

CLIMATIC REGIMES RESULTING IN UNUSUAL
OCCURRENCES OF RHOPALOCERA IN
CENTRAL TEXAS IN 1968

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ABSTRACT. During 1968 several species of Rhopalocera which normally do not occur in this area (or occur only in small numbers during the latter part of the season) were abundant in central Texas. Meteorological regimes which influenced this influx of tropical species are discussed.

Central Texas is a major ecotonal area between the Nearctic and the very northern fringes of a dilute Neotropical rhopaloceran element which appears as far north as Central Texas under various climatic regimes. Some of these species may occur as far north as Kansas or Nebraska as stragglers, but breeding populations are not established. One such climatic regime occurred in 1968. Discussed below are observations made at the Brackenridge Field Laboratory of the University of Texas at Austin within the corporate limits of the city of Austin.

Heliconius charitonius vasquezae Comstock and Brown and *Dryas julia moderata* (Stichel) (both Heliconiidae) were very common in 1968 as early as June. The existence of numerous fresh specimens and the length of time during which these two species were present (well into the fall months) indicate that breeding colonies of both species had become established. At least one suitable larval foodplant, *Passiflora lutea* L. (Passifloraceae), is present on the grounds of the field laboratory. Nocturnal roosting aggregations (up to eleven individuals) of *H. charitonius* were observed at several sites within the eighty-acre area. Different sites were used at various times. Each site was a shrub or tree at the edge of a wooded area. These two heliconians are seen in the Austin area in about half the years, but they normally appear in late summer or fall indicating late season dispersal from areas to the south with permanent populations. Sporadic breeding occurs in at least some of these years as indicated by reports for both species in 1966 (Rickard, 1967, 1968).

Dynamine dyonis (Geyer) occurred commonly from July into the fall. Specimens were normally restricted to wooded areas along a dry arroyo. Breeding occurred as indicated by the fresh condition of most specimens seen throughout the season. *D. dyonis* was initially reported in the Austin area in 1899 (Brues, 1905). A breeding population was established "along the bed of a dried up creek near Austin, Texas." Brues had not

seen this species before this time (time of initial observations in Austin area by Brues unknown) and did not see it during the three following years, although he collected in the same areas. As his first records were in October, this species probably immigrated into the area in late summer 1899; the progeny of these immigrants were observed by Brues. Brues (1905) records that *Mestra amymone* (Menetries) was "very common about Austin . . . in former years they were much less numerous." *M. amymone* is a permanent resident of the Austin area (Masters, 1970) but was exceptionally abundant in 1968.

Adults of *Achlyodes thraso tamenund* (Edwards) (Hesperiidae) were commonly seen resting on soil surfaces in open areas in 1968. Kendall (1965) reported this skipper from southern Texas. Records included Goliad, Kleberg, Live Oak and San Patricio Counties (all well south of the Austin area).

Hurricane Beulah struck the Texas coast near the mouth of the Rio Grande River on 20 September 1967. Torrential rains covered a large area of south Texas resulting in floods and semi-permanent ponds of water (Grozier, et al., 1968; Baker, 1971). Subsequently, many rhopaloceran species not before known from Texas (or the United States) were reported from south Texas, particularly from Cameron and Hidalgo Counties at the southern tip (Doyle, 1970; Heitzman, 1970; Heitzman and Heitzman, 1972; Kendall, 1970, 1972).

The effect of this storm upon the rhopaloceran fauna in south Texas is well-documented and was more than temporary as some species have been found in subsequent seasons (Tilden, 1974). While this storm may have been related to the unusual rhopaloceran occurrences in central Texas in 1968 in an indirect manner, the major cause involves the weather of 1968. The species involved in this temporary northward movement could have occurred in the central Texas area in late 1967 and remained undetected, but their survival of the 1967-68 winter in these latitudes is most unlikely. Coldest temperature at Austin for this winter was 22°F. which is certainly much too cold for these species to survive. Average monthly temperature for winter 1967-68 were generally below normal in southern and central Texas. If these species could survive such cold weather, these taxa would be common in central Texas during many seasons.

