Boston, p. 1212; Priestaf 1972, J. Lepid. Soc. 26: 104) may reflect the relatively recent introduction of *P. rapae* to North America and its subsequent geographic overlap with native *Pieris* (Scudder 1889, loc. cit.; Klots 1951, loc. cit.). The possibility that crosses between *P. virginiensis* and *P. n. oleracea* from this locality are fertile can be tested using laboratory-reared stock. Bowden (in litt. and 1972, Proc. Brit. Entomol. Nat. Hist. Soc. 4: 103–117) found that some crosses between *virginiensis* and *napi oleracea* individuals (from stocks from different localities) produced viable hybrid offspring (tests of hybrid fertility were negative but too few to be conclusive); others produced infertile eggs. If the artificial crosses produce fertile hybrid offspring, then one might expect to find some evidence of introgression in sympatric populations (cf. Hovanitz 1963, J. Res. Lepid. 1: 124–134). If the crosses are not fertile, then the observation that these two distinct, sympatric, native *Pieris* do not exhibit more effective pre-zygotic isolating mechanisms is curious (cf. Shapiro 1975, Am. Midl. Nat. 93: 424–433).

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UTILIZATION OF GRASS INFLORESCENCES AS ADULT RESOURCES BY RHOPALOCERA

Adult Lepidoptera utilize a number of energy sources to supplement the nutritive material assimilated during the larval stage. While flower nectar is the most common adult resource, others, e.g., rotting fruit, carrion and dung are often utilized (Downes 1973, J. Lepid. Soc. 27: 89–99; Neck 1977, J. Res. Lepid. 16: 147–154). Flowers most frequently visited are those with colorful petals and/or sepals. While tropical grasses are visited by a large number of insect species (Soderstrom & Calderon 1971, Biotropica 3: 1–16), as a general rule, grasses have non-conspicuous, anemophilous flowers which have few, if any, insect visitors.

Herein I report massive utilization of grass inflorescences by several species of Rhopalocera. Observations were made along Sandy Creek in Enchanted Rock State Park, Llano Co., Texas, on 27 October 1978 from 1000 to 1700 h. Skies were cloudless; temperature range was 10°–25°C during the observation period.

Rhopalocera were visiting inflorescences of two grass species: K-R bluestem, *Bothriochloa ischmaeum* (L.) Keng var. songarica (Fisch & Mey.) Celarier and Harlan, and Dallis grass, *Paspalum dilatatum* Poir. The following species and numbers were observed during a single transect: *Precis coenia* (Hübner) (51), *Danaus gilippus strigosus* (Bates) (8) and *Cynthia cardui* (L.) (2). Butterflies had their probosces extended towards and around the base of achenes of the inflorescences. Achenes of both these grass species were post-anthesis, but some substance was apparently being removed from the shiny surface of the achenes.

Other rhopaloceran species present at this site but not observed at the grass inflorescences were *Anaea andria* Scudder, *Ancyloxypha numitor* (Fabricius), *Atlides halesus corcorani* Gunder, *Chlosyne lacinia* var. adjutrix (Scudder), *Colias* (*Zerene*) *caesonia* Stoll, *Colias eurytheme* Boisduval, *Eurema nicippe* (Cramer), *Nathalis iole* Boisduval, *Physiodes phaon* Edwards and *Phyciodes vesta* Edwards. Most of these species flew over the two grasses with no evidence of attraction. Butterfly families represented by the above species include Hesperiidae, Lycaesidae, Nymphalidae and

Pieridae. These butterfly species visited a number of flowering plants, e.g., *Eupatorium havanense* H.B.K. (Compositae), at which no *Precis*, *Danaus* or *Cynthia* were observed.

The grass-visiting species ignored not only various other flowering plants but also a number of other grass species, e.g., side-oats gramma, *Bouteloua curtipendula* (Michx.) Torr., most of which was brown with achenes fully desiccated. The stage of desiccation, i.e. maturation of seed, is the apparent key factor in restricting butterflies to the two species of grass. Both the grass species visited by Rhopalocera are weedy, drought-resistant, naturalized grasses which have extended seed production compared to native grasses (pers. obs.). *B. ischmaeum* also grows in nearly monospecific meadows on interstream high areas and terraces. A few butterflies visited inflorescences in these areas, but their numbers were not comparable to the lower sites. While arborescent vegetation at these higher sites may have restricted butterfly access, some butterflies were present; the probable reason for reduced utilization was low soil moisture which caused more rapid achene maturation. The observation of three *Precis* in immediate proximity to each other on one particularly "green" *Paspalum* inflorescence supports this idea.

Of interest is the identity of the substance obtained by *Precis*, *Danaus* and *Cynthia* from the surface of the achene of *Bothriochloa* and *Paspalum*. Lepidopteran adults have long been known to feed at sap exudates and honeydew on leaves (Norris 1936, Trans. R. Entomol. Soc. Lond. 85: 61–90). Karr (1976, Biotropica 8: 284–285) reported unidentified moths feeding at a "nectar-like material" of a grass species in the Canal Zone (Panama); a later report (Pohl et al. 1979, Biotropica 11: 42) indicated this substance may have involved nectar-like production by an ergot. However, I have observed several species running probosces over the surface of apparently healthy leaves without honeydew deposits or fungal infestation. Obviously, some exuded substance on the leaf or achene surface has some attractive (and presumed nutritive) value to a number of adult Rhopalocera. Grass species with extra-floral nectaries are unknown (Pohl et al., op. cit.). One wonders whether the substance(s) involved are secondary compounds produced to deter herbivory (see Levin 1976, Annu. Rev. Ecol. & Syst. 7: 121–159). However, water-soluble compounds, e.g., sugars and amino acids, are normally not present on such external surfaces. Water-insoluble compounds, e.g., waxes, flavonoid phenolic compounds and terpenoids, often occur on these external surfaces. These compounds are not nutritive in nature, however; normally they serve as feeding and/or ovipositional deterrents or attractants. At this point one does not know whether these butterflies were obtaining a nutritive substance or were merely being stimulated by surface phytochemicals.

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