

plateau above the *Quercus* zone was also sampled without any observations of *phyciodoides*. The results of this sampling would indicate that the species is associated with the *Quercus* dominated Madrean evergreen woodland biotic community. According to Brown (1982, *ibid.*), this community also dominates much of the region collected by Holland and Forbes, as well as the Chiricahua Mts. of Cochise Co., Arizona—the type locality for *phyciodoides*.

Holland and Forbes also expressed interest in the relationship between *phyciodoides* and other riordinids, especially *Apodemia palmeri* (Edwards) and *A. hepburni* (Godman & Salvin). While our limited observations cannot answer the questions in this subject, they may provide a better understanding of the Riordinidae associations by biotic community. In addition, a potential pattern becomes apparent in the associations between *phyciodoides*, *palmeri*, and *hepburni*.

No riordinid species were observed in the sampling of the Petran montane conifer forest. Within the Madrean evergreen woodland, we found *phyciodoides*, *Apodemia hypoglaucia* (Godman & Salvin), *Emesis ares* (Edwards), *Baeotis zonata* (Felder), *Lasaia maria* Clench, and *Calephelis arizonensis* McAlpine. Only *phyciodoides* and *arizonensis* were common in this area, the other species were represented by less than half a dozen specimens each. In the Sinaloan deciduous forest, and lower into its transition with the Sinaloan thornscrub (16 miles east of Tecoripa to three miles east of Santa Rosa), six species were recorded: *hepburni*, *hypoglaucia*, *arizonensis*, *maria*, *Emesis poeas*, and *zonata*. In this zone, only *maria* and *hepburni* were common. *A. hypoglaucia* was not observed here on the late July 1984 trip but was taken on 26 August 1984 by Doug Mullins within the same zone (near Tepoca, highway 16). A stop along the river at San Jose de Pimas in the lower Sinaloan thornscrub (transitioning to Sonoran desert-scrub) resulted in three different species: *palmeri*, *Apodemia mormo mejicanus* (Behr), and *Calephelis nemesis* (Edwards). *A. palmeri* was common while the other species were present in lower numbers.

In summation, these observations do not answer the problems presented by Holland and Forbes, but they do provide further clarification of the biotic associations of *phyciodoides* and its relationship with *palmeri* and *hepburni*. In southeastern Sonora, *phyciodoides* appears to be closely associated with the *Quercus* dominated Madrean evergreen woodland, a habitat which dominates middle and upper mountain regions into southeastern Arizona. Categorizing riordinid species by biotic community in this region gives the perception that the three *Apodemia* species mentioned above are each associated with different habitats, and perhaps "replace" each other as the biotic communities are transversed.

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POPULATION OUTBREAK OF PANDORA MOTHS (*COLORADIA PANDORA* BLAKE) IN THE MAMMOTH LAKES AREA, CALIFORNIA

Pandora moths (*Coloradia pandora* Blake), which are fairly widespread over the northern pine forests of the west, periodically exhibit an unusual increase in population as described by Brown (1984, *J. Lepid. Soc.* 38(1):65) and Ferguson (1971, *Moths of America north of Mexico*, Fasc. 20.2a, E. W. Classey Ltd., London). During a field trip in 1982, shortly after the described outbreak of adults on the Kiabab Plateau of Arizona, such an outbreak was witnessed in the Mammoth Lakes area (el. 7000 ft.) of California. On the

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 Saturniidae, 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.

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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