Torrential rains associated with Hurricane Beulah allowed the development of larger than normal populations of these species in areas closer to central Texas than is normally the case (southern Texas and/or northern Mexico). The key to the appearance of these species in early 1968 was higher than average rainfall in May 1968 at Austin (8.75" vs. normal

4.22") and many other localities in central Texas, especially along the Balcones Escarpment (scattered localities actually had lower than normal totals). Rains and cooler than normal temperatures during the summer (U. S. Weather Bureau, 1968, Climatological Data, Texas, p. 73) fostered plant growth and development of certain rhopaloceran populations. Rainfall at Austin in summer 1968 was 18.5% above normal and high temperature was only 98°F.

Population movements from south Texas or, more likely, from northern Mexico along the Balcones Escarpment was initiated by large resident populations; survival of these populations was allowed by favorable moisture conditions. None of these forms was seen in central Texas in early 1969 (low temperature during 1968-69 winter was 22°F.).

A second northward movement was observed in fall 1968. These movements may have involved species more common in northern Mexico at the end of the rainy season. Population development in northern Mexico probably reached levels such that northward population movements ensued. Climatic conditions of central Texas may not have been significant in the occurrence of the following form as no evidence of reproduction in these relatively northern areas is known. Rainfall in the Border Country of Texas was up to twice normal during this fall period (Posey, 1968; Wagner, 1969).

Colias (Zerene) cesonia (Stoll) is one of the common species in Austin, particularly in spring and fall. This species is normally represented in central Texas by the nominate subspecies which exhibits a reasonably obvious "dog face" even in the female. Several female specimens of *C. cesonia* collected during October 1968 exhibited a different phenotype, *immacusecunda* Gunder, with greatly reduced black markings on DFW and DHW. Originally described as a "form ♀" (Gunder, 1928), this form has been treated as an aberration by some authors (Brown, 1965). I believe this form represents a normal (seasonal?) phenotype present in certain populations in Mexico (Neck, pers. obs.). Under certain climatic conditions this form moves northward into Texas.

Other observers reported occurrences of tropical or sub-tropical species in the central Texas area in 1968. *Biblis hyperia aganisa* Boisduval was seen in San Antonio, Bexar County by W. Tyron on 7 October 1968 (Tilden, 1974), Kendall (1972) reviewed the occurrence of the tropical heliconian, *Eueides cleobaea zorcaon* (Reakirt), in southern Texas as far north as San Antonio in 1968.

In an attempt to verify that a particular climatic regime was responsible for the occurrence of the above butterflies in central Texas, weather records for 1899 and 1966 were consulted to determine if peculiar climatic

conditions existed at the time of previous occurrences in central Texas of some of the above species.

In 1899, statewide precipitation in Texas was about normal, being 94% of average, but summer precipitation was high, 131% of average (Norquest, 1941). Precipitation records for particular stations for 1899 are not published in readily available form. However, a massive rainstorm occurred in late June 1899 in central Texas. This storm, which produced the worst flood on record for the Brazos River, was centered north of the Austin area, producing over thirty inches of rain in certain areas (Texas State Almanac, A. H. Belo Corp.). If rain from this storm was distributed, albeit in smaller amounts, to the south, then this storm with its attendant rainfall and wind circulation could have been involved in the occurrence of *D. dyonis* in central Texas in 1899. Ironically the occurrence of the subtropical butterfly *D. dyonis* in central Texas in autumn 1899 followed the most severe Texas winter on record. Record low temperatures were recorded at various stations including 12°F. on 13 February at Brownsville at the southern tip of Texas. Central Texas temperatures were at or below 0°F. Brues (1905) remarked that "the summer had been very favorable for the development of insects as Hymenoptera and Diptera were more abundant than I have ever seen them in that part of the country."

Occurrence of breeding *H. c. vasquezae* and *D. j. moderata*, in central Texas in October 1966 (Rickard, 1967, 1968) probably resulted from heavy rains in August of that year. Following below normal rainfall during the first seven months of 1966, August was excessively wet for both Austin (6.21" vs. normal 2.17") and San Antonio (4.28" vs. normal 2.25"). Such a large influx of moisture is quite sufficient to cause rapid vegetative growth and large scale movements of various butterfly populations.

Environmental changes over large areas such as southern Texas and northern Mexico provide natural experiments which reveal factors which control the extent and abundance of occurrence of particular species (see earlier report by Gilbert, 1969). Obviously, two major climatic regimes of present-day central Texas prevent the establishment of a fringe Neotropical fauna: insufficient rainfall and relative extreme winter cold.

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