124.

Couper, W. 1873. Attracting Lepidoptera. Canadian Entomol. 5:18–20.

Denton, S. W. 1889. Catching butterflies by means of decoys. Canadian Entomol. 21:110–113.

Downes, J. A. 1973. Lepidoptera feeding at puddle margins, dung, and carrion. J. Lepid. Soc. 27:89–99.

Lederhouse, R. C. 1982. Factors affecting equal catchability in two swallowtail butterflies, *Papilio polyxenes* and *P. glaucus*. Ecol. Entomol. 7:379–383.

Norris, M. J. 1936. The feeding-habits of the adult Lepidoptera Heteroneura. Trans. R. Entomol. Soc. 85:61–90.

Ritland, D. B., and J. M. Scriber. 1985. Larval developmental rates of three putative subspecies of tiger swallowtail butterflies, *Papilio glaucus*, and their hybrids in relation to temperature. Oecologia 65:185–193.

Scriber, J. M. 1982. Foodplants and speciation in the *Papilio glaucus* group. pp. 307–314 *in* Proceedings of the 5th International Symposium on Insect-Plant Relationships. Pudoc, Wageningen.

Scriber, J. M., M. H. Evans, and D. B. Ritland. (in press). Hybridization as a causal mechanism of mixed color broods and unusual color morphs in the eastern tiger swallowtail, *Papilio glaucus*. *in* M. Huettel (ed.). Evolutionary genetics of invertebrate behavior. Univ. Florida Press, Gainesville.

Scriber, J. M., and G. L. Lintereur. (1983). A melanic aberration of *Papilio glaucus canadensis* from northern Wisconsin. J. Res. Lepid. 21:199–201.

Scudder, H. S. 1889. pp. 1295–1296 *in* The butterflies of the eastern United States and Canada, with special reference to New England, Vol. 2. Cambridge, Mass.

Sevastopulo, D. G. 1974. Lepidoptera feeding at puddle-margins, dung and carrion. J. Lepid. Soc. 28:167–168.

Shapiro, A. M. 1979. "Mud puddle clubs" in pure *Colias eurytheme* (Pieridae) in north central California. J. Lepid. Soc. 33:197–198.

Wagner, W. H. Jr. 1978. A probable natural hybrid of *Papilio eurymedon* and *P. rutulus* (Papilionidae) from Idaho. J. Lepid. Soc. 32:226–228.