

GENERAL NOTES

EFFECTS OF 1933 HURRICANES ON BUTTERFLIES
OF CENTRAL AND SOUTHERN TEXAS

Hurricanes are massive tropical storms that may be accompanied by tremendous winds, precipitation, and/or surge tides. Such storms are normal occurrences in southern Texas, having been observed since the beginning of historical records (Schlesselman, 1945, *Trans. Tex. Acad. Sci.* 38: 173-182). Two hurricanes struck the Brownsville area in 1933 (5 August and 4 September) causing widespread damage and torrential rains from there southward into Mexico. On 6 July a hurricane struck the Mexican coast approximately equidistant from Tampico, Tamaulipas, and Brownsville. Rainfall from this hurricane in the Brownsville area broke a lengthy drought (July precipitation was 4.50 in. vs the normal of 1.68 in.). Rainfall from November 1932-June 1933 inclusive totaled 8.59 in., compared with a normal rainfall of 13.66 in. for November-June. Precipitation at Brownsville during July-September 1933 was 26.14 in., compared with an average of 9.44 in. (normal annual precipitation is only 26.75 in.). Rainfall in central Texas was unaffected by these hurricanes; San Antonio precipitation during July-September 1933 was 7.94 in. (exactly normal).

Rainfall surges following droughts typically cause large increases in the numbers of many lepidopteran species, some of which subsequently migrate in tremendous numbers. The September storm was very severe, whereas the August storm was relatively minor (names were not applied to tropical storms until 1953). All three storms had profound effects on the biota of southern and central Texas. Three literature reports describe tropical butterfly occurrences that seemingly resulted from these storms, although the observers did not connect their observations with the hurricanes. These three accounts deal with, respectively: 1) initial population movements in direct response to environmental disturbances; 2) establishment, *albeit* temporarily, of a breeding population in the same year as the storms; and 3) apparent overwinter survival and continued reestablishment of a population during the following year.

H. B. Parks (remarks published by Engelhardt, 1934, *Bull. Brooklyn Ent. Soc.* 29: 16) collected numerous specimens of *Anteos chlorinde nivivera* Fruhstorfer and *Anteos maerula lacordairei* (Boisduval), both Pieridae, at San Antonio, Bexar Co. during the last week of August and first week of September 1933. Parks states, "these huge butterflies were a glorious sight. They arrived in large numbers and stayed with us about a week." San Antonio was apparently the center of the flight, but specimens were also seen or reported at Kerrville, Austin, and San Antonio. Northward movement of these species was apparently in direct response to the August storm. During this same period, and subsequently, he collected the following species: Hesperidae: *Chiomara asychis georgina* (Reakirt); Nymphalidae: *Siproeta steneles biplagiata* (Fruhstorfer) and *Marpesia petreus* (Cramer); Pieridae: *Phoebis philea* (Johanssen); and Heliconiidae: *Heliconius charitonius vasquezae* Comstock & Brown and *Dryas julia moderata* (Stichel). By listing these species, Parks was indicating that these were unusual captures for the San Antonio area. This classification is verified by my observations in the area. The two heliconians are seen in most years in low numbers but normally not until late summer or fall, although early summer occurrence of both species was observed in 1968 (unpub. data). *Siproeta steneles biplagiata* has been observed sporadically in the Austin area.

The second report involves a species that had not previously been seen in Texas or the rest of the United States and probably has not been observed since. A "perfect specimen" of *Dryadula phaetusa* (L.) was collected on 19 December 1933 at Sarita, Kenedy Co. by H. Glazbrook (1934, *Ent. News* 45: 251-252). *Dryadula phaetusa* apparently was able to disperse northward in late 1933 after the storms and breed at Sarita. Larvae of this species feed on passionflower (Passifloraceae:

Passiflora). *Passiflora foetida* L. var. *gossypiella* (Hamilton) Mast probably occurs in the more mesic wooded habitats of this area. No severe winter weather had been experienced in this area by mid-December 1933. The nearest weather records are for Corpus Christi, Nueces Co. (88 km to the NNE). Ironically, the coldest temperature for late 1933 was 43°F on 19 December. *Dryadula phaetusa* is known from the temperate and tropical regions of southern Mexico but extends up the coasts an unknown distance toward the United States (Hoffman, 1940, An. Inst. Biol. Mex. 11: 639-739).

The third report involves the occurrence, which may or may not be associated with these hurricanes, of another tropical butterfly in central Texas. *Anartia jatrophae luteipicta* Fruhstorfer (Nymphalidae) was reported near Sutherland Springs, Wilson Co. in late October 1934 (Parks, 1935, Bull. Brooklyn Ent. Soc. 30: 83). The existence of newly emerged specimens among those collected indicates that a breeding colony had been established. Doubt about the association between the occurrence of this species and these hurricanes results from the observation of this butterfly west of San Antonio on 9 November 1931 by A. J. Boyles. However, Parks (op. cit.) states that "a very careful search has been made [since 1931] without success [until 1934]." Therefore, occurrence of *A. j. luteipicta* in central Texas is believed to be the result of a colony established in late 1933 (or early 1934) after northward dispersal associated with the hurricanes of August and September 1933. Normally, *A. j. luteipicta* would not be expected to survive the winter cold of central Texas. However, the winter of 1933-1934 was exceptionally warm; the coldest temperature recorded at San Antonio (45 km NWW of Sutherland Springs) was 29°F. A population was probably established in late 1933 with successful overwintering and survival until the following winter. Survival through the 1934-1935 winter is unlikely (low temperature 18°F). Survival between the 1931 sighting and the putative 1933 establishment is unlikely since colder weather occurred in both 1931-1932 (low temperature 24°F on 13 March) and 1932-1933 (low temperature 12°F).

In September 1967, Hurricane Beulah, after striking land at the mouth of the Rio Grande River near Brownsville, Cameron Co., Texas, brought extremely heavy rains to southern Texas. As a result of this storm, a fairly large number of lepidoptera species previously unknown in Texas (and the United States) have been reported in southern Texas (Doyle, 1970, J. Lepid. Soc. 24: 212; Heitzman, 1970, Mid-Cont. Lepid. Ser. 12: 10-11; Heitzman & Heitzman, 1972, J. Res. Lepid. 10: 284-286; Kendall, 1970, J. Lepid. Soc. 24: 59-61, 266; Kendall, 1972, *Ibid.* 26: 49-56). At least some of these species have established permanent populations in this area (see later collections reported by Tilden, 1974, J. Lepid. Soc. 28: 22-25).

RAYMOND W. NECK, *Texas Parks and Wildlife Department, John H. Reagan Building, Austin, Texas 78701.*

COLONY OF *PIERIS NAPI OLERACEA* (PIERIDAE) IN INDIANA

According to Blatchley (1891, Ann. Rep. Indiana State Geol. 17: 365-408), *Pieris napi oleracea*—*aestiva* Harris was collected by Mr. A. B. Ulrey in Kosciusko Co., Indiana in the summer of 1890. When collecting extensively in Kosciusko Co. and other northeastern counties in the mid-1930's and from 1964-1970, I failed to locate *P. napi*. On 12 July 1971, John Campbell, a high school student in my collecting party, collected one in the Pigon River State Fish and Game Area, Mongo, LaGrange Co., Indiana. My identification of this specimen as *Pieris napi oleracea* Harris was confirmed by Mr. Harry K. Clench of the Carnegie Museum. John and I returned to Mongo on 24 August 1971 and collected 23 more specimens. Since that time *P. n. oleracea* has been found annually in the Mongo tamarack bog, the largest bog of its type in Indiana and only 7 miles from the Michigan border.