night of 30 August 1982, many hundreds of adults were observed flying and at rest on a motel in the town of Mammoth. Activity began at about 2000 h and continued for at least several hours.

At a rest stop located five miles north of Mammoth on route 395 at the same approximate altitude, several thousand adults were seen the next day (31 August 1982). On the ground of the north side of the rest stop building were many hundreds of bodies and fragments of bodies, indicating probable predation. This evidence consisted of disassociated heads and wings covering a large area.

Activity at the motel resumed the night of the 31st, and several females were captured. Each of these laid up to a hundred blue-green spherical eggs, which were not kept through hatching.

The area around Mammoth is covered almost exclusively with lodgepole pine (*Pinus contorta*), and this forest, one of the largest in California, extends past the rest stop mentioned above.

As a collector's note, the rest stop described above has proven to be an excellent collecting spot, when open, which depends on enough water being available to make it usable. Many specimens can be taken there, including large Saturnidae, as the building is lit at night. Also, less than two miles north of the Rest Stop, route 395 crosses Deadman's Creek, an excellent collection area for butterflies.

KELLY RICHERS, *5913 Bel Aire Way, Bakersfield, California 93309.*

Journal of the Lepidopterists' Society
39(4), 1985, 339–340

PUDDLING BY SINGLE MALE AND FEMALE TIGER SWALLOWTAILS, *PAPILIO GLAUCUS* L. (PAPILIONIDAE)

The eastern tiger swallowtail, *Papilio glaucus* L., is noted for puddling in large groups on damp soil. These conspicuous aggregations are apparently all male; no female has ever been reported in them. This agrees with the general case in the Lepidoptera. In both butterflies and moths, puddling is a far more common behavior in males than in females (Downes, 1973, J. Lepid. Soc. 27(2):89–99; Adler, 1982, J. Lepid. Soc. 36(3):161–173).

Puddling is apparently associated with the acquisition of sodium ions and amino acids from the substrate (Arms et al., 1974, Science 185:372–374). Adler and Pearson (1982, Can. J. Zool. 60:322–325) have shown that the sodium budgets of males and females of the cabbage butterfly, *Pieris rapae* L., are significantly different, with males having a higher need for sodium than females. This greater need for sodium by males may reflect the more active role of the male in reproduction, both in terms of greater flight activity (Downes, op. cit.) and in the production of nutrient rich spermatophores (Adler & Pearson, op. cit.). This in turn may explain the preponderance of males at puddling aggregations.

We have eight observations of fresh male *P. glaucus* puddling singly over the course of several summers near Ithaca, Tompkins Co., N.Y. and near Cooperstown, Otsego Co., N.Y. These may represent cases where the individual is the first to find an area of rich resources and thus may form the core of a puddling aggregation later on. Males in this species are attracted to conspecific decoys (Arms et al., op. cit.). This may be a consequence of their mate-locating behavior, which apparently involves searching for mates at a wide variety of sites (Berger, pers. comm.). Patrolling males may key onto a puddling individual in the hopes that it is a female and remain at the puddling site if it is rich in

needed nutrients. Alternatively, single puddling males may be at sites with lower concentrations of the needed resources.

We have observed five cases of puddling by female *P. glaucus* at a study site near Cooperstown, Otsego Co., N.Y. In all five cases, the females were puddling singly. The first observation was at 1050 h on 22 June 1983 (day 16 of the brood). A fresh female was captured while puddling on damp soil in a vegetable garden, where she had been settled for about two minutes.

Three observations all occurred on 13 June 1984 (day 10 of the brood). At 1045 h, a fairly worn female was disturbed while puddling on damp soil at the edge of a road. She flew to the end of a nearby cornfield where she puddled in two different locations for a total duration of about five minutes. This female was subsequently captured while nectar-feeding. At 1230 h, a fresh female flew slowly along a different road edge. She landed once, probed at the soil, then continued down the road. Finally, at 1620 h, a slightly worn female was seen taking off and landing several times along the road edge, probing the soil at least once.

The fifth observation was at 1627 h on 2 June 1985 (day 17 of the brood). A very worn female was observed taking off and landing at several different spots on the soil of the vegetable garden and was subsequently captured after she had been puddling for about three minutes.

Papilio glaucus is a highly vagile, wide-ranging species. Both sexes show very low recapture rates in mark-recapture studies (Lederhouse, 1982, Ecol. Entomol. 7:379–383). Females of this species may well have greater relative nutrient requirements than females of more sedentary species. Puddling females may represent those cases where their requirements cannot be met from larval feeding, nectar, or the contributions of a male's spermatophore.

However, we have observed both males and females puddling singly in two related species, the black swallowtail, *Papilio polyxenes* F., and the zebra swallowtail, *Eurytides marcellus* (Cramer). The black swallowtail is not a wide-ranging species and differs considerably from the tiger swallowtail in its habitat preference and reproductive strategy (Lederhouse, 1983, Oecologia 59:307–311). That males puddle singly in this species may again be influenced by their territorial mating system, which involves male defense of lek sites (Lederhouse, 1982, Behav. Ecol. Sociobiol. 10:109–118). The observations of females puddling in these species may suggest that puddling in female Lepidoptera is more common than is widely believed.

One possible reason why female Lepidoptera are not often seen puddling in groups may be to avoid harassment by males at these sites. We have often observed the investigation of and attempted copulation with puddling individuals by new arrivals at aggregations of puddling *P. glaucus* males. A female in this situation would have to compromise between efficient puddling and exercising her reproductive choice.

THERESA A. BERGER AND ROBERT C. LEDERHOUSE, *Department of Zoology and Physiology, Rutgers University, Newark, New Jersey 07102.*

Journal of the Lepidopterists' Society
39(4), 1985, 340–341

FLOWER VISITATION RECORDS FOR SNOUT BUTTERFLIES (LIBYTHEIDAE)

In the course of a general survey of libytheid butterflies (Shields, Tokurana, in press), flower visitation records were noted for *Libytheana bachmanii* Kirtland (most) and *Libythea celtis* Fuessly, gleaned from published sources and correspondence. These records are arranged here according to the classification of A. Takhtajan (1969, Flowering plants: