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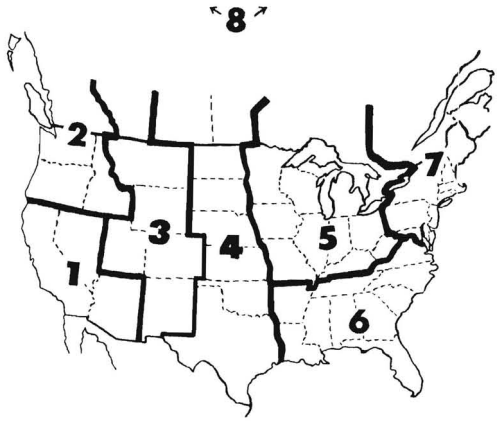
THE FIELD SEASON SUMMARY OF NORTH AMERICAN LEPIDOPTERA FOR 1951

The season of 1951 appears to have been one of normal or above-normal abundance of Lepidoptera. The outstanding climatic events were severe summer droughts in the northwestern region, and to a lesser degree in the southwestern and south-central regions. In parts of the Northeast, prolonged wet and cool weather in the summer interfered with collecting, and perhaps with amount of flight, to some extent.

MIGRATIONS

In most regions migrations seem to have been inconspicuous, and there are only scattered reports of migrant activity. Danaus plexippus appears to have had a fairly strong migration in the East, but it did not penetrate far to the North. Nymphalis californica was seen migrating in Monterey Co., Calif., on June 9, and in the High Sierras in August. In Arizona and New Mexico Celerio lineata larvae were in plague abundance, but migrations of the moths were not noted; perhaps C. lineata will emigrate in 1952.



SEASON SUMMARY ZONES

UNUSUAL EVENTS

The great outbreak of Malacosoma disstria in the northeastern and north-central regions was much intensified in 1951; there were widespread areas of defoliation, and even outside of those areas the moths occurred in unbelievable numbers. A notable event in the West was the appearance of a second brood of Euphydryas in various localities. In the Lake States Nymphalis milberti was remarkably numerous. There are many new records for states, provinces, and even the Continent.

PROCEDURES IN SUMMARIZING

The usual practices have been followed, to ensure clarity and uniformity. Subspecific names are in general omitted except where they may be of distributional significance, or where several subspecies occur in a limited area. Authors' names are omitted after species names. The nomenclature in general follows Klots' A Field Guide to the Butterflies (1951) for the eastern butterflies, with names of western butterflies harmonised so far as reasonably possible. The nomenclature of the moths follows the arrangement of the Canadian National Collection, which is based on McDunnough's Check List of the Lepidoptera of Canada and the United States of America (1938-39), with revisions indicated by more recent work.

This year more comparative data are presented than have been available for any preceding Summary. Likewise, the participation has been greater than ever before, over 90 individual reports having been utilized! This was due largely to the record response in the rather densely populated Central and Northeast areas, with 25 participants each. The two proportionately weakest areas are California and the Southeast.

There is a suggestion that 1952 will be a year of increased migrations, and News readers are urged to keep careful notes in great detail of any observation of Vanessa cardui, Celerio lineata, and others.

Eugene G. Munroe

by Lloyd M. Martin
Los Angeles, California

CALIFORNIA

Collecting reports again show that lack of rain has kept the Lepidoptera at a low point through most of southern California. In the northern part of the state the rainfall was about normal and most species appeared as usual. The fall of 1950 in northern California was open and mild, the rainfall of the 1950-51 winter season was almost normal, lacking only a few hundredths of an inch. The early spring was rather mild and insects came out early or normally. Subsequent cold, windy weather and unseasonable storms caused a recession in emergence and most of the regular late spring insects seemed to be delayed. By late May and June, however, the warm weather and lack of rain had caused the season to catch up and during the rest of the year it was almost normal. It is the exceptional season that is very good for collectors, and this season was not more than usually good.

NORTHERN AREA. Among the highlights might be mentioned these: Precis coenia was more than usually common and its prickly black larvae were found on plantain and commonly on cultivated snapdragons, to the disgust of home owners. Vanessa carye was especially common in the late fall brood; larvae were taken by one of the San Jose State College classes in large numbers and many were reared; in fact, it was so common it was used as a laboratory insect to show complete metamorphosis. In general, it was not a good year for Hesperiidae, but Hesperia dodgei seemed to have a very good year.

At Alum Rock Park in Santa Clara County P. coenia, Philotes sonorensis, Anthocharis sara, Pieris rapae, Colias eurytheme, Glaucopsyche lygdamus and Euchloe ausonides were reported as early as Feb.16 and 24 by Mr. Samuel Smoker. By the end of February it turned cold with heavy rain and snow and several heavy frosts; by March 10 the days were warmer, and butterflies and moths were appearing again. On March 11 in the Silver Creek Hills area, E. ausonides, C. eurytheme, Euphydryas editha, P. coenia, Lycaenopsis pseudargiolus, Autographa californica, Melicleptria pulchripennis were taken. To the south in the San Luis Obispo County area on March 18 it was too cold and too early, but it was a much later season than in 1940; only very few of the early species were out. By April 15 the weather had warmed up and Mitoura siva mansfieldi, Melitaea leanira wrightii, M. palla, G. lygdamus, Plebeius acmon, Everes amyntula, Polites sabuleti, and Atalopedes campestris were out.

By May 30 Mocho Creek in Alameda County had warmed up enough to produce a few interesting things. Strymon auretorum and S. dryope were rare at Arroyo Bayo in Santa Clara County; Euphydryas chalcedona, E. editha, Nymphalis californica and anticpa, Papilio rutulus and eurymedon, Strymon saepium, Plebeius acmon, Ochlodes agricola, and Danaus plexippus were all quite scarce. A few larvae of D. plexippus were found feeding on Mexican milkweed. On June 17 on the north side of Mt. St. Helena (near the Napa - Lake County line) it was very hot and badly dried, very little being seen on the wing: only a few E. chalcedona, Limenitis lorquini, and Adelpha bredowii californica. On June 18 at Bear Creek, Mendocino National Forest, collecting was good: Papilio eurymedon and rutulus were common; P. zelicaon, P. philenor, and P. multicaudatus were quite scarce. Parnassius clodius was common; about forty were taken in two hours collecting, flying to flowers of Monardella and milkweed. Also taken were: Speyeria callippe and hydaspe, Vanessa virginiensis, carye and atalanta; D. plexippus, Cercyonis alope and sylvestris, Colias eurytheme, P. rapae, Coenonympha californica, Lycaena xanthoides and gorgon (the latter badly worn); Strymon sylvinus, S. californica, S. auretorum, Incisalia iroides, Plebeius acmon, Erynnis propertius and Pyrgus communis. Of the moths Pholus achemon, Sphinx perelegans, and Hemaris senta were all taken at milkweed flowers. The moon was nearly full and light did not attract much.

On the eastern side of the Sierra Nevada Mts., near Lone Pine in Inyo County, on Aug.14 Plebeius melissa was scarce but Pseudocopaeodes eunus was common; collecting as a whole was very poor. On Aug.15 at Tioga Pass collecting was fair: Speyeria mormonia was common, Colias behrii scarce, Plebeius shasta, P. aquilo, and P. saepiolus were fairly common, Lycaena editha, L. mariposa, L. nivalis, L. cupreus, and L. rubidus were present but not common; Oeneis chryxus and Euphydryas nubigena were present but very badly worn. Near Leevining in Mono County on Aug.16 Speyeria nokomis was present but not common; Everes amyntula was rare; Plebeius saepiolus was scarce, as was Limenitis weidemeyerii; Ochlodes sylvanoides was fairly common. Pieris occidentalis and P. beckerii were present. At Bridgeport, the same day, Ochlodes sylvanoides, Polites sonora, Coenonympha ampelos, Cercyonis oetus and C. silvestris and Polites sabuleti were taken but were quite scarce and well worn for the most part. Between Aug.31 and Sept.21 in the Alum Rock Park area in Santa Clara County, most of the common species had appeared, with Danaus plexippus apparently migrating toward the coast. At this time of the year the second broods of some species were on the wing, but were not as common as earlier in the season.

Thomas W. Davies reports from the Bay area: The collecting season did not have a very good start. The early morning fog that we have in summer began the end of March and continued to the end of September. A great many of the days were never free from heavy fog and consequently collecting in the immediate Bay area was very poor. Although the coast area was shrouded in fog the interior coastal valleys were warm and most of our collecting was spent in the foothills forty to fifty miles from the Bay region.

In the Mocho Canyon region, east of Livermore, the collecting was fairly good on April 1: fourteen males and eight females of Pieris sisymbrii were taken; Pholisora catullus was common, along with Anthocharis sara and Erynnis propertius. One specimen of Atlides halesus was taken. In this same canyon on April 19 the day started cool with a high fog which disappeared by noon. Euphydryas editha was quite common, having made a reappearance after an absence

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

of four years from its favorite hilltop. Only two specimens of E. chalcedona were taken, it being a little early for this common species. Specimens of Papilio zelicaon that looked and acted very much like Papilio bairdii brucei were taken in swift flight over the high hilltops, in company with E. editha. C. eurytheme, P. acmon, and C. californica were scarce and only a few fresh specimens were taken. Pholisora catullus had disappeared and was replaced by Hesperia columbia on the higher points of ground; seven males of the latter species were taken.

Mitchell Canyon, which lies in the shadow of Mt. Diablo, Contra Costa County, was the objective on May 19. A number of species were in full flight. Eighteen males of Papilio multicaudatus were taken, but no females were seen. Pieris rapae and P. napi were common; the latter was somewhat worn, and one specimen of the later brood, P. castoria, was taken. Coenonympha californica, L. lorquini, Adelpha californica, P. acmon, and M. palla were common. One specimen of Melitaea leanira was taken, showing that the season was just beginning for this little species.

A third trip to Mocho Canyon on May 30 found the canyon very dry. The only species collected in numbers was Speyeria callippe, mostly fresh males with very few females flying. M. palla was taken but in reduced numbers and some in damaged condition. Lycaena xanthoides was caught in fresh condition and one fresh male specimen of Strymon dryope was taken near water in the lower end of the canyon.

An excursion to Alpine, Lake, and Marin Counties on June 3 did not result in very good collecting. The weather was fair and most of the plant life was in bloom, but insects were poorly represented. The most common species was E. chalcedona; some of these were in worn condition. A quick trip to Point Reys, Marin County, was made in the same day; here collecting was much better. On the sand-dune-covered peninsula Plebeius pheres (?) was flying in company with Platyprepia virginalis in good numbers. A stiff wind was blowing with a slight overcast of fog. Callophrys dumetorum was found in the depressions between the sand dunes, keeping away from the winds.

On June 10, at Chews Ridge, Monterey County, Speyeria adiaste clemencei was found in fair numbers. Only one female was taken; the males in fresh condition showed the season was beginning for this subspecies. Melitaea gabbii and Strymon californica were common, with the latter species the more prevalent. Males and females of Speyeria coronis in poor condition were taken in company with S. clemencei. A migration of Nymphalis californica was noticed here. On June 9 the species was seen to be flying north-east with from two to three specimens passing a given point every 20 to 30 seconds. On June 10 the migration had stopped and only strays were flying, some of these flying back whence they came in a haphazard way.

Collecting in Mitchell Canyon on June 30 yielded a number of Lycaenidae. The most common species were Habrodais grunus and Strymon saepium. Strymon adenostomatis and Tharsalea arota were taken in fair numbers. The early spring butterflies had disappeared; Papilio multicaudatus was lacking, the fall brood not having appeared.

In the higher Sierra Nevada Mts. on Aug. 4 and 5 most of the early species were gone. Speyeria mormonia was common in the meadows of Sonora Pass. A few specimens of S. montivaga were taken in the same meadows, along with Lycaena rubidus, editha, and Pieris occidentalis. A few ragged specimens of Oeneis stanislaus were taken at this lower elevation. At the summit of Sonora Pass, Oeneis stanislaus was at the end of its season with very few perfect specimens being taken. Eumenis ridingsii was sought but not found. On Aug. 4 of the previous year, fourteen specimens of this species were taken, while at the same time O. stanislaus had disappeared. This shows that Eumenis ridingsii is a much later insect than O. stanislaus, and also indicates the discrepancy between dates of appearance in the two years. Other species taken this year at Sonora Pass were Plebeius melissa, aquilo, and P. shasta, all of which were quite common.

Another migration of Nymphalis californica was noted at Sonora Pass. The specimens here were flying southwest at about one to two every 30 to 60 seconds. These were all fresh, perfect specimens and of a much darker underside color than the Monterey swarm.

A trip made to Santa Cruz County in the first part of June for Speyeria adiaste and S. coronis was very unproductive, only two or three coronis being taken. It has been noticed in past years the large red Harvester Ants have been increasing in such large numbers that they overrun the woods. From one ant-hill two feet high and five feet wide an army of ants from 12 to 18 inches was moving in a solid front through the woods. Whether these ants attack the larvae and eggs of Lepidoptera, I do not know, but it does seem odd that the ants increase while the Lepidoptera population decreases. In passing I may say that the "Monarch", Danaus plexippus, returned to Pacific Grove in Monterey County at the butterfly trees in great numbers, after making a poor showing last year.

SOUTH-CENTRAL AREA. Collected in the San Gabriel area on Feb. 17 were 22 Philotes sonorensis, which closely corresponds numerically to the collection made the same date last year. The typical annual and perennial plants here were noted to be several weeks later than last year. Big Dalton Canyon was searched the same day for this species and none was found, although several stations were visited.

Returning to these localities Mar.14, we took 50 males and 13 females of P. sonorensis near the pump station in San Gabriel Canyon; Glaucopsyche behrii and Plebeius monticola sparse and fresh. In Big Dalton Canyon 2 males and 1 female P. sonorensis were taken. At this locality the plant association with which it was found is quite different, being the stream bottom and sides in a steep canyon, rather than on the flat wash. The foodplant, Dudleya lanceolata, was abundant, however, in spite of different dominant vegetation and exposure. It was subsequently noted that a considerable difference in wing-pattern is found between individuals from these different habitats. Subsequent investigation has shown a similarity in morphology correlated with

ecology over the whole range of this species (San Francisco Bay to Lower California). Zerene eurydice, Anthocharis reakirtii, and Vanessa atalanta were taken. Next we collected in San Gabriel Canyon again, but at a place about two miles above the pump station on the steep canyon wall. Here 1 male P. sonorensis was found (like the Big Dalton Canyon form), in addition to males of Anthocharis reakirtii and Papilio eurymedon.

On April 8 we collected at Toyon Cove, Santa Catalina Island. Anthocharis sara gunderi, Everes amyntula, Glaucopsyche behrii, Strymon avalona, and S. adenostomatis were seen, and all but Strymon avalona were quite abundant, particularly around a flowering mint.

Several collections were made in the Santa Monica Mountains from March through May. The usual species, viz.: Anthocharis reakirtii, A. sara, Coenonympha californica, Glaucopsyche behrii, Papilio rutulus, P. eurymedon, were all abundant, in quantities not unlike those of previous years. Melitaea gabbii was far more common than usual; it was possible to collect hundreds in one day at several different localities over the period of flight from late March to mid May.

In the San Jacinto mountain area on April 14 Pieris sisymbrii was occasional (a dozen seen and four taken) at Pinyon Flat. Ocotillo and Palo Verde were in full bloom here, indicating a somewhat wet season for this area as compared to the dry spell of the last four years. In Tahquitz Canyon several Melitaea chara were taken, although these were by no means as abundant as in 1944, when they were seen by the thousands in the same place. In 1945 and 1950 they were totally absent at the same approximate date. Philotes battoides was taken in small numbers.

In the area around Schroebers Camp, Bishop Creek, Inyo County, on July 6 vegetation was very dry; the characteristic iris of the meadows were well past flower, indicating an early season as compared to that of 1945. The butterfly fauna further supported this conclusion. Weather conditions on the east side of the Sierras seemed rather variable locally; the indications were that the season was brief and early. Plebeius icarioides was the commonest butterfly, with a few other Lycaenids and Nymphalids about but not common. July 7, at Onion Valley, upper Independence Creek, a beautiful subalpine meadow at nearly 9,000 ft. was found. The meadow itself was quite moist and is surrounded by slopes on which Eriogonum umbellatum (sulphur flower) was predominant. Up the slope, Philotes enoptes were taken at 9,400 ft.; at 10,000 ft. Plebeius lupini and P. enoptes were fairly common, as was Euphydryas nubigena; at Heart Lake, 11,000 ft., Philotes battoides was just coming out, quite early for this insect at this elevation. There were only occasional snow patches. On July 8, down Independence Canyon from 8,000 to 6,000 ft. Pieris occidentalis, Cercyonis paulus, Euphydryas olancha, Plebeius lupini, and Melitaea palla were present but scarce. Strymon saepium, Lycaena heteronea, and Plebeius icarioides were all very common, and a number of each were taken, mostly on Eriogonum umbellatum. Where the road crossed the stream Papilio eurymedon, Limenitis lorquini, Papilio rutulus, and Lycaenopsis argiolus were common and easily netted.

On July 17 in the open meadows about Mather, on the west side of the Sierras, north of Yosemite at 5,800 ft., the meadows were drying rapidly. Monardella was common and very attractive to Speyeria leto and Plebeius monticola, which were abundant; only male leto were seen. One male Tharsalea arota was seen. In the Humphrey's Basin area on July 18-19 little collecting was done due to the persistent rain. The amount of snow in the basin was about equal to that present at the same time in 1945. The butterfly fauna was similar except that Parnassius behrii and Oeneis ivallda were not seen, whereas they were abundant in August of 1945. Colias behrii, Philotes battoides, Euphydryas nubigena, Plebeius saepiolus, podarce, P. lupini and P. shasta were all out in good numbers.

On August 18-19 along the San Simeon Highway, on the coastal cliffs of the Santa Lucia mountains near Big Sur, it was hoped a long series of the new Philotes enoptes subspecies could be taken, but only three were found. The heavy fog probably accounted for this, as on the same date in 1948 Claude Smith and Rudy Mattoni took 30 in an hour. Everes amyntula were common when the sun was out. The season was presumably later because of the persistence of the summer fogs, which usually disperse earlier than this date.

On June 7 in the Bouquet Canyon area the vegetation was very dry, very little rain having fallen since the last of February. However, a quantity of Hesperia lindseyi were taken, mostly on the flowers of Yerba Santa and thistle. The females and some of the males were in poor condition, which showed the season was far advanced; normally the species should be just appearing at this date. Ochlodes agricola, Helioptes ericetorum, Strymon saepium, Plebeius monticola, and Strymon californica were taken, but in small numbers. Speyeria macaria and S. callippe comstocki were very common on the flowers of Yerba Santa. At this locality it is hard to differentiate between these two species (?); they seem to interbreed to such a great extent. Some specimens are typical S. macaria and others typical S. callippe comstocki, with all the intergradations in between. One very old female specimen of Papilio indra pergamus was netted but released as soon as a correct determination was made; it is not normally found at this low elevation and locality.

SAN DIEGO COUNTY AREA. We were fortunate in having seven collectors in this area during the year, and this summary is a compilation of their efforts.

During the winter, spring, and summer the prolonged drought continued to have an adverse effect on Lepidoptera. Temperatures were somewhat above normal except in the mountain areas where the season was late and cool with snow as late as April. Winter and spring were marked by bright clear spells, and summer temperatures were not extreme. Fall rains were above normal, exceptionally so in desert areas. Up to November 27, Needles had 4.60 inches, Blythe 4.75 inches, El Centro 2.57 inches, and rainfall has been well above normal in San Diego County for the fall and winter season.

Early season emergence was about normal with Glaucopsyche lygdamus, Everes amyntula, Philotes sonorensis, Coenonympha californica, and Copaeodes wrightii appearing by mid-February. Spring flights

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

were mostly poor, in the desert areas especially poor until late summer.

Summer emergence was normal except at higher elevations where the season was delayed three weeks, reaching a peak about July 15 compared to a normal date of around June 25. May collecting in the mountains was especially poor. Flights of most species were below normal during summer.

Fall collecting in coastal mountain areas was not good, but it seldom is. On the desert, following heavy rains in August, enormous flights of Melitaea chara, Papilio rudkini, Apodemia mormo deserti, and other species occurred. The desert dried up by November 1, and collecting was nearly over.

Late fall flights of common species were average in quantity and dates in urban areas. There was no marked migratory movement, although Danaus plexippus was more abundant than a year ago at the end of the season.

Hesperioidea probably suffered the greatest reduction in numbers, followed by Nymphalididae, Papilionidae, Lycaenidae, and Satyridae, while Riodinidae and Danaidae were almost normal.

Some general information on species follows: Anthocharis cethura was again found at Otay in the immediate coastal areas in March. What we have been calling Euchloe creusa lotta is probably E. ausonides andrewsi, considerably extending the range of this race (Laguna Mts. April 22, Warner Hot Springs April 14).

A fresh female Euphydryas chalcedona was taken July 21, substantiating the existence of a partial second brood here. Colias harfordii was taken in numbers near Alpine in June and July, in foothill areas rather than the customary mountain areas. Strymon adenostomatis was very abundant in the mountains July 15, but most other Theclinae were scarce. A few specimens of Strymon leda ines were taken Oct. 28; it begins to look like this may be nothing more than a late-season form of S. leda (Klots mentions such a form of Strymon clytie).

A single fresh male Papilio philenor was taken in the desert Sept.16, miles from any possible foodplant. This species is rare here, and the wild foodplant is undiscovered, no native Aristolochia being known. Strymon columella was scarce but was found where the recorded food plant, Sida hederacea, could not be found, indicating that it probably will eat other malvaceous plants.

Larvae of Papilio rudkini were abundant on Thamnosoma montana during September and October in the desert. Melitaea chara was the first species to respond to desert rains, appearing in heavy flight on Sept. 3, followed by a second brood three weeks later. The foothill colony of this species at Lakeside did not appear in flight until mid-September but then flew in good numbers.

Calephelis wrightii was found near Lakeside again, showing that it is established within twenty miles of the ocean. Nathalis iole, usually scarce, was common in October in desert canyons. Eurema nicippe, after several years below normal, made a comeback in November. Phoebis sennae, however, has remained at abnormally low levels for several years now.

VARIOUS CALIFORNIA LOCALITIES. On June 11 at Lake Hughes, Los Angeles County, E. chalcedona and Cercyonis sylvestris were common, Speyeria macaria scarce, and at Sandbergs S. atossa was not found. In Bouquet Canyon June 11 and 12 Speyeria macaria was abundant, other butterflies scarce. (Thorne)

In the Tehachapi Mts. on June 13 Strymon saepium and S. californica were very abundant, E. chalcedona abundant but worn, other species probably average. In the coastal ranges west of Bakersfield butterflies were scarce; only a few Speyeria callippe were taken. At Atascadero diligent collecting resulted in only one male Speyeria adiaste clemencei on June 15. Collecting was poor in this area.(Thorne)

At Blythe on June 25 Strymon columella was scarce, Pyrgus scriptura fairly common, Chlosyne lacinia and Limenitis archippus obsoleta could not be found. At Blythe on Aug.26 Chlosyne lacinia larvae were exceedingly numerous, Danaus gilippus larvae abundant, but imagines of all butterflies were scarce. (Thorne)

In the Providence Mountain - Essex area on Aug. 25 the country was turning green but it was too early for collecting. A single gravid female Papilio rudkini produced 32 progeny, 10 dark males, 10 dark females, 6 yellow males, 6 yellow females, indicating heterozygous parentage on both sides with black dominant. I was unable to mate the F_1 generation in captivity. (Thorne)

In the Sierra Madre mountains of the Santa Barbara area from June 20-24, the following were abundant and fresh: Brephidium exilis, E. chalcedona (some worn), Ochlodes nemorum. Less common, but fresh, were: Coenonympha california, Strymon (adenostomatis?), Heliopetes ericetorum, Erynnis tristis. Plebeius acmon was abundant and partly worn. Of Melitaea sp. only an old ♀ was found, although numerous larvae (of this?) were found in nests of Mimulus. One Danaus plexippus was seen closely. (Remington)

NEVADA

On June 18 C.L. Remington found Rhopalocera at various altitudes near Angel Lake in the Ruby Mts. Abundant species were Papilio eurymedon (♂♂ fresh and poor, 1 ♀ fresh), P. rutulus (fresh), Anthocharis sara (♂♂ fresh), Euchloe ausonides (♂♂ fresh), Nymphalis antiopa (worn), N. milberti (worn), Speyeria nevadensis (♂♂ very fresh, ♀♀ just emerging), Phaedrotes piasus (fresh ♂♂ in myriads on moist spots), Lycaenopsis pseudargiolus (fresh ♂♂), Plebeius icarioides (fresh ♂♂ and ♀♀). Scarcer species were: Pieris napi (fresh ♂♂), Nymphalis californica (worn), Incisalia sp. (worn and fresh ♂♂), Glaucopsyche lygdamus (fresh ♂). The same day at Wells, fresh Pieris beckeri were numerous. On June 28, at Deeth, also in Elko County, P. protodice was abundant and worn; Coenonympha tullia, Lycaena helloides, and Minois sp. were scarce and fresh.

ARIZONA

HUALAPAI MOUNTAINS. June 22 and 23: Strymon autolycus ilavia, Atlides halesus, Epargyreus clarus were abundant, other species probably below normal. August 24: mountains were green and excellent for butterflies but too early. All species were scarce. (Thorne)

YARNELL AND PRESCOTT. On June 21 Eurema mexicana,

Papilio bairdi, P. philenor, Nathalis iole, Hesperia ericetorum, Melitaea perse were common; Chlosyne californica, Asterocampa leilia, Melitaea thekla, Antigonus pulveruleuta, Strymon alcestis were all rare. (Thorne)

YUMA. In the Gila Mountains on Oct.27, Pyrgus scriptura, Strymon columella, and a few lycaenids were found, thirty days late for this section. (Thorne)

VERDE VALLEY AREA (D.L. Bauer). Last year's season summary left off with the very cold wave that hit most of the state on Nov.9. It was the only really cold spell that we had all winter. The weather proceeded to warm up soon afterward and by the last week in November Eurema nicippe and Pieris protodice were out in some numbers. They continued on the wing in the Verde Valley until the 27th of January when they were last observed. The last of January a storm hit the state that brought rain and snow and was the first good rain of the winter. After this storm it stayed cold and no butterflies were observed until the middle of March. This period from the last of January to mid March was also dry as well as cold. From the last of March through May, which is usually the time for the winter rains to taper off, we had good rains and at times rather heavy snow in the mountains. This precipitation was brought by a series of storms at about ten-day to two-week intervals. The last one came in mid May and brought considerable snow to the mountains. There were a few showers after this date but nothing heavy.

The usual dry spell came by June, just about a month late, and ran into the first half of July, with the summer rains a few weeks late. Once the summer rains got started they continued through the last week of July and August. The last few days of August brought a three-day storm that brought heavy rains to most of the state. Nearly four inches fell in the Verde Valley and up to six and seven inches in the mountains. After this heavy summer storm the rains continued at intervals throughout the rest of the year. September precipitation ran over an inch in the Verde Valley, as it did also in October; November rainfall dropped to .57 inches and in December is off to a good start.

The weather for the period can be summed up as follows: the winter was very dry and warm; early spring was dry and cool; late spring wet and cool; summer wet and warmer than the previous two years; fall wet and about average in temperature; early winter wet and a little on the cool side: no hard hitting cold waves but a gradual dropping of temperature.

Here were the effects of this weather pattern on the Lepidoptera. As was noted above, E. nicippe and P. protodice flew through December and January. During February and the first half of March no butterflies were seen and only very few moths. Early spring species were late and many of them well below last year's numbers. Lycaenopsis argiolus made a very poor showing, only a few specimens being taken, in marked contrast to 1950 abundance. Incisalia iroides dropped from being the most abundant spring species to very rare this year. Anthocharis sara also dropped in numbers as did Euchloe creusa and nearly all spring species except Melitaea gabbii sabino, which, if anything, showed a slight increase. Almost all skippers showed a decrease in numbers, several being absent. Among those taken a year ago but not this year were Pyrgus scriptura and P. philetas, Celotes nessus, Erynnis horatius, Caicella caicus, and Papilio polyxenes. Moths did not make too good a showing either; however Litocala sexsignata, which was very abundant last year, was also abundant this spring. There may have been a slight drop in numbers, but there were still thousands of them.

The rains that came in April and May brought out the late spring and early summer butterflies in unusual numbers, with a number of new records for the Verde Valley area. By mid April collecting was good and continued good through July. Melitaea and Euphydryas were out in good numbers. Anthocharis sara increased in numbers through April, as did L. argiolus. Incisalia iroides remained rare. New records for the Cottonwood area during late spring were: Strymon alcestis, Mitoura spinetorum, Erora quaderna, Strymon autolycus ilavia, Euptychia rubricata, Agraulis vanillae.

Collecting continued to improve through May and June, resulting in record numbers of species and record abundance for many species. On June 28-29 I kept a record of the species that visited a short series of springs in the canyon just above Jerome on Mingus Mt., and in the three or four hours total observation on the two successive afternoons a total of 40 distinct species of butterflies visited the damp ground for drinks; the surface of the water was covered with moths that had become bogged down. While I watched I saw many butterflies alight on this covering of moths that floated on the water. Some took off as the moths gave way under them, but not a few were bogged down as the covering gave way under them. I was too busy collecting and observing the butterflies to determine the various species of moths, but did observe that most of them were Geometroidea of many species. (Detailed notes are appearing elsewhere in the News).

During April to July nearly all species showed great increases in numbers, and, as stated above, many new records were obtained in the Cottonwood-Mingus Mt. area. The most outstanding increase in numbers was that of Limenitis weidemeyerii. Last year only three specimens were seen after much searching in remote canyons above 7,000 ft. on Mingus Mt. This year they were the most abundant butterfly at the springs and water holes down to 5,000 ft. all during June and into July. It seems almost impossible such an increase could occur in just one season. Another hard-to-understand occurrence was the sudden appearance of Strymon autolycus ilavia in considerable numbers, in fact it was the most common Hairstreak of the May-June season. Last year I searched diligently in the same area and in the identical locations and did not even see one. There were some species, that usually fly only after the summer rainy season, that came out in late June. For example Philotes enoptes dammersi, normal flight period September, was seen in June. The following species showed considerable increases over last year's flight: Euptychia dorothea; E. rubricata; Melitaea pola; Euphydryas klotsi; L. weidemeyerii; Asterocampa celtis; Apodemia nais (new record); Atlides halesus; Strymon autolycus; S. alcestis; Atrytonopsis deva; A. vier-

FIELD SEASON SUMMARY 1. SOUTHWEST - cont.

ecki, and A. pittacus. Most other species showed some increase, but a few were strikingly absent, namely: Papilio polyxenes; Euptoieta claudia - rare during spring and summer; Melitaea fulvia - one specimen only; Chlosyne lacinia and C. californica -very few; Polygonia satyrus -numbers reduced considerably; also Anaea andria, Plebeius melissa, Zestusa dorus, Yvretta carus did not appear all season; neither did Atrytonopsis python, while Megathymus yuccae remained almost the same as last year in numbers.

The usual low came the last of July and August. However, several species continued to increase: Papilio philenor, Colias eurytheme, Danaus plexippus, D. gilippus, Limenitis astyanax, Asterocampa celtis, and a few other of the commoner species.

The heavy rains the last few days of August had a spectacular effect of many of the species of butterflies. Many species immediately emerged and began to increase so that by the middle of September many species were out in great abundance. The increase in numbers continued through October in many species and in a few continued into November. Some that were not taken in the spring and summer or were very scarce are as follows: Euptoieta claudia made a tremendous gain in numbers in some sections after being almost entirely absent during the previous months; Eurema mexicana made a good gain after being scarce the first part of the season; both Danaus plexippus and D. gilippus made large gains in numbers, especially the former, which had been rare during the last year or so. Asterocampa celtis, Limenitis astyanax, L. archippus obsoleta, Anaea andria, Libytheana bachmanii, Hypaurotis chrysalus, Atlides halesus, Brephidium exilis, Hemiargus isolus, Philotes enoptes, Lycaenopsis argiolus, Cogia hippalus, Heliopetes ericetorum, Celotes nessus, Hylephila phyleus, and Lerodea eufala, all showed substantial increases over last year and over the spring and summer of this year.

A number of new records for the Verde Valley were obtained. September and October collecting turned up the following: Papilio bairdii rudkini, Melitaea dymas, M. perse, Nymphalis californica, Asterocampa leilia, (previous "A. leilia" records were A. celtis antonia).

But the most spectacular increase was that of Chlosyne californica. In all my previous collecting it has been a rarity, to be searched for in a few canyons at about the 4,000 ft. level; but during September and October they became, along with Euptoieta claudia the most widespread and abundant butterfly in the Verde Valley. The increase was not limited to the Verde Valley, for a trip to Yuma County the first of October showed them more abundant there than at any time during the four years from '46 to '50.

The most outstanding result of the late August rains was the appearance of an abundant second brood of Euphydryas klotsi! The Euphydryas are generally considered single brooded and the usual spring brood appeared the last of March, but the unusual fall brood was much more abundant than the spring one. This second one was not a freak local occurrence, for in five localities spread over a distance well over a hundred miles east and west they were out in mass numbers greater than in the spring flight. Since this genus is given to much geographic variation I checked thoroughly to see if the fall brood differed in any way from the spring as to color and markings and found no differences. Of course there is considerable variation in the spring brood but the variation of the fall brood was within the same limits. There was no decided tendency toward lightness or darkness, although there were many very light and very dark specimens taken. A total of about 200 specimens of the fall brood were taken so that any such tendencies could be observed.

Species that maintained about the same numbers this fall were as follows: Euptychia dorothea, Cercyonis meadii, Gyrocheilus patrobas tritonia, Phyciodes mylitta, Leptotes marina, Hemiargus gyas, Plebeius acmon, Pyrgus communis, Hesperia woodgatei, Hylephila phyleus, Atalopedes campestris, Megathymus polingi. The following were taken for the first time in the fall: Nathalis iole, Phoebis sennae, Nymphalis californica, Pyrgus philetas. Nymphalis californica was unusual in its fall occurrence in that instead of remaining at its usual range in elevation it was flying about the mesquite trees in the Verde Valley at about 3,500 ft. elevation. No migrating trend was observed.

The gradual cooling of temperatures with no sudden severe cold snaps prolonged the breeding of a number of species. A good example is Euptoieta claudia, which bred until late November; a few larvae taken into the house emerged in December. Also Limenitis astyanax was observed ovipositing in mid-November, well after the willow leaves had begun to fall. All butterfly collecting came to an end by the end of November in the Verde Valley.

OAK CREEK CANYON AREA. Collecting in the Oak Creek Canyon Area followed much the same pattern as that in the Verde Valley. Early spring collecting was much below last year's, but June and July were much above last year's collecting for the same months. May also was better than in 1950. The variation in numbers was about the same as mentioned above. Incisalia iroides after being out by the thousands last spring was down to just a few casuals this year; Anthocharis sara also dropped considerably in numbers; Lycaenopsis argiolus was on the "less common" list too. Late spring species showed increases: Euphydryas hermosa, Speyeria atlantis, and a number of skippers. In late June Thorne found Speyeria sp., Limenitis weidemeyerii, Euptychia rubricata, Epargyreus clarus, Emesis clio were abundant. Polygonia satyrus, Limenitis astyanax, Adelpha bredowi, Papilio multicaudatus, Thorybes mexicana, Poanes taxiles, Eurema nicippe, Lycaenopsis argiolus, Dalla pirus were common; Atrytone ruricola and Incisalia eryphon were scarce.

SOUTHERN ARIZONA (Ford and Martin). Between March 12 and 18, various spots in southeastern Arizona were visited. Very few insects were found due to a late spring and to lack of rain in January and February. Anthocharis pima was just beginning to appear on the very top of "A" mountain to the west of Tucson, as well as on the rim of Bear Canyon in the Santa Catalinas. Normally this species should be in full flight on this date. The weather had be-

come warm during the day but the nights were cold, which was not good for moth collecting. Madera Canyon in the Santa Ritas was dry and cool at 5,000 ft. Three specimens of Erynnis burgessi were taken in fresh condition, whereas the Nymphalis antiopa were old and worn. The vegetation was very dry with no leaves; the willows were just beginning to show some signs of life. Pieris sisymbrii, Asterocampa leilia and Incisalia iroides were taken in very small numbers. Just to the south of Mountain View in Pima County, on the Tucson-Benson road, a colony of Megathymus yuccae was located on Yucca baccata; eight pupae were taken in three hours' work. The pupae were brought back to Los Angeles, where two ♂♂ and three ♀♀ emerged within a few days.

Between July 28 and Aug.12 a second trip was made to Madera Canyon in the Santa Ritas to photograph insects in their natural environment. Collecting was just fair; normally at this time of year many species of moths should have been out as well as butterflies. However, it had been raining all over southeastern Arizona for over two weeks prior to our arrival, which caused a delay in the emergence of most species. Narthecophora pulverea was found quite commonly; in years past this species had been scarce. A large freshly emerged female Anisota oslari was taken. One male Citheronia splendens was was found in a gas station in Nogales, while collecting Chalcopasta acema, which was a rare find. Phyciodes picta was found in a worn condition near the Baboquivari Mts., whereas Apodemia palmeri were were just beginning to make their appearance; normally these two species are out at the same time. Sphinx australis, which is normally found at this time of year was scarce; in previous years this was the time when they are out in numbers. Celerio lineata larvae were out in vast numbers, crossing the roads in all directions and feeding on almost any plant they could get to. In September the moths were a pest at the moth lights at night.

Between Aug. 19 and 26 a third trip was made to the different mountain ranges of southeastern Arizona. It was surprising to find the vegetation so green; all the way from the Chiricahuas in the east to the Baboquivaris in the west the wild flowers were in bloom, the grass tall and green, and the insect life spread all over the desert. Normally the summer rainfall in the desert areas is not as heavy as it was this year. This caused the populations of insects to spread out and the collecting was not as easy as in the past years when the populations were confined to canyons where it was moist and cool. In the Chiricahuas it was of interest to find very little rain had fallen on the east side of the mountains whereas on the west side the rainfall was above normal, and the insect population was accordingly so.

On the last collecting trip of the season, between Sept. 2 and 17, the Santa Ritas, the Patagonias, and the Baboquivaris were visited. Collecting was good, in most cases above normal. By this time the summer rains had tapered off and the fall insects were out in numbers. Apodemia palmerii was very common, more so than in years past, whereas Strymon leda was notably absent. Atlides halesus, Polygonus amyntas arizonensis, Danaus gilippus, and Eurema nicippe were some of the species taken commonly there. T. W. Davies was fortunate enough to get a freshly emerged Papilio ornythion in the lower part of Madera Canyon. Papilio cresphontes was not seen. A fresh male Eurema dina was taken, also in the lower part of Madera Canyon, by Martin. One male of Asterocampa subpallida, which is supposed to be endemic to the Baboquivaris, was taken by Ford, also in lower Madera Canyon. Davies and Hammer took 58 species of butterflies in two weeks at Madera Canyon, which shows the butterflies were out in large numbers. Eurema proterpia and gundlachia were scarce; normally they should have been out in numbers at this time of the year. Gyrocheilus tritonia were out in their usual large numbers above 6,000 ft. for about ten days, beginning on Sept. 8. In the moths, Antaplaga hachita and sexseriata were taken as was Hemioslaria pima, all very rare. Grotella binda, G. sorar, and Lythrodes radiatus were out for only a very short period. Cargida pyrrha was conspicuous by its absence; in years past it has been common, as has been Neumoegenia poetica.

In conclusion, the southern Arizona season was late in getting started, with more rain than usual in the lower flat lands during the summer. Due to the heavy rains the butterflies and moths were not confined to canyons as they have been in the past, and collecting was more difficult. It might be stated that this was one of the best seasons seen in the past 20 years of collecting in southern Arizona.

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2. NORTHWEST - OREGON, WASHINGTON, IDAHO, BRITISH COLUMBIA

by John C. Hopfinger
Brewster, Washington

[The scattered reports are not sufficient to indicate general trends; the severe summer drought affected most areas, but particularly Vancouver Island, where the dryness was unprecedented, and led to widespread forest fires and the closing of the forests to travel. The effect on the fauna appears to have been mixed, some species being depressed, but many scarce species being taken in unusual abundance. E.G.M.]

OREGON (Macy)

In western Oregon and Washington the winter had somewhat colder than average weather, but the summer was unusually warm and dry with cloudless skies until late September.

Both Papilio rutulus and P. eurymedon were

FIELD SEASON SUMMARY 2. NORTHWEST - cont.

scarce in western Oregon but a good many were seen on the islands of Puget Sound. Parnassius clodius also appeared to be less abundant than usual and there were fewer Anthocharis sara. Coenonympha tullia ampelos and Phyciodes mylitta were much less abundant in the Willamette Valley than usual. A rather fresh specimen of Adelpha bredowii was seen near McMinnville, Oregon, in October.

On the east side of the Cascade Mts., in central Oregon, there were considerable numbers of Lycaeides argyrognomon ricei in appropriate places and a few specimens of Plebeius shasta were captured. A number of Polygonia zephyrus were flying but very few Nymphalis californica were seen in the mountains and none elsewhere. Observations were more limited than in most other years.

WASHINGTON

EASTERN AREA (Frechin). An unusually warm and dry spring apparently contributed in part to some unusual population fluctuations in the diurnals. Species that overwinter in the pupal state appeared to show a decline in adults. Species apparently affected most were the spring emergers. Far below normal were Incisalia polios, I. eryphon, Callophrys dumetorum, Lycaenopsis argiolus, Glaucopsyche lygdamus columbia, Plebeius icarioides blackmorei. Species that appeared to benefit by the dry spring all pass the winter in the larval stage. A tremendous increase was observed for Parnassius clodius. Speyeria cybele pugetensis and Boloria epithore were more abundant than usual. The Hesperiidae appeared unaffected by climatic influences, with only Polites sonora showing a population decrease; only Epargyreus clarus was seemingly out in more than normal numbers. All Papilio continued to be scarce. The other diurnals had a normal season. Nymphalis californica and N. milberti were very rare. The above applies to spring collecting only. No collecting was done in the higher altitudes.

In the Tenino Prairie Euphydryas editha again appeared in tremendous numbers. A long series of Polites mardon was taken, but the males were badly worn. Four Hesperia juba were taken at the time, May 30. In June and July, Speyeria cybele pugetensis, S. zerene, and a fine lowland Hesperia, near hulbirti, was taken in good quantity. All other diurnals appeared to be in normal numbers.

In the Olympic Mountains collecting was confined to the lower levels near Lake Cushman. A long series of Mitoura nelsoni was taken where only a few examples were seen the previous year. M. johnsoni was a bit more in evidence, but still scarce. It is interesting to note that Incisalia eryphon and I. polios were quite common here, although scarce in the Basin. The precipitation is of course much heavier in the rain forests. All other diurnals were scarce as usual. Only the Mitoura and the Incisalia are actually residents of the dense rain forests, although species preferring untimbered or partially timbered areas, are established on the fringes of the forest.

PHALAENID COLLECTING AROUND WALLA WALLA (Cook). After early fall frosts, November was above normal in temperature. The winter and spring were about normal, but the summer was very dry. Moth collecting was about as poor as in 1950, and the average of 31.6 moths per night was next lowest in 7 years of operation.

Of 47 common species, 13 were higher than in 1950 and 17 lower. The rest showed no appreciable change. Of the very common forms, Euxoa messoria, E. septentrionalis, E. atomaris, Xylomiges rubrica and Autographa californica were much above normal, while Feltia ducens, venerabilis, Graphiphora c-nigrum, Scotogramma trifolii, Mamestra configurata, Lacinipolia stricta, Leucania farcta, Crymodes devastator, Platyperigea extima and Caenurgina erechtea were below normal in numbers.

Unusual captures included 4 specimens of Euxoa infracta and 1 of Prodenia praefica, the last of which has not been captured for several years.

The cold winters of 1948-49 and 1949-50 held down Heliothis obsoleta for two years, but the larvae were very abundant in late corn this fall. Schinia sexplagiata, of which as many as 1800 have been taken in some seasons, was absent entirely this year.

Cutworms reared from several locations in central Oregon turned out to be chiefly Euxoa septentrionalis, which is rarely, if ever, recorded as economic. The larvae were feeding on alfalfa in all cases.

NORTH-CENTRAL AREA (Hopfinger). The winter of 1950-51 was fairly mild, with a week's zero weather about the end of January. About the middle of March the hillsides along the river valleys were bare of snow. By the first week of April, such early species as Pieris sisymbrii, P. beckeri, and P. occidentalis were well out, reaching their peak about the middle of May. Euchloe creusa, E. ausonides, and Anthocharis sara also showed up in the normal (rather small) numbers. A cold spell about the end of April, when the temperature went down to 16° F., retarded the flights to some extent. About the first week in May all Papilio were on the wing, showing some increase over previous years, but not reaching their former abundance. P. oregonia, the one exception, showed up as well as last year, especially in the second brood. All Lycaenidae were fairly plentiful, and could be found in their usual habitats. Euphydryas anicia and Melitaea sterope were much less in evidence than in previous years. Nymphalis californica and milberti were scarce compared to last year. N. antiopa showed an increase but is never common here. By the middle of July Speyeria were plentiful, S. zerene garretti more so than in many years, with meadii a close second. The small creek valleys along the Methow River showed in general a bigger population of butterflies than in a good many years. In the higher altitudes of the Cascades, at some 4-5,000 ft., during the middle of June, hibernating Polygonia were very com-

mon, some being in excellent condition. During September at the same place very few showed up. In the same localities Euphydryas anicia and Boloria epithore, usually common, were absent. Very few Lycaenidae were seen. A few Colias edwardsi were taken; they were scarce as usual. At about 7000 ft. Erebia vidleri were old and shabby by the end of July, and were scarcer than normal. Speyeria mormonia was abundant, as well as Boloria titania rainieri. Oeneis chryxus was old by that time, and not worth taking. Colias interior was flying in good numbers, about as usual. No Parnassius were seen at all in these places, where formerly a dozen or so could be obtained in one trip. During the first week of August along the San Poil River a good many Neophasia could be seen in the tops of the pine timber, but none came in reach of the net. Cercyonis baroni and sylvestris showed a decrease compared to last year, while C. oetus could be seen in better numbers. Phalaenid moths were scarce, for the second year, and very few were taken at light. As whole, the year 1951 seemed to be a "normal" year.

Frechin reported that along the Wenatchee River, Chelan County, several days' collecting even under overcast skies, was still productive. A good series of Papilio indra was taken, on moist spots along the river and the highway. P. zelicaon was scarce, but P. eurymedon and P. rutulus were fairly common. The most common species observed was Plebeius icaroides, which gathered in quantity on moist spots, and were easily taken. A nice series of Colias occidentalis was also taken. This species was rare in 1943. Only three Pseudohazis eglanterina were seen. Polygonia were also scarce. Speyeria zerene was seen, but not captured.

IDAHO

PHALAENID COLLECTING AT TWIN FALLS (Cook). As in former seasons, Mr. J.R. Douglass operated a light trap at Twin Falls during the 1951 season. The average catch per night was the lowest in the 7-year period of operation, being 9.8 moths per night.

Of the 45 common species, 5 were less abundant than in 1950, 4 were more abundant. Moths whose populations are increasing are Euxoa olivia, E. cicatricosa, Crymodes devastator, and Anagrapha simplex. Among those with decreasing populations were Euxoa ochrogaster, which was an economic pest in 1950 and 1951, Feltia ducens, Lacinipolia stricta, and Proxenus miranda nitens.

Unusual captures were 1 specimen of Schinia cupes, 1 of Euxoa andera, 1 of Agrotis orthogonia, and 31 of Loxagrotis albicosta. The last species is somewhat of a problem on beans in that area, but rarely comes to light. More specimens were captured this season than had been taken altogether before.

BRITISH COLUMBIA

SOUTHERN VANCOUVER ISLAND (Guppy). Weather: The 1950-51 winter was close to normal. The only unusual feature was a short cold snap with some snow, at the beginning of March. As some early moths had been flying for two weeks before that, they may have been adversely affected. The spring and summer were marked by a very extraordinary drought. No rain at all fell in April, an unheard-of condition in what is usually a wet month. May rainfall was about normal. The drought set in again in June, and continued, except for one short break in July, until nearly the end of September. The most noticeable effect of the drought was a scarcity of many common moths. Butterflies, on the whole, were good. All species were out very early, but soon became worn, no doubt as a result of their being on the wing every day. It seems necessary to include here some mention of the changing conditions on Vancouver Island. It should be borne in mind that until quite recently V.I. was largely overgrown with dense rain-forest. In such an environment few butterflies can thrive. The first, and most extensive, change occurring on arrival of civilization is the logging and burning over wide areas. Later, a small part of the land is put under cultivation. Roads also provide many miles of ideal conditions for butterflies. It appears certain that clearing operations in this district are causing a very noticeable annual increase in many Lepidoptera. Most seemingly affected are Speyeria hydaspe, Boloria epithore, Carterocephalus palaemon, Euclidina cuspidea, and Caenurgina erechtea.

Following are more detailed notes on some aspects of the 1951 season: Papilio zelicaon continued to show marked increase, though it was not yet common. Parnassius clodius was very common for the third successive season. A most interesting note is the discovery of a colony of P. smintheus at 5000 ft. near the top of Mt. Arrowsmith. F.M.Brown says of specimens sent to him that they are not distinct from specimens from the type locality (Banff, Alta.). Neophasia menapia is barely holding its own. A fair number of somewhat worn males were found in July and early August. Later, when the females should have appeared, there were none of either sex seen. Oeneis nevadensis, true to form, did not show up at all. A visit to the southern end of the Island, in late April, found Euphydryas taylori very abundant. Another trip late in June turned up large numbers of Coenonympha inornata. Since I have not collected in this area before, I cannot compare with previous years. Speyeria hydaspe, from being a rather scarce species, has become nearly our commonest butterfly. Except on the West coast, and in the vicinity of Victoria, they were around wherever I collected, from sea-level up to 5000 ft., from early June until late August. Boloria epithore also continued on the increase. Of Nymphalis antiopa worn spring and summer specimens were much commoner than usual; few autumn individuals were noticed. Mitoura nelsoni, which I took occasionally in 1950, was not seen at all. Hesperiidae were plentiful; C. palaemon has in recent years become a common species near my home, probably due to grass growing on burnt-over land. A fairly large Sphingid, noted on several occasions flying in early morning and late afternoons, may herald the return of the Celerios. Unfortunately, I was not able to net any. My brother took C. lineata at Vancouver City and on the western coast of Vancouver

FIELD SEASON SUMMARY 2. NORTHWEST - concl.

Island. On the other hand, two battered specimens given to me by a neighbor appear to be Sphinx pereleganS, a species never common here. Smerinthus cerisyi was scarce after two years of comparative abundance. No Saturniidae were seen. Isia isabella and Diacrisia virginica have nearly disappeared after being pests in the light traps for several years. Diacrisia pteridis showed an increase after being nearly absent for four or five years. Arctia caia occurs sparingly, showing no ill effect of the drought. For the third successive year Phalaenidae in the main were unusually scarce. It is notable that I collected more species new to me than in previous years, although a yearly falling off would be expected. This suggests that some rare species were favored by the drought. Several specimens of Catocala were taken, probably all aholibah. In former years I was able to get only one. Phalaenidae captures of special note were: Polia radix, Zanclognatha jaccnusalis; Protagrotis obscura; Oncocnemis dunbari; O. youngi; Fishia discors; Pleroma obliquata. Caenurgina caerulea is increasing on an almost exact parallel with Euclidina cuspidea, and flies in the same localities. In Geometridae, Erannis vancouverensis was quite common at light in November, not having been taken before.

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Contributors: W.C. Cook; D.P. Frechin; R. Guppy; R.H. Macy.

3. ROCKY MOUNTAINS - NEW MEXICO, UTAH, TO ALBERTA

by Donald Eff
Boulder, Colorado

The report for the Rocky Mountain area this year is somewhat sketchier than usual, due to the failure of several of the resident collectors to submit their observations.

The winter of 1950-51 apparently was about standard in the northern half of this area, with the Continental Divide in the vicinity of Denver, Colo., receiving its heaviest snowfall in 53 years. However, over the Continental Divide on the Western Slope in Colorado the snowfall was only about normal in the higher mountains and the lower valleys were exceptionally dry and cold. To the south things got hotter and drier (southern Colorado), culminating in the drought conditions that plagued New Mexico to such an extent that it was necessary for that state to declare a state of emergency. The semi-arid conditions in New Mexico, followed by cold, retarded greatly the appearance of what spring species were to appear. In Colorado and Wyoming inclement weather during May and June retarded appearance of species due then. In fact, over the entire season, the majority of species were from one to two weeks behind schedule. No report was received for Alberta.

MONTANA

Neil Euting of Nashotah, Wisconsin, did some traveling in this state, and is the only collector to submit any report of conditions there. He was somewhat hindered in his collecting (aren't most of us?) by the pursuit of his occupation. He did have some excellent collecting in May in the vicinity of Missoula and Billings. The balance of the season found him more often than not the victim of the whims of the weather whenever the chance to collect did appear. This is a common malady among resident collectors of the mountainous areas. Apparently Euphydryas anicia was common throughout the majority of its range this year. Charles and Jeanne Remington remarked concerning the number of Checker-spots when they were enroute to San Francisco during June, and they offered the opinion that perhaps the reason that collectors don't take more of them is because they wait until later in the season when more species are in flight before taking trips through this area. Euting found them quite numerous in the vicinity of Missoula, during the latter part of May. Also taken were a good number of Plebeius icarioides, Glaucopsyche lygdamus, and Oeneis uhleri.

UTAH

W. Levi Phillips reports from the Salt Lake Valley and neighboring canyons of the Wasatch Range that spring temperatures averaged 3 to 5 degrees colder than in 1950, and that there were more rainy days. Many butterflies were late in appearing. Examples of earliest records are:

	1951	1950
Papilio zelicaon	May 25	April 18
Papilio multicaudatus	May 26	May 17
Papilio rutulus	May 21	May 16
Vanessa cardui	May 29	April 11

Danaus plexippus was scarce until Sept.2, when the southern migration began, continuing until Oct. 7; Nymphalis antiopa and N. milberti were scarcer than usual; N. californica was scarce; Vanessa atalanta was absent, as in the past several years; Limenitis weidemeyerii was in its usual numbers; Adelpha californica was absent, as in 1950. Papilio rutulus, P. eurymedon, and P. multicaudatus were scarcer than usual; P. zelicaon was more numerous than usual; 2 specimens of P. indra were taken. Parnassius were in normal abundance. Speyeria callippe were more abundant than usual, other species of the genus scarcer. In general the year was a poor one, but better than 1950.

On September 20 at St. George, southern Utah, the air was orange with Colias (eurytheme?); Chlosyne lacinia was present.

WYOMING

The only report from a resident collector in Wyoming is from Duke Downey, at Sheridan at the edge of the Big Horns. His report for conditions in that area is similar to that of Euting in Montana, i.e., cloudy and cool in June, with July producing some fair collecting. Speyeria showed a definite increase there. Papilios and Colias were very poor. Lycaenidae were spotty. In the moths, Catocalas were few, but there was an epidemic of one of the smaller moths (unidentified). Downey did not get a chance to collect the alpine terrain, but the Remingtons made a brief visit to the Big Horn Mts. on June 14-15. They found Euphydryas anicia and Colias philodice very abundant and fresh, with ♀♀ rare; two larvae of E. anicia were found parasitized by large Ichneumonidae. Glaucopsyche lygdamus was past its peak, but Plebeius saepiolus and Erebia epipsodea were just emerging. Overwintered Nymphalis antiopa and Polygonia spp. were numerous. On the western slope a Hesperia was numerous, the ♂♂ worn, the ♀♀ fresh. Lower down, at middle Tensleep Canyon Anthocharis sara (both sexes), G. lygdamus, and Plebeius icarioides were numerous and fresh. E. epipsodea (♂♂), Lycaenopsis pseudargiolus, Pyrgus ruralis, Limenitis weidemeyerii, and Hesperia sp. were fresh but scarce. Battered N. antiopa were remarkably common. Much lower in the Canyon, at the Fish Hatchery, there were several E. epipsodea, Coenonympha tullia, and Euchloe ausonides, the latter commonly ovipositing.

Near Upton, Weston Co., on June 13 they found Colias alexandra, E. anicia, C. tullia, Phyciodes tharos, and large numbers of Coloradia sp. all just emerging.

On June 16 in the Jackson Hole the Remingtons reported A. sara, E. ausonides, Pieris sisymbrii, C. philodice, Papilio rutulus, C. tullia, E. epipsodea, G. lygdamus, P. icarioides, P. saepiolus numerous and fresh. Incisalia eryphon, Mitoura spinetorum, Lycaena snowii, and Callophrys sheridani were much scarcer and worn. Pieris napi and Callophrys (affinis?) were fresh but scarce.

Across the Teton Mts., in Teton Canyon, they found P. napi, A. sara, E. ausonides, L. pseudargiolus, Erynnis spp., and I. eryphon were fresh and abundant. P. rutulus and P. (brucei?) were fresh and in fair numbers. Overwintered N. antiopa, Polygonia hylas, and P. satyrus were present. Malacosoma larvae were rather numerous.

COLORADO

Our reports from this state come from few collectors. Rev. Rotger, who moved to Pagosa Springs from Durango, was collecting for the most part in new territory and was handicapped in his report because he was therefore unable to make any comparisons; also his collecting schedule was irregular this year. Minor sent an excellent comprehensive report on collecting conditions in Mesa County in the west-central sector. The only other area to be reported is the north-central area, from which comes the author's report. He is joined in the report for this area this year, with some excellent observations made by Leuschner of Oak Park, Illinois, and the Remingtons. Mr. Leuschner's report on the moths is particularly gratifying. He collected in Colorado from July 14 to 23.

NORTHWESTERN COLORADO. The Remingtons collected here on June 29. Near Mt. Harris, Routt Co., the outstanding captures were 5 ♂♂ (worn) of Satyrium fuliginosa. Species which were abundant and fresh there were: Pieris protodice, Colias philodice, Oarisma garita, Lycaena helloides. Vanessa cardui, Pieris rapae, Pyrgus communis, and Speyeria sinope were fresh but scarcer. Coenonympha tullia and Plebeius icarioides were abundant and worn. In the famous locality on the western slope of Rabbit Ears Pass, Boloria toddi was again found. ♂♂ of Speyeria sinope and S. atlantis were just emerging, and no other species were seen. Papilio eurymedon and P. rutulus were common and fresh, as usual. Only one Limenitis weidemeyerii (a ♀) was found, where the species normally abounds. In great abundance were Lycaenopsis pseudargiolus, Everes amyntula, Thorybes sp., and Phyciodes gorgone. Less common, but fresh, were C. tullia, Glaucopsyche lygdamus (some worn), P. icarioides, Erynnis spp., Euchloe ausonides, Pieris napi. Several Anthocharis sara (worn ♂♂) were found. In Grand County, six miles east of Muddy Pass, where Boloria toddi was first taken in 1949, a fresh B. toddi was found, as well as several fresh E. epipsodea, C. tullia, and P. icarioides and a cluster of young Pseudohazis larvae.

WEST-CENTRAL COLORADO (Mesa County). The winter was cold and dry with little snow at the lower altitudes, but about normal at the higher elevations. Spring species in the lower elevations appeared about on time - the first of April. But then, instead of the weather warming gradually, the temperature remained at about the same level and then began to get colder, resulting in the failure of flora to develop, drying up the grass, and retarding the appearance of insects. As a result, the spring collecting, which started out promisingly enough with the appearance for the first time in years of Megathymus yuccae coloradensis, was a dismal failure, with even the two most plentiful species, Melitaea acastus and Euphydryas anicia below average, and many of the other usual species, such as Melitaea fulvia, Phyciodes barnesi, Pieris beckeri, P. occidentalis, and P. sisymbrii entirely missing. A few Euchloe ausonides did show. Papilio were practically non-existent; only two badly damaged indra minori were seen, and only a few P. rutulus. Plebeius melissa was in the same class with the Papilios, and Limenitis archippus and Epargyreus clarus, both of which are usually plentiful, failed to appear. Along about the middle of June the weather jumped from cold spring into a very hot and dry summer, also not beneficial to the various butterflies. However, Cercyonis masoni was seen in fair numbers at its type locality, Spring Canyon, and also in Pyramid Canyon. It appears the last of July and first part of August. Two species turned up in abundance, Coenonympha tullia ochracea and Parnassius smintheus. C. ochracea apparently was making a comeback after a two-year near-oblivion period, and Parnassius, usually scarce there, was abundant for the first time in

FIELD SEASON SUMMARY 3. ROCKY MTS. - cont.

the history of Minor's collecting. Oeneis chryxus was back after a three year absence. Skippers as a whole were very, very poor. Moths were about as scarce as the bulk of the butterflies, some like Smerinthus cerisyi, Hemaris thetis, Gnophaela vermiculata, and Nemeophila plantaginis were entirely absent. Even Plataea trilinearia was quite rare. In review, Minor considers this the poorest season for collecting since 1925, at least in the lower elevations. He had no opportunity to collect in the alpine areas.

NORTH-CENTRAL COLORADO. In this section I am assisted by the report of Leuschner, who collected on several of the mountain passes in this general area, and the Remingtons. Also, I was privileged to collect for short periods in the company of B.H. Weber of Burbank, California, and H.A. Freeman of Garland, Texas, both of whom visited here for a few days. Weber came through Utah and took some nice material, but apparently did not get it all identified in time to submit a report. When he left here he went via Glenwood Springs and then south to Ouray and Silverton, with no good collecting being encountered along the way. Freeman went straight south from Denver to New Mexico. Aside from what he collected around here, he noted in his report that Strymon godarti was fairly common in the vicinity of Colorado Springs. Mention of his other captures will be made from the corresponding area through which he travelled. The peak of the collecting was past at the time of his arrival August 12, but it was a revelation to me to see a real skipper man pick them up where I never even saw them. Near Tolland he took a pair of one not too common here, and which was new to me, Polites sonora utahensis.

On the eastern side of the Rockies we had a late wet spring. Collecting, ordinarily beginning the first of April, did not start until the 27th of that month because of late snows and spring rains. Even then there were only a couple of good days and then more inclement weather that delayed things until the second week of May. However, from that point on, with the abundant moisture that produced a profusion of flowers and covered the land with a carpet of green, collecting was better than for several years. Euchloe olympia was quite common for the first time. Others present at this time of the year in more than normal abundance were: Callophrys apama, Oeneis uhleri, Plebeius icarioides, Phaedrotes piasus, and Erynnis afranius. Callophrys sheridani seemed to be about the only casualty and this was undoubtedly due to the inclement weather during the first two weeks of April, its normal flight period. Encouraging signs were noted in the reappearance of a few Incisalia schryverii, a slight increase in the scarce iroides, better than average numbers of Pieris sisymbrii, the reappearance of Phyciodes barnesi, and the first capture of Incisalia polios in the Boulder vicinity. Anthocharis sara was still very scarce, only a couple being seen. Philotes enoptes had a very good year, as did Euphydryas capella. On June 24 I started for the bogs at Tolland only to find the bridge washed out, so went to Caribou to see if I could find there Boloria frigga sagata; I saw and caught one very fresh specimen, but was amazed to discover B. freija out in some numbers. However, nearly every specimen was worn, with only a couple of the females appearing in good condition. The fact that B. freija apparently appears prior to B. frigga sagata (at least at this altitude), which is generally regarded as the earliest of the higher elevation Boloria, came as a distinct surprise, and goes to prove that it is well to go to your favorite haunts at other than the usual time. I had found B. freija before, but only at higher elevations and at a later date.

The collecting below 9000 ft. continued to be fairly good during June with an increase in nearly everything except Speyeria halcyone and Limenitis weidemeyerii. Speyeria meadii was more plentiful than I've ever seen it, and S. edwardsii was seen in some numbers again after a two year absence. Skippers numbers were pretty good, with Hesperia viridis, Atrytone ruricola, Oarisma garita, Polites themistocles, and P. manataaqua among the most common. Melitaea palla was still scarce and M. arachne continued to be entirely absent. Not since G.W. Rawson and I found a second brood in 1948 have I seen an arachne. Remington took a fresh ♂ Asterocampa leilia on July 2. The alpine collecting, which begins in July, might have been fair had it not been for the strong winds that continually plagued the tundra. Many of the species could have been in more abundance than was indicated by the number of specimens seen, because the wind was blowing so hard that it was almost impossible for any species to fly. Leuschner collected on many of the passes in the vicinity, on most of which I was unable to collect. In Rocky Mountain National Park he found Cercyonis oetus abundant, as it was at Boulder. Others that he found common in the meadows of the lower elevations were Colias alexandra, Parnassius smintheus, Lycaena heteronea, and Coenonympha tullia. He also found Plebeius acmon common there, a condition not found in the immediate Boulder vicinity. Pseudohazis sp. also commenced to fly in the meadows there on July 21. In the higher elevations, near Tyndall Glacier he found Colias meadii quite common, as it appears to have been throughout most of Colorado. Erebia magdalena was about as numerous as usual, and just as impossible of capture. He also found Euphydryas eurytion near Hallett Peak, a species that I did not see at any of the other alpine collecting areas that I visited. He also found Oeneis (not yet positively identified) which are probably lucilla or brucei, or both, fairly common near Tyndall Glacier and again at Loveland Pass. The spots that I visit annually in search of Oeneis, Mt. Evans, and Niwot Ridge near Navajo Peak, showed them still entirely absent, as they have been for the past couple of years. Weber and I found Plebeius shasta minnehaha plentiful at timberline on Niwot Ridge in spite of gale-like winds. Later I discovered a larger colony of them near James Peak in Boulder County. Leuschner had good collecting near Breckenridge with Erebia epipsodea, Lycaena helloides, Pieris napi, and a number of the Blues. The Blues as a whole seemed to be greatly increased in numbers this year. L. helloides I also found plentiful while collecting at Tolland with Freeman, but P. napi and E. epipsodea were nearly absent. The

disappearance of these last two is probably the result of a flood that swept the bogs at Tolland. On Hoosier Pass, Leuschner found Erebia callias and Boloria helena abundant. Also there seemed to be quite a few B. freija there. In the lower elevations, Speyeria hesperis and S. ethne were common, as was Cercyonis olympus. Strymon saepium was more plentiful than for a couple of years. Strymon melinus atrofasciata put in its appearance after an absence of several years. The season closed with Hesperia ottoe pawnee and Phyciodes camillus about normal in numbers.

In the moths I am indebted entirely to Leuschner for the only report, an excellent one. Celerio lineata was uncommon this year. He collected in Big Thompson Canyon at the Park entrance, at Fall River campground, near Loveland Pass, and just above Breckenridge. About 95% of all moths collected were Geometridae or Phalaenidae. There were a few Arctiidae, 4 species of Notodontidae, and 9 species of Lasiocampidae. Breckenridge supplied 4 specimens of Apantesis determinata, Malacosoma americana, Nemeophila plantaginis (very common), many Phalaenids, no Catocala, and many Geometridae, mostly of the Larentiinae. About 250 moths were taken each night of the two spent there. Nothing different was taken below Loveland Pass, and only a total of about 30 specimens in all. Fall River had some species not taken elsewhere (C. perlata, for example) but only a total of about 30 specimens. Big Thompson was quite different from the other three places. Hesperumia sulphuraria, Epiplatymetra coloradaria, and Apantesis nevadensis were the commonest. The only other Arctiid was Arachnis picta. No Sphinx or Notodontidae were found.

A brief résumé of the various species by genera seems to show the following for this area of Colo.: Papilio poor (although the Remingtons found P. indra, P. multicaudatus, and P. rutulus numerous on July 1); Parnassius better because of the return of hermodur to the highest elevations; Anthocharis sara nearly absent; Euchloe good, as were the Colias; Neophasia menapia very poor, but better than at any time since 1948; Pieris about normal, poorer in a few places; Danaus plexippus more common than previously; Coenonympha very good; Cercyonis good; Oeneis spotty, rather poor as a whole; Erebia poorer than usual, with E. magdalena and E. callias the only species to hold their own; Speyeria definitely on the increase, aside from S. halcyone, always scarce here. Boloria freija was more common than usual, B. frigga sagata very scarce, B. helena common, B. selene scarce, B. eunomia alticola not too plentiful; Euphydryas very good for capella and apparently the same for E. eurytion, at least in the right spots. Melitaea poor, with M. arachne absent. Phyciodes about normal except tharos; Polygonia scarce; Nymphalis and Vanessa normal; Limenitis weidemeyerii poor, very few being seen; Apodemia nais, reappearing in small numbers; Strymon fair, aside from titus and californica; Mitoura with M. spinetorum missing entirely and several fresh M. siva on July 1; Incisalia, improving, but very little, with the exception of I. eryphon, which remained common; Lycaenidae: about normal, with the Blues having an excellent year. Thorybes not too common; Pyrgus centaurae and communis, both fairly common; Erynnis good, especially afranius and pacuvius; Butleria scarce, as usual; Oarisma garita abundant; Copaeodes minima not seen; Hesperia good, with uncas and viridis showing the largest gains; Ochlodes poor; Polites very good; Poanes taxiles rather scarce; Atrytone ruricola plentiful; Amblyscirtes scarce.

SOUTHERN COLORADO (Rotger). The collecting does not appear to have been of the best because for the second consecutive year it was very dry, and it undoubtedly did have a definite effect on both the numbers and species to appear. Collecting started in May and several Incisalia eryphon were taken, but only a couple each of Callophrys, Pieris napi, and Anthocharis sara. In June at Mesa Verde he found one Megathymus yuccae, and only a couple of others such as Papilio multicaudatus, Melitaea acastus, Phyciodes barnesi, and Euptychia henshawi. The last part of June Rotger collected at South Fork where he took several Megathymus streckeri, a few Eumenis ridingsii, and Oeneis chryxus. Euphydryas carmentis and Speyeria edwardsi were taken near Pagosa Springs. In July and August he found several specimens of Speyeria cybele carpenteri, S. atlantis, and S. mormonia. Boloria selene was common at one place. He also took Strymon sylvinus, S. titus, Tharsalea virginiensis, some Lycaena rubidus, Apodemia nais, and noted a fair number of Danaus plexippus. Polygonia and Neophasia menapia were scarce here also. In the La Garita Mts. he found Parnassius smintheus, Erebia epipsodea, and one Callipsyche behrii. North of Slumgullion Pass several Colias meadi were taken, as well as Erebia callias and Parnassius. No Oeneis lucilla were even seen. About the middle of August H.A. Freeman collected through this area on his way back to Texas and found Strymon godarti in the vicinity of Raton Pass. Here also he took Strymon titus, which apparently was more plentiful in the southern part of the state than elsewhere, Pholisora mejicanus, Hesperia harpalus ochracea, Pyrgus communis, and Epargyreus clarus. P. mejicanus was also taken near Trinidad as well as one specimen of Apodemia mormo.

NEW MEXICO

Our report for this state comes mainly from O.D. Standard of Belen. Freeman, still on his way back home, found one specimen of Oarisma edwardsii at Jemez Springs and found Hesperia uncas rather common in the eastern section of New Mexico. Conditions in New Mexico, as previously mentioned, were very poor because of the drought. The very mild winter, with cold, late spring made collecting conditions unfavorable until near the middle of July. During this period even the common species failed to appear. Everything was very late, but a number of species were found which had not appeared for a year or two, among them Nathalis iole, Chlosyne lacinia and Phyciodes tharos. Phoebis eubule also appeared after an absence of three years. Libytheana bachmanii became scarce after last year's large numbers. Celerio lineata was plentiful here. Sphingidae and Catocala were scarce. Papilio polyxenes made an excellent showing this year. Always present in low numbers, this year it was common. Collecting for the season though, was very poor.

FIELD SEASON SUMMARY 3. ROCKY MTS. - concl.

NOTES OF SPECIAL INTEREST. New Mexico was invaded by hordes of caterpillars, (apparently Sphingidae) numbering in the millions. At one place they were believed to have a 20 mile "front". They made Highway 66 slippery and dangerous for driving because of their crushed bodies; they ruined the motel business in a few places and brought out the forces of the city and county departments to do them battle. Most of the concentration was in the vicinity of Albuquerque. From newspaper photographs they were apparently Celerio lineata.

Phoebis eubule, taken only occasionally in Colorado, was seen in more numbers this year than at any time previously. Standard reports their reappearance in New Mexico after a three year absence. Rev. Rotger saw several in southern Colorado, Leuschner saw one on Hoosier Pass, and I saw several in Boulder County, on the foothills of the Front Range, at Tolland, and at Caribou. I have one specimen captured on the top of Arapahoe Pass at an altitude of 11,500 feet.

The famous bogs at Tolland received a further serious set-back this year when high waters during the middle of June flooded the area. To top it all, the dam of man-made Teller Lake in Mammoth Gulch above the bogs burst and further inundated the area with a solid wall of water, depositing a layer of silt over everything and washing out many places, uprooting trees, washing out bridges, roads, making a general mess of things, and probably ruining collecting for several years to come.

The most unusual records for these states were: Downey's Wyoming Catocala manitoba; Rotger's Libytheana bachmanii; Remingtons' Asterocampa leilia and Satyrium fuliginosa; the several Phoebis eubule, and Renk's specimens of Oeneis jutta reducta from near Fraser, Colorado.

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Contributors: D. Downey; N.A. Euting; H.A. Freeman; R. Leuschner; W.C. Minor; C.L. and J.E. Remington; J.J. Renk; B. Rotger; O.D. Standard.

4. GREAT PLAINS - TEXAS AND EASTERN PLAINS OF ROCKY MTS. STATES TO SASKATCHEWAN AND MANITOBA

by H.A. Freeman
Garland, Texas

In the southern part of Area 4 the spring was characterized by being wet and rather cold; however, the summer was marked by a very severe dry spell that lasted into the fall. The southern part of Texas had very little rain at all during the summer and thus the butterfly population suffered. Conditions were not as bad over the central and northern part of the area. The only report received from Canada was from C.S. Quelch, and he indicated that the climatic conditions were about average; however the butterfly collecting was below average. W.J. Reinthal, in Norman, Oklahoma, indicated that conditions were about average in Oklahoma.

NORTH

Quelch reported from Transcona, Manitoba, as follows: The first three weeks of April were cold, with little snow or rain. From April 23 to May 28 the weather was warm and dry. The rest of the season was rather uniformly cool. It was dry until August. In August rainfall was average. September was wet. Collecting was very poor, even worse than in 1950. In fact his records show a steady decline in abundance year by year since 1948, which was a very good year. Coenonympha inornata and Euptychia cymela are the only two species consistently plentiful in all years. The winter of 1950 was an average winter, no extremes at all. Most species were appearing at about their normal time.

The following details are from Quelch's records and show abundance for four years, 1948-51 (A - abundant, B - good, C - fair, D - few, E - scarce, F - none):

Species	1948	1949	1950	1951
Lyc. pseudargiolus	C	D	saw 1	F
Gl. lygdamus	A	A	E	E-
Pl. saepiolus	A	C	E	E
Pl. melissa	C	D	D	F
Ev. amyntula	B	C	F	C
Inc. polios	A	C	C	C
Inc. augustinus	A	C	F	E-
Inc. niphon	A	C	F	F
Ly. helloides	C	D	D	C
Ly. dione	A	E	F	C
Ly. thoe	C	C	C	C
St. titus	A	C	E	F
St. edwardsii	A	A	F	F
Ph. ismeria	B	E	none	D-
Ph. nycteis	A	B	E	E
Ph. tharos	A	C	E	E-
Bol. toddi	B	E	E	E
Speyeria spp.	A	C	E	E-
Van. cardui	C	A+	none	none
Coe. inornata	A	A	A	A
Eup. cymela	A	A	A	A
Cer. alope	A	A	C	C
Col. philodice	B	E	E	C
Col. eurytheme	B	E	E	F
P. rapae	A	C	C	A
P. occidentalis	10 Aug.1951 (4), first in 7 yrs.			
Er. icelus	A	C	E	E
Er. brizo	A	C	E	E
Er. juvenalis	A	C	E	E
Th. pylades	A	A	E	E
Pyr. communis	A	C	D	F
Pol. themistocles	C	C	E	E
O. garita	B	C	E	C

Remarks on summary:

The Satyridae seem to be the only group that retained its abundance through the four period. The only apparent reason for the drop in abundance between 1948 and 1949 is the fact that the fall of 1948 and spring of 1949 were very dry, April 1949 being a record dry month with only .016" precipitation. 1950 had a cool summer. The area covered in this report is largely that around Transcona, where Quelch collected regularly on an average of ten hours a week. He also collected at Birtle, Manitoba, from July 15 to 30. Birtle is 200 miles west of Winnipeg. Speyeria and B. toddi flew in fair numbers, but other species were very scarce. He also collected at Kenora, Ontario, Aug. 4 and 5. Collecting was poor there also; only a few Hesperiidae were taken.

In South Dakota the Remingtons collected in Custer County on June 12-13. They reported: Euchloe olympia, fresh; Pieris sisymbrii, numerous less fresh ♂; Colias philodice, few, fresh; Euphydryas anicia, numerous and fairly fresh; Vanessa atalanta, several, fair; Nymphalis milberti, scarce; Incisalia augustinus and I. polios, both fresh and abundant; Glaucopsyche lygdamus, fresh but rather scarce; Lycaeides sp., scarce; Pyrgus communis, numerous, fair; Isturgia sp., very abundant, fresh; Hemaris diffinis, one, fresh.

MIDDLE

Ronald Leuschner, Oak Park, Illinois, collected at Chappell, Deuel Co., Nebraska, July 22, and found the moths fairly swarming around a well-lit ice-cream stand. Schinia was the most abundant group: about 5 species were represented, with jaguarina by far the most common. There must have been over a hundred specimens on and around the building. Other families besides Phalaenidae were: Sphingidae, about 3 Phlegethontius sextus; no Notodontidae noticed; a few Arctiidae, including 2 specimens of Euchaetias bolteri and 3 very small Apantesis (blakei?); the only Geometridae noticed was a Euchlaena obtusaria.

On June 9 the Remingtons found: two Danaus plexippus at Shelton, Nebr.; at Grand Island Papilio glaucus, Epargyreus clarus, and Everes comyntas fresh but scarce, and several worn Vanessa atalanta ♀♀; at Ogallala Lycaeides sp., Pholisora catullus, and Pyrgus communis numerous and just emerging. On June 10 in Banner Co. they found Mitoura siva ♂ very fresh, V. atalanta numerous, Lycaeides sp. and Hemaris diffinis scarce and fresh, and Euptoieta claudia less fresh. On June 11 in Sioux Co., Euphydryas bernadetta was abundant but many were worn; Lycaeides sp., Oeneis varuna, and Colias philodice were fresh but scarce.

In the Kansas-Oklahoma area collecting was on an average with past years. Climatic conditions were about average; thus most of the species appeared at about the usual time. Megathymus yuccae stallingsi again produced a good flight. Strymon ontario autolycus and S. falacer were abundant in the Norman area, together with Erynnis juvenalis and E. horatius.

SOUTH

On May 13 Howell Daly and I collected in the Sherman to Gainsville area and found several interesting species. Thorybes confusis and daunus were fairly common as was Achalarus lyciades. These three species have never been found abundantly in Texas previously. There were several other rather good species collected in that area, Strymon ontario autolycus, Amblyscirtes belli, Polites themistocles, and Erynnis baptisiae.

During March, Daly and I found the collecting around Tyler in eastern Texas about the same as during the past three years. The small colony of Incisalia hadros in the Tyler State Park was still in evidence as about two dozen specimens were collected. Incisalia henrici was more abundant there than at any previous time during my observation of that area. About a dozen specimens of Megathymus yuccae were collected either on the wing or in the pupal stage in the roots of Yucca louisianensis. Several specimens of Hesperia metea licinus were collected, as well as Erynnis martialis. The abundance of Papilio was about average as P. philenor and P. glaucus were common.

In the Dallas area Daly and I found collecting on an average with past years. During March Incisalia henrici and Megathymus yuccae were fairly common. Amblyscirtes belli and A. vialis were common during May and June. Cogia outis was rare as compared with past seasons.

During October W. S. McAlpine made a collecting trip to the southern part of the state. He tried to locate specimens of Lephelisca rawsoni at New Braunfels, as I had previously tried to do, but to no avail, as the area around New Braunfels had been very dry all during the summer. At Del Rio he found Lephelisca australis very abundant. Several other interesting species were collected.

During the last of October W. J. Reinthal made a collecting trip along the Rio Grande from Laredo to Brownsville. Among the interesting species that he collected were several specimens of Strymon pastor. Other things collected in that area corresponded with specimens that I had found to be fairly constant in that area.

During November Lowell Hulbirt collected around Brownsville and found that Lasaia sessilis, usually present, was absent from that area, however he found that Strymon pastor was more abundant that at any other time that he had collected there. He also caught some specimens of Atrytone eulogius, which has always been a rare and fine catch.

During August I made a collecting trip to west and south Texas with fine results. In the Alpine area I found collecting very good as the autumn rains had already started, and in the canyons and low areas many of the familiar species were present. A few specimens of Lephelisca were found near a stream of water eleven miles north of Alpine. Achalarus casica as well as Thorybes pylades were abundant. Several specimens of Papilio multicaudatus were observed as well as P. cresphontes. In the Chisos Mts., larvae of Megathymus

FIELD SEASON SUMMARY 4. GREAT PLAINS - concl.

mariae were fairly common in Agave lecheguilla. There were few Lepidoptera on the wing in the Chisos Basin as conditions there were very dry. Five miles south of Marathon, near a large spring, several specimens of Ancyloxypha arene were collected as well Eurema nicippe and Nathalis iole. At Del Rio, Lephelisca australis was very abundant, as fifty-five specimens were collected in a half hour. Lerodea julia and Amblyscirtes celia were on an average with past years. A small colony of Megathymus smithi was discovered east of San Antonio. I had been searching for this colony for the past fifteen years and thus was happy to discover it. Because of the extreme dryness other Lepidoptera were scarce near San Antonio. At New Braunfels I searched for Lephelisca rawsoni but saw none because the small canyon where I had previously collected this species was completely burned up by the drought.

Contributors: H.V. Daly; L.H. Hulbirt; R. Leuschner; W.S. McAlpine; C.S. Quelch; W.J. Reinthal; C.L. Remington; D.B. Stallings.

5. CENTRAL - MISSOURI TO WEST VIRGINIA, NORTH TO ONTARIO

by P.S. Remington, Jr.
St. Louis, Missouri

This year replies were received from 25 collectors in this zone, a much better return than last year. As a general summary, it might be said that collecting was much better this year than last, even though there were very heavy and prolonged rains throughout much of the zone in the spring and early summer. Papilio were perhaps less common than in other years, but most other butterflies were fairly abundant. For the moths, there seems to be pretty definite agreement that Saturniidae and Sphingidae are becoming less common year by year, but Noctuidae, Geometridae, and the microlepidoptera remain plentiful.

Starting with the northern tier of states, all correspondents agree that the winter was very severe, temperatures went down to -52° F. at Chippewa Falls, Wisconsin, with heavy snowfall. In general the spring was cold and wet, a condition which persisted into the summer, and there was an early fall freeze.

MINNESOTA

Tveten, from Kiester, found the summer collecting very poor. While this may be due in part to the cold weather, he thinks it may be due also to the extensive weed spraying. He has noticed a steady decline of butterflies in southern Minnesota in recent years. Pieris rapae and Colias philodice were about the only species noted in this predominantly agricultural area. On a trip to the north, around Cook, on Aug.3, he found Boloria titania grandis very abundant on swampy roads through dense woods, and also found Nymphalis antiopa, N. j-album, Colias interior, and Pieris napi. He caught one specimen of Feniseca tarquinius, two Lycaena epixanthe, and saw many worn Speyeria atlantis.

Merritt, of Kentucky, also collected in Minnesota this summer. On August 26, between Hibbing and Big Falls, he collected in addition to those species reported by Tveten, Cercyonis alope, Danaus plexippus, Speyeria aphrodite, Boloria selene, B. toddi, Polygonia comma, P. faunus, P. progne, P. gracilis(?), Nymphalis milberti, Vanessa atalanta, Limenitis arthemis, L. archippus. He found the dominant butterflies to be L. arthemis, N. milberti, and the Polygonias. This dominance continued into Ontario, but both Nymphalis became even more abundant.

WISCONSIN

Four collectors reported from this state. Sieker found 1951 very much like 1950. Glaucopsyche lygdamus is becoming a little more common at Madison. The usual Erynnis were not found. Colias was common from early May on, C. eurytheme being dominant at first, but C. philodice outnumbering it five to one as the season progressed. In Door County Plebeius saepiolus reappeared after an absence of 13 years. Three species of Strymon were abundant this year - S. acadica, S. edwardsi, S. falacer. Pieris napi was taken sparingly, flying with P. rapae which seems to be invading the coniferous forests too. The usual satyrids were about as common as usual, Nymphalidae not so common. Sieker found Danaus plexippus very abundant this year, but was not able to observe migration.

Of moths, Sieker reports the lilac and grape feeders (Sphingidae) practically absent. In June and July Ceratomia undulosa was the dominant Sphingid and there were some Smerinthus jamaicensis and Cressonia juglandis. One notable capture was several Sphinx eremitus, the first seen in ten years. Saturniids were almost lacking, just a few Hyalophora cecropia and Antheraea polyphemus. Catocala had an interesting season: two rarities taken were C. semirelicta and C. angusi; also taken were C. cerogama, C. briseis, C. relicta, C. retecta, C. unijuga, C. nuptialis. A curious fact was the absence of C. cara, formerly half the season's catch of Catocala.

Koerber, collecting in the eastern part of the state, reports that the severe winter was followed by a scarcity of the following species: Speyeria cybele (scarce and small), Limenitis astyanax, Papilio glaucus, P. polyxenes, and Vanessa cardui (both the latter missing). The Monarch migration started in his area in mid-August and continued to its climax in early October. His most unusual catch was a female Limenitis arthemis near Plymouth on Sept.3. It

is seldom found so far south in Wisconsin.

Arnhold, in more northern Wisconsin, found Colias philodice and C. eurytheme as plentiful as usual, but Pieris napi - usually a rarity - was more common than P. rapae. He recalls seeing a few Euchloe olympia in May. Near Hayward he took a number of Limenitis arthemis and saw Boloria selene. Moths seemed to be scarce. He caught Catocala briseis on Sept.3 and raised a few C. amestris from the larva.

MICHIGAN

Five collectors responded. Beebe, at Ecorse, reports that the first half of the collecting season was poor but the last half good, giving an average year. A procession of Papilio appeared, perhaps as migrants, as follows: P. glaucus on May 24, P. polyxenes on May 25, and P. cresphontes on June 29. A worn specimen of Danaus plexippus was seen on June 10 and a fresh one on June 23. Southward migration began on July 29 and continued to Oct. 25. Eurema lisa, a rarity this far north, was seen on Aug. 20. Beebe found the moth collecting very good this year with several new state records established. The appearance of some species known only from Colorado was noteworthy. One of the features of this year was the infestation of the forest tent caterpillar, Malacosoma disstria in a broad belt from Minnesota through Wisconsin and Michigan and into northern Ontario. Railway trains were delayed as the locomotives could not gain traction on account of the bodies of the crushed larvae and auto travel was also dangerous (see Life magazine). This recalls a similar outbreak of Hyalophora cecropia in Wayne County, Michigan, in 1933-35.

Nielsen collected extensively in Lake, Osceola and Mecosta counties in the north central part of the lower peninsula. Three species of Incisalia were taken in May: I. irus, I. niphon, I. augustinus. Also Erynnis icelus, E. juvenalis, and Hesperia metea (only one). One specimen of Oeneis chryxus strigulosus was taken in open jack pine plain on May 23 in Lake county. On June 15 he took Lycaeides argyrognomon, Papilio glaucus, Euptychia cymela, Erynnis martialis, Papilio troilus, Melitaea harrisii, Hemaris thysbe. In Osceola county in early July Nielsen took Lycaena thoe, Strymon liparops, S. acadica, Lethe portlandia, L. eurydice, Euphydryas phaeton, Polites peckius, Atrytone logan, Feniseca tarquinius, Ceratomia undulosa. On July 23 he observed Strymon titus, S. liparops, Pieris protodice, Lycaena phlaeas, Lycaenopsis argiolus, Wallengrenia otho, Atrytone ruricola. From July 10 to August 23 Speyeria cybele, S. aphrodite, and Boloria selene were numerous. Nymphalis milberti was seen in great numbers on August 9 resting on thistle and goldenrod. Also very common was Everes comyntas. Hesperia leonardus was abundant in late August, Papilio marcellus very scarce.

In Mecosta county on June 17 Nielsen collected Hesperia sassacus, Poanes hobomok and its dimorphic female, Danaus plexippus, and one male Hyalophora promethea. On July 4 he collected Cercyonis alope nephele, Lethe eurydice, Phyciodes tharos, and Polites manataaqua. On Aug.11 one Strymon liparops was seen, also Pieris napi. Sugaring at Chippewa Lake in late August produced Catocala antinympha, C. relicta, and C. concumbens. A day of collecting in Lenawee County July 14 yielded Hemaris diffinis, Papilio marcellus, Paonias myops, Smerinthus jamaicensis (last two at light). On Oct.12 in Montcalm County Nielsen took Lycaena helloides and Pyrgus communis.

Voss collected in Emmet and Cheboygan Counties. He made some studies of Incisalia during the middle of May in the latter county and found I. augustinus, I. polios, and I. niphon all common on the jack-pine plains, I. polios and I. augustinus common in dry aspen woods, and augustinus also found in sphagnum bogs. Two new records for Cheboygan County were Glaucopsyche lygdamus and Pyrgus centaureae on May 13, the latter in a sphagnum bog. The summer seemed abnormally cool and wet. Colias interior was very abundant, and he took an apparent hybrid female between between C. interior and C. philodice. Lycaena epixanthe was common in bogs in July. Hesperia laurentina common near Mackinaw City in late August along with Strymon liparops and S. falacer (the last two rare). Danaus plexippus was at least as abundant as the preceding season. Voss, like Nielsen, reports Nymphalis milberti to be very common this year. Apparently it was a milberti year. Euchloe olympia was a new record for Presque Isle County on May 14.

Clench, collecting near Ypsilanti, reports that collecting was much better this year than in the past three years. More species and larger numbers were observed, many of which were only rarely encountered before or not at all. Emergences were roughly on time, the most notable exception being Thorybes pylades, which was a full two weeks early. Clench's observations are so helpful that they are here given in full and might serve as a model for other collectors who report on a succession of years in the same area:

1. Species appearing earlier than usual, by about 1 week, except as noted, with their observed frequency: Colias philodice (early by only 3-4 days if at all; about usual numbers); Strymon falacer (very common, about as in 1950); Strymon caryaevorus (slightly commoner, but still very scarce); Everes comyntas gen. I (commoner than usual); Thorybes pylades (early by 2-3 weeks, about usual numbers).

2. Species appearing on time, with frequencies: Pieris protodice gen. II (commoner than usual); Lethe portlandia (commoner); Speyeria cybele (commoner); Strymon acadica (commoner); Lycaenopsis argiolus gen. I (commoner); same, gen. II (usual numbers); Everes comyntas gen. II (commoner); Lycaena thoe (commoner); Thymelicus lineola (commoner, about equal to numbers in 1948); Polites peckius (commoner); Pholisora catullus (not seen in area reported until about 2 weeks later than normal, but in an adjacent county was seen on time).

3. Species appearing later than usual, all by about one week, with frequencies: Pieris rapae gen.I (commoner? - less than 1948, however); Cercyonis alope (commoner); Euptychia cymela (commoner); Lycaena helloides, gens. I and II (more than '49 and '50, less than '48); Poanes hobomok (usual numbers).

4. Other species, not reported above, scarcer than usual: Papilio polyxenes; Lethe eurydice.

5. Other species, not reported above, more abun-

FIELD SEASON SUMMARY 5. CENTRAL - cont.

dant than usual: Ancyloxypha numitor (not observed before); Boloria toddi (absent in most years); Erynnis sp. (usually very scarce or absent, several taken, more seen).

6. Species normally present, but absent this year: Pieris protodice gen. I (though gen.II was observed, see above); Strymon melinus and S. liparops (never anything but rare, their capture is more an accident than anything else).

7. Miscellaneous observations and noteworthy captures: Strymon acadica, fairly common in a newly found field; especially interesting was the rather large number of mated pairs (4-5 of them, late P.M., July 22); Atrytone logan (first record for area, several between July 15 and July 22); Speyeria aphrodite (first record for the area, perfect, July 24); Lethe portlandia was much more abundant than ever before seen here or elsewhere; Euptychia cymela appears to have a partial second brood here, as over the last four years specimens taken around July 1 are quite perfect, long after the insect has been flying; Limenitis archippus female and L. astyanax females were both seen to oviposit on the same Populus tree.

P.S. Remington, returning through the upper peninsula from a trip to Alaska, observed a fresh Nymphalis j-album near Iron Mountain, on August 4.

ONTARIO

Romine visited the Parry Sound district July 15-23 and enjoyed taking some unfamiliar species: Pieris napi, Speyeria atlantis, Cercyonis alope nephele, Polygonia faunus, Limenitis arthemis (all battered), and the moth Ctenucha virginica.

Merritt collected briefly in Ontario in late August. He noticed especially the great abundance of Nymphalis milberti. "Wherever flowers were blooming by the roadside, milberti could be had by the dozens." Near Rushing River he took a pair of Lycaena helloides, a worn Strymon titus, and a worn Erynnis persius (?), the only skipper he saw in Ontario.

OHIO

Mrs. Chase reported rather fully on collecting in Richland, Marion and Crawford counties. As in previous years, she has successfully reared many species of moths and butterflies. She found that many of the formerly common Saturniids and Sphingids have become rare or absent in her area. Hyalophora promethea had a rather good summer; Actias luna was scarce. On Oct.12 a neighbor brought to her a live female Thysania zenobia, a rare catch. The Chases and Romine sugared on Sept.3 in Marion County and took Catocala vidua, retecta, relicta, amatrix, cara, angusi, epione, paleogama, innubens, and others. Romine notes that "in spite of the worst winter here on record (1950-51) the Catocala seemed quite normal in number of species and specimens", and Mrs. Chase also notes that "1951 was a fairly good summer following a severe winter in contrast to almost no bugs in 1950 following a mild winter." Perhaps the answer is that the severe winter killed off the enemies of Lepidoptera.

Mrs. Chase succeeded in rearing larvae of Papilio marcellus and noted a slight difference in some of the larvae resulting in two kinds of pupae - brown ones which hibernated, and green ones which emerged in 14 days, the summer form with long tails. A notable catch for Ohio was several Achalarus lyciades in late June, a new record for all three counties. At the same time she found Melitaea nycteis, Lethe eurydice, Lycaena thoe, Strymon titus. In an extensive swamp in Troy Township, Richland County, Lethe eurydice was swarming, as well as Euphydryas phaeton. There is no Turtle Head (Chelone glabra) in this swamp, but larvae were found on Pentstemon. All were parasitized. Nymphalis milberti was very common here too. N. antiopa was scarce, but quite common were Speyeria cybele, S. aphrodite, Boloria toddi, Limenitis archippus; Speyeria idalia was missing.

Welling sent a most detailed and helpful summary of collecting in Lake County, species by species. One interesting fact in his report is a description of a small patch of rough, tall grass approximately 75 feet by 15 feet, in which two rare Hesperiids were found, Atrytone dion and A. conspicua. They were not found outside the borders of this patch anywhere. Welling's list of 50 species of butterflies and 134 species of moths from his area is on file in the Society's Field Season Summary files at Yale for those interested. Species seen in 1950 but not 1951 were Euptychia mitchelli, Eurema lisa, one melanic female of Papilio glaucus, rare in Ohio, Atalopedes campestris.

WEST VIRGINIA

Preston collected 25 species of Rhopalocera in Randolph, Tucker, and Preston Counties from July 7-11, when the most abundant species were Speyeria cybele, Boloria toddi, Polites verna.

KENTUCKY

Monroe and Merritt both observed fewer butterflies than in the previous three years, following a winter more severe than usual. No large migration of Danaus plexippus was observed. Both collectors searched for Lephelisca borealis again, but saw only one. The area where it has been found in Oldham County is being destroyed for collecting through construction. Monroe found four species new to the state at Mammoth Cave National Park: Erynnis martialis, Amblyscirtes hegon, Poanes hobomok, and Autochton cellus. He found Euphydryas phaeton common in marshes in Knox and Perry Counties. A trip to Black Mountain, elevation 4100 ft., yielded nothing not found elsewhere. In southwestern Kentucky in late September he found Euptoieta claudia very abundant, and several Feniseca tarquinius. Another state record, from Marshall County, was Erynnis zarucco. Merritt observed Incisalia henrici to be very common this year where it had previously seemed to be quite local. Melitaea nycteis was also more common than previously. He noted that the early spring butterflies were scarce. No Anthocharis genutia appeared this year. Also Papilio marcellus, Incisalia niphon, and Lycaenopsis argiolus were scarce. Erynnis of

various species (icelus, brizo, juvenalis, persius) were rare. One would see dozens where in previous years there were hundreds. Merritt reports finding Speyeria diana, S. cybele, and S. aphrodite flying together in Bell County, Ridge State Forest, altitude 2200 ft., on July 2. He also observed S. diana on Black Mt.

INDIANA

The only report from this state is from Leuschner. At Turkey Run he took Mitoura gryneus, Phyciodes tharos, Everes comyntas, and Papilio philenor. At Clifty Falls Park he noted a fresh male Speyeria cybele on June 7, a full month before they appear in Chicago. On June 15 he found Lycaeides melissa "common all over northern Indiana". He found hundreds of larvae of Hemileuca maia on the great willow meadows of Schererville, although over half of them were feeding on scrub poplar. Several fresh Lethe eurydice were seen. Another trip to Hesseville in early July turned up a fresh colony of Strymon titus and some female Speyeria cybele, also Lethe eurydice, Strymon edwardsii (common), S. acadica (scarce), but the many fine Hesperiidae which were found here at this time in 1949 were lacking. Leuschner also collected a great many moths in forest-collecting at lights, beginning at Turkey Run on May 18, when he found mostly Geometridae. Another trip there on June 4-8 found more Notodontidae as well as Geometridae. At Clifty Falls, about one-half mile off the Ohio River, lights were set up on the wooded banks of a deep chasm. The moths flew all night, from 8 to 5 a.m. About 500 specimens were taken each night, not including worn specimens of micros. The Notodontidae made up the greatest share of the catch. Again Geometers made up a good part of the catch, but there were also many fine Acronicta, of species quite different from those in Urbana, Ill. Among the larger moths Actias luna was commonest. Arctiidae were poorly represented. Clifty Falls was revisited Sept.8-11, when the Catocala season was in full swing. In contrast to normal Chicago collecting, C. amatrix and cara were definitely rare and poor, perhaps past their peak; C. vidua accounted for about 3/4 of all taken. Leuschner revisited Turkey Run on July 8-9 and found an entirely different fauna. Anisota stigma and Panapoda rufimargo were the most common moths, along with Sabulodes transversata and Abbottana clemataria.

ILLINOIS

CHICAGO AREA. Five collectors sent reports, two in great detail. Woodcock has completed three seasons of collecting moths at lights in his own backyard in Chicago, starting early in spring and ending late in the fall, checking every night. He is now able to list nearly 300 species of moths and micros taken at this one spot. A complete report has been prepared for later publication. Kistner, in a different section of Chicago, also collected moths at lights from May 1 to Sept.1, although some of his spots were in forests. He lists about 50 species of moths. An unusual capture was a specimen of Utetheisa bella taken in the middle of the Chicago Loop at light. He took Catocala minuta on July 11, the first record for the Chicago area. Kistner also collected the normal butterfly population of his area at River Grove in May and June and at Shiller Park in July. At the latter place he reports Asterocampa celtis, not reported by others. At Park Ridge on Sept.9 he took Lycaena helloides and one fresh male Melitaea nycteis, indicating a partial second brood of this species.

Hayes reports two broods of Apantesis vittata coming to lights, the first June 1-18, the second August 16-30, with the second more plentiful. He writes that Nymphalis antiopa was so common in late August that it got in the way of the collector. He observed Danaus plexippus very common in the city Sept.18-20 on their early fall migration. The last one was seen Nov.2.

Leuschner reports that an early highlight of the season was the capture of Euchloe olympia and Incisalia polios on May 12 near Waukegan, the latter "numerous almost beyond comprehension." At Urbana the moth collecting began with Palaeacrita vernata on Mar.3. Acronicta was well represented there in April and A. lobeliae was the most common species, where A. interrupta had been last year.

ALTON AREA. Lauck found 1951 a banner year for collecting. Due to the late, cold, and wet spring the early species were ten days later than usual. By the second week of June everything was flying on schedule. The excessive rainfall kept pastures and fields green and provided an abundance of Lepidoptera all summer and fall. At Marquette State Park near Grafton on April 21 he took Papilio glaucus, P. troilus, P. marcellus, Anthocharis genutia, Strymon melinus, Incisalia henrici, Thorybes bathyllus, Erynnis persius, E. martialis, Amblyscirtes vialis. Another trip to this spot on June 9 found Colias eurytheme swarming, with Pieris protodice and P. rapae. Lethe portlandia, Euptychia cymela, Cercyonis alope, Feniseca tarquinius, Strymon falacer were also present. In his garden a number of larvae of Agraulis vanillae and Euptoieta claudia were observed feeding on Passion Vine and several Sphingidae laid eggs on his Snow Ball bushes. During late July and early August many Papilio cresphontes were seen on the purple Iron Weed. Piasa Creek swarmed with Limenitis astyanax and L. archippus, as well as Nymphalis antiopa. Hundreds of Eurema lisa, Colias, and Nathalis iole were present around mud puddles. Phoebis sennae was strongly flying over the hills and Precis lavinia and Pyrgus communis were common on asters. The notable catch on Oct.14 was one Strymon m-album, a great rarity so far north.

MISSOURI

This co-ordinator found the same conditions as Lauck found at Alton, which is only 25 miles from St. Louis. Where I usually find Anthocharis genutia by April 10, this year I saw none until May 11. Trips to favorite spots in Jefferson County produced no Atrytonopsis hianna or Hesperia metea and only one Mitoura gryneus. Euchloe olympia was absent for the third straight year, and even Incisalia henrici was scarce. Practically no Erynnis brizo, juvenalis, or persius were seen. Then "the rains descended and the floods came." I left on June 28 for a six weeks trip to Alaska and barely got through Kansas on the way. In late August a trip through the Ozark Mts. of south-central Missouri produced very few Lepidoptera. A notable capture in Kirkwood on August 19

FIELD SEASON SUMMARY

was a specimen of Lephelisca muticum. There must be at least two broods of this scarce insect here as I have taken it in June, Aug., and Sept. An interesting and unusual sight on Aug.19 in Kirkwood was a veritable flying circus of butterflies around a group of elm trees in a woodland pasture where several of the trees were exuding sap. There were several species involved, including various Polygonia, Asterocampa, Vanessa, Limenitis, and possibly others.

On June 8 in Linn County, C.L. and J.E. Remington found: Euptychia cymela, Lycaenopsis pseudargiolus, Speyeria cybele, and Ancyloxypha numitor abundant and fresh; Thorybes pylades, T. bathyllus and

5. CENTRAL - concl.

Polygonia interrogationis (both forms) numerous but rather worn; and one worn specimen of Danaus plexippus.

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Contributors: F. R. Arnhold; R. Beebe; M.L. Bristol; Mrs. Hazel Chase; H. K. Clench; L. W. Griswisch; J.B. Hayes; Mrs. Vonta P. Hynes; D.H.Kistner; T. Koerber; A. G. Lauck; R. Leuschner; J. R. Merritt; B. L. Monroe; M.C. Nielsen; F. W. Preston; C. L. and J. E. Remington; R. Romine; W.E. Sieker; J.L. Tveten; E.G. Voss; E. C. Welling; H. E. Woodcock.

6. SOUTHEAST - FLORIDA TO LOUISIANA, NORTH TO ARKANSAS AND MARYLAND

by Ralph L. Chermock
University, Alabama

The report on the southeastern section has insufficient data to draw any broad conclusions. The season was apparently somewhat variable, but the available information does not include summaries of climatic variations, or comparisons of the fauna with previous years, to provide a basis for analysis. However, the following information might be useful for comparison with previous or subsequent seasonal summaries.

Nicolay, collecting in the vicinity of Washington, D.C., from June 20 to the end of the year, made observations on butterflies there. Very few butterflies were on wing from June 20 to Aug.1, with many species scarcer than would normally be expected. However, the season improved later in the year. During the first two weeks of July, he collected near Norfolk, Va., where collecting was excellent. The following species were relatively common: Atrytone dukesi; Poanes viator; Amblyscirtes textor; A. carolina; Hylephila phyleus; Papilio glaucus; P. marcellus; Everes comyntas; Lycaenopsis argiolus; Strymon cecrops; Limenitis arthemis astyanax; Vanessa virginiensis; and Phyciodes tharos. Freshly emerged specimens of Atrytone dion, Lerema accius, and Ancyloxypha numitor were on wing at this time. During the last week of August he collected the same area again and found A. dukesi (believed to be second brood); A. dion; A. logan; A. ruricola; P. viator; P. vehl; P. zabulon; Polites verna; L. accius; Wallengrenia otho; A. textor; Atlides halesus; P. glaucus; and P. polyxenes.

Smith, collecting at Newnan, Georgia, submitted a list of dates for the first observed appearance of 42 species of Rhopalocera during 1951, including: Papilio polyxenes - Mar.25; P. troilus - Mar.26; P. marcellus - Mar.25 and May 19; P. philenor - Apr. 1; Eurema nicippe - Feb.24; E. lisa - June 1; E. daira - Aug.10; Phoebis eubule - Mar.25; Colias eurytheme - Feb.25; Zerene cesonia - Apr.1; Euptychia hermes - Apr.29; E. gemma - Mar.25; Cercyonis pegala carolina - July 6; Phyciodes tharos - Mar. 24; Melitaea gorgone - Apr.29; Vanessa virginiensis - Mar.22; Precis lavinia - Apr.10; Limenitis arthemis astyanax - Apr.28; Danaus plexippus - Apr.13; Strymon melinus - Mar.2; Incisalia irus - Apr.28; Feniseca tarquinius - Mar.26; Everes comyntas - Mar.23; Lycaenopsis argiolus - Mar.2; Epargyreus clarus - Apr.11; Thorybes pylades - Apr.29; T. bathyllus - Apr.1; Pyrgus communis - June 17; Pholisora hayhurstii - July 5; P. catullus - Apr.28; Erynnis martialis - Mar.31; Hesperia metea - Apr. 29; Problema byssus - June 15; and Atrytonopsis hianna - Apr.29.

Kimball, collecting in the vicinity of Sarasota, Florida, sends the following records of moths from that area: Nola lagunculariae; Afrida notatis*; Prodenia sunia*; Catabena esula; Xanthoptera aurifera*; Metaleura alibinea*; Tolype minta; Chlorochlamys paularia*; Microgonia cubana*; Heterocampa cubana; Lamprosema schistisemalis*; Syngamia titiusa*; Nacoleia hampsoni; Argyria diplomochlalis*; Palatka nymphaella; Aristotelia corallina*; Emprora argentilineella*. [Species marked with an asterisk appear to be new records for North America. - E.G.M.]

Davidson sends the following notes on collecting in central Florida: "The unusually cold winter of 1950-51 appeared to have a profound effect upon butterflies in Central Florida. Whereas many species were on wing during the two preceding winters, practically none was flying for nearly two months following the cold snap at Thanksgiving time in 1950. A few Precis lavinia, an occasional Phoebis sennae, Euptychia hermes, and Danaus plexippus were all that were seen. Heliconius charitonius did not show up before summer. April brought good flights of Papilio palamedes, P. marcellus, Eurema lisa; Zerene cesonia, Euptychia areolata, Phyciodes tharos; P. phaon, Strymon cecrops, Polites vibex, Wallengrenia otho, Atrytone arogos, and Atrytonopsis loamii. By September, it appeared that the leeway had been made up, and with a few exceptions populations were

strong. No individuals of Atlides halesus or Strymon m-album were seen, and among the skippers, subnormal numbers were noted in Lerodea eufala, Lerema accius, Panoquina ocala, and Erynnis spp. At salt water on Merritt Island, there was a scarcity of Ascia monuste and Panoquina panoquin, but a good late flight of Hemiargus ceraunus. The year proved to be a good one for Eurema nicippe and the Papilios. Pieris rapae swarmed about the cabbage fields near Sanford in May. In October, a strong concentration of the larvae of Papilio polyxenes was noted on the umbellifer Oxypolis filiformis. Erinnyis ello was relatively scarce, and a few larvae of Pholus fasciatus and the oak-feeding Datana were seen.

Epstein collected in southern Florida from Oct. 14-25, and sent the following notes. He found the following species common: Danaus gilippus; D. plexippus; Heliconius charitonius; Agraulis vanillae; Phyciodes phaon; Anartia jatrophae (local); Strymon cecrops; S. melinus; Papilio cresphontes; P. palamedes; P. polydamas (local); Phoebis sennae; P. agarithe; Eurema nicippe; Ascia monuste; Appias drusilla (local); Phocides batabano; Urbanus proteus; Pyrgus syrichtus; and Lerema accius. The following species were less abundant to rare: Dryas julia; Euptoieta claudia; Phyciodes frisia; Marpesia petreus; Anaea floridalis; Limenitis archippus; Papilio glaucus; Phoebis philea; Eurema lisa; E. daira; Strymon m-album; S. martialis; Polygonus lividus; and Copaeodes minima.

In central Alabama, 1951 produced the poorest collecting season in four years. This was probably partially due to an exceptionally cold winter, which extended far into the spring, and to a somewhat average late spring and early summer, followed by a three-month drought which extended into October. Winter came early, resulting in a short autumn. Butterflies which are normally characteristic of the early spring were relatively scarce or absent. However, the late spring fauna was somewhat better than average. Euphydryas phaeton, Melitaea gorgone, M. nycteis, and Megathymus yuccae were recorded for the first time from the Tuscaloosa area during this period. The extended drought resulted in a very poor summer season, with even the commonest butterflies being relatively scarce. During the fall, Eurema nicippe, E. lisa, Phoebis sennae, Euptychia hermes, Lethe portlandia, and Lerema accius had good flights. These were soon stopped by early cold spells, and very few butterflies were on wing during the winter months.

Freeman sent the following notes on collecting in Arkansas: "During the first of June, the following species were normal as to occurrence and were fairly common: Strymon melinus; S. falacer; Amblyscirtes vialis; A. linda; Polites themistocles; and P. manataaqua. The following were normal, which is usually rather scarce: Speveria diana; S. cybele; Lethe portlandia; and Strymon ontario. The following appeared during early June; however the normal time is during July: Strymon liparops and Polites verna. During the period from July 19 to Aug.3, the following species of Rhopalocera were found in normal numbers, which is commonly: Thorybes pylades; T. confusis; T. bathyllus; Amblyscirtes vialis; A. belli; Achalarus lyciades; Epargyreus clarus; Lerodea l'herminieri; Erynnis martialis; E. horatius; Pholisora catullus; P. hayhurstii; Pyrgus communis; Atalopedes campestris; Polites manataaqua; P. verna; Strymon melinus; Euptychia gemma; E. hermes; E. cymela; Papilio philenor; P. polyxenes; P. troilus; P. glaucus; Phyciodes tharos; Precis lavinia; Vanessa atalanta; Limenitis arthemis astyanax; Nathalis iole; Eurema lisa; Colias eurytheme; and Zerene cesonia." Dolba hylaeus, Herse cingulata, Phlegethontius sextus and quinquemaculatus, Celerio lineata, Xylophanes tersa, and Hemaris thysbe and diffinis were common. A few specimens of Cressonia juglandis were collected around lights.

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Contributors: W. M. Davidson; H. Epstein; H. A. Freeman; C. P. Kimball; S. S. Nicolay; M. Eugene Smith.

7. NORTHEAST - DELAWARE AND PENNSYLVANIA NORTH TO SOUTHERN QUEBEC

by Sidney A. Hessel
Woodmere, N. Y.

Based on reports from 24 contributors evidence is not at hand to indicate any abrupt change in the Lepidoptera population as a whole. The reports seem to reflect local experiences as to human interferences and weather conditions. A general trend is, of course, apparent that the progressive reclamation of the land for agriculture, industry, and residence, the draining of the swamps, the broadcast use of chemicals in pest control, and the intentional and unintentional burning of waste areas are localizing many Lepidoptera populations in the area. Most dates of first capture, especially of early species, run one to two weeks ahead of 1950 but behind 1949 by perhaps comparable amounts.

Except for Danaus plexippus, migrants were scarce, though no more so than in 1950. There were a few records only of Vanessa cardui and none, except in the southern part of the area, of Phoebis sennae eubule. The Monarch, on the other hand, came early, stayed late, and flew in good numbers. Some very notable migrating concentrations were seen on the Conn. shore and on Long Island. Total numbers appeared to represent an increase well over the 1950 population, though by no means equal to maximum years. The earliest date observed as Apr.17 and the latest Nov.29, both Orient L.I. (Latham). Among the moths a few Sphingidae typical of more southern areas were taken, but they were scarce, as were Alabama argillacea and Anticarsia gemmatilis. Sunira bicolorago, as infrequent as the preceding two in 1949 and 1950, was in abundance.

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

Reported from Conn. at greatly increased levels were Cingilia catenaria (adults at light and day-flying), Alsophila pometaria, and Alypia octomaculata (larvae, but not as bad as 1950).

Temperatures in the late fall of 1950 were generally above normal in the Northeastern area with greatest plus departures in the northern and northeastern U.S.A., southeastern Canada and the Maritime Provinces. Precipitation was also above normal, heaviest in western Pa., northern Me., and the Canadian area, except for northern N.S. There was a great storm in late November, a combination of heavy rain, storm tides, flash floods, and winds of whole gale to hurricane force. This occurred as a suddenly intensified disturbance from the southern Appalachian highlands moving north and northwest, the most violent storm of its kind on record. Although spared the unseasonal cold and snow to the westward by the inflow of warm moist marine air, New England had severe gale and flood damage. Two inches of rainfall were recorded over a large part of New England on the night of Nov.25-26, and four to six inches fell in some places in a three-day period. Winds were generally worse inland than at the sea-coast. New England recorded its second wettest and fourth warmest November in its sixty-three years of records.

December, January, and February continued the trend of the earlier season with temperatures 2-6 degrees above normal in northeast U.S. and from 5 degrees in southeast Canada to 8-10 degrees over Nova Scotia. Rain and snowfall were about normal except in western and southeastern N.Y., N.J., southeastern Pa., Md., and Del., where they were light, and along the coastal areas in Canada, where they were somewhat above normal.

Above mean temperatures continued throughout the spring, from plus 2 degrees (Md., Pa., Del.) to 4 degrees (coastal Me.) and 5 degrees (Maritime Provinces). Rainfall was near normal, somewhat lighter in east-central Pa., eastern Md. and Del., and above normal in N.B.

Summer temperatures were about normal, somewhat warmer in the Middle Atlantic states and N.E. coast and cooler in interior Pa. and New York state, Vt., N.H., and Que. Rainfall was spotty with average or plus amounts over most areas, slightly below normal in southern New England, the Middle Atlantic states, and most of the Canadian area except southern Que., and N.B., where it was above normal.

Fall temperatures were above normal throughout New England, northern N.Y., and in the coastal area from southeastern N.Y. to Del. and eastern Md.; a few degrees cooler than mean temperatures prevailed in the balance of N.Y., Pa., and western Md. Rainfall was normal to above normal in coastal Canada, New England, the eastern parts of N.Y., Pa., and Md., and in N.J. and Del.; below normal in the inland Canadian area and western N.Y., Pa., and Md.

The detailed summary by regions follows.

PENNSYLVANIA

NORTHEASTERN LANCASTER COUNTY (Ehle). 87 species of Rhopalocera representing a 12 year list are reported upon in tabular form for 1950. Unlike the winter-spring season of 1950, the corresponding period of 1951 was more nearly normal, with average or above average temperatures and precipitation. Possibly as a consequence, the majority of the emergence dates were one to two weeks earlier than those of 1950 and more in line with 1949. Anthocharis genutia was found a month earlier, Lycaenopsis argiolus two weeks earlier; Papilio cresphontes larvae had all dispersed when sought in the third week of May. The butterfly population has been quite constant for the past three seasons. Although Danaus plexippus was, as usual, abundant throughout the season, migrations were not observed. Other migratory species were scarce; a single Phoebis sennae was observed Sept.15. Lethe eurydice appeared as usual in early July, but unusually large numbers of worn specimens were still on the wing in Sept. Among species to be classed as scarcer than usual were Precis lavinia (as in the past two seasons); Vanessa virginiensis, V. cardui, Euptoieta claudia, and Papilio polyxenes (as in 1950). Those appearing more commonly included Nymphalis antiopa, Lycaenopsis argiolus, Strymon falacer, S. liparops, and S. edwardsii, the latter in the wake of greatly swollen numbers in 1950. Other highlights of the season were: Euphydryas phaeton, many mature larvae feeding on Chelone glabra (May 22); Papilio philenor ♀ observed ovipositing on small isolated plants of Aristolochia serpentaria (12 eggs were collected with all food plant which could be found in the area; the resulting larvae ultimately consumed at least ten times the quantity of food plant that would have been available at the original area); Aug.12 and 21 yielded the rare "yellow-black" female forms of P. glaucus.

IRWIN AREA (Ackermann). The winter was rather severe in western Pa. and the spring late. Only a few early Geometers had appeared by April 7. At that time a southern trip was begun, primarily to observe Papilio marcellus at various latitudes as spring advanced northwards. Quite frequently, Ackermann states, P. marcellus appears at the northernmost locality he knows by the middle of April. This is in Preston Co. near Morgantown, W. Va., at the Pa. border. (In the period 1913-20 P. marcellus was taken regularly each year in fair numbers at Mt. Gretna near Lebanon in late June and early July. S.A.H.). The first specimen was seen April 8 in S.C. The northeast district was not reentered until April 24 on which date the Pa. locality was visited without evidence of the species. All vegetation was very retarded. Some fresh Incisalia henrici were taken. In Elk Co. conditions were about the same as two weeks earlier in W.Va. Among more common moths at lights were Crocigrapha normani, Melalopha albosigma, Cladara atrolitura, and Operophtera bruceata. Bapta semiclarata was flying by day along a woods road. At Irwin Cirrophanus triangulifer was taken Sept.9. On a second trip southwards Atalopedes cam-

pestris was taken Sept.9-21 at Slaughter Beach, Del., and Eurema lisa at Salisbury, Md., Sept.9-22. At Cape Charles, Va., there was a "great swarm" of Precis lavinia coenia.

CENTER COUNTY (The Prestons). Records of 45 species of diurnals are presented in tabular form for the period Apr.19 - July 12. As the observers had no previous experience in the locality, no comparisons are made with other years. The season began about Apr.20 with the appearance of several Pieris rapae, a worn Nymphalis antiopa, and Lycaenopsis argiolus. The latter lasted until about May 1. Erynnis began to appear about Apr.27, E. brizo lasting until May 13, E. juvenalis remaining into July; the flight of E. icelus was May 13-30. Papilio glaucus was seen May 22 and became abundant June 1 in the mountains. Epargyreus clarus and Poanes hobomok were first captured May 22, the latter disappearing by mid-June and the former continuing all summer. Thorybes pylades and Hesperia sassacus were found May 26. The winter had been severe, and Aug. and Sept. were very dry. Although the type locality for Glaucopsyche lygdamus nittanyensis was visited in early June and again in the third week, none were found.

NEW JERSEY

GENERAL (Mueller). Diurnals were much scarcer than last year. Common, however, were Papilio glaucus, P. troilus, Danaus plexippus, Phyciodes tharos, Polygonia interrogationis, P. comma, Limenitis archippus, Boloria toddi, Vanessa atalanta. In fair numbers but not as common as last year were Pieris rapae, Colias eurytheme, C. philodice. Scarce were Papilio cresphontes, all Theclinae (especially Mitoura gryneus and hesseli), and all Hesperioidea except Panoquina panoquin which was common in the salt marshes. Moths were about as frequent as in the previous season but at light only. Bait produced almost nothing. Very common were Ampeloeca myron, Darapsa pholus, Phlegethontius sextus, Paonias myops, Antheraea polyphemus, Eacles imperialis, Anisota rubicunda, Catocala ilia, and C. ultronia. Other Catocalae were scarce, as in 1950. Unusual captures include Herse cingulata, Xylophanes tersa, Pachysphinx modesta, Meroloncha dolli, Eutoype depilis (one each), all from the Lakehurst district.

LAKEHURST AREA (Ziegler, Rawson, Ehrlich, and Gillham). May 5, Incisalia polios, mostly fresh males, was not uncommon over Bearberry; I. augustinus was a bit worn, common, and apparently well past its peak; I. niphon, a few specimens in fresh condition. Search for Mitoura hesseli at this time produced only a glimpse of an occasional individual winging rapidly across the road and open areas. On May 12 3 collectors were able to take a total of 21 specimens. Matings were observed. In Lebanon State Forest June 23, a warm but cloudy day, Lycaena epixanthe was common in the cranberry bogs, and was taken in fair numbers. Strymon liparops was numerous. A few Atrytone bimacula were taken in the Forest marshes.

In the Springdale area, on July 7, Strymon falacer was common and fresh. Lephelisca borealis was in fair numbers but apparently scarcer than most years. Speyeria cybele and Strymon titus were fairly common. S. acadica was found about a patch of Salix discolor; S. edwardsii was scarce.

NEW YORK

SARDINIA AREA (Rupert). The most notable feature of the season was the reappearance of species which were regularly taken ten or fifteen years ago but which have been missing or rarely seen throughout the 1940's. Among these were Acronicta noctivaga, A. sperata, Phlogophora iris, Dipterygia scabriuscula, Lithophane grotunda, Orthodes furfurata, Anaplectoides prasina, and Euthyatira pudens (of those species that commonly come to bait); and Earophila vasiliata, Melalopha apicalis, Haploa confusa, and Ellida caniplaga (among those commonly attracted to light). Conspicuously absent were the usual Saturniidae. Considerable search for cocoons during the winter of 1950-51 failed to disclose even one Hyalophora cecropia, H. promethea, or Antheraea polyphemus, all of which are usually common. At light only Actias luna was present in normal numbers. The Catocala season, about two weeks late, was otherwise normal. The only new record for the area was Ulolonche modesta (1).

ITHACA (Keji). Comparison should be made with prior summaries. The number of different days on which each species was seen and the range of dates is presented together with keyed information as follows: "E", "L", and "S" represent earlier, later, and same, with regard to first and last observation dates respectively. The numerals measure such margins in days compared to 1950. "I" (increased), "D" (decreased), and "N" (no significant change) compares the number of individuals to 1950. Man-made changes in the areas forming the bases of previous reports have upset somewhat the strict continuity of records in this respect. Observations have been extended more to the wooded area. Weather permitting, records were made daily for about one-half hour at noon and from about 5:30 to 7:15 P.M. The winter was relatively cold, snow covering the ground for the most part on 85 of 118 days from Nov.28 to Mar. 25. Spring developed rather suddenly about mid-May. The season ended abruptly with cold and snow Nov.1. Rainfall was only moderate but the vegetation remained green. Papilio polyxenes May 14-Aug.27 (48 days: 10E, 37E, D); P. glaucus May 21-Aug.14 (35 days: 20E, 11L, N); P. troilus June 19-July 19 (4 days: 11E, 24E, D); Pieris rapae April 30-Oct.26 (147 days: 2E, 6E, I); Colias eurytheme June 16-Oct. 26(95 days: 8E, 12E, I); C. philodice May 15-Oct.26 (134 days: 9E,5E, I); Danaus plexippus July 10-Oct. 26(53 days: 34L, 5E, D)(as in 1950 definite indication of southerly flight in Sept. and Oct., observed almost daily Sept.15 to Oct.5, thereafter singles on Oct.18 and 26); Lethe portlandia June 28-Aug.2 (12 days, none 1950); Cercyonis alope July 4-Aug.13 (17 days: 5E, 13E); Euptychia cymela May 25-July 3 (31 days; 14E, 7L, I); Speyeria cybele June 24-Sept.4 (13 days: 6E, 5E, D); Boloria toddi May 27-Sept.19 (21 days: S, 5E, I); Euphydryas phaeton absent 1951; Melitaea nycteis,one, June 25, none 1950; Phyciodes tharos May 21-Oct.26(95 days: 4E, 5L, I); Polygonia interrogationis June 25-Sept.23(11 days: 1E, 21L, I); P. comma June 25-Sept.23 (11 days, none 1950); Nymphalis antiopa Apr.4-Oct.15 (10 days: 2E, 6E, I);

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

Vanessa atalanta June 25-Sept.19 (33 days: 30L, 12L, I); Vanessa cardui absent; V. virginiensis, one, Sept.12, none 1950; Limenitis a. arthemis June 7 - Sept.9 (17 days: 6E, 18L, I); L. a. astyanax, one, Aug.13, none 1950; L. archippus June 9-Sept.8 (6 days); Strymon liparops June 20-July 21 (8 days,none 1950); S. titus July 6-19 (4 days, none 1950); S.falacer July 2-10 (6 days, none 1950); Lycaena thoe June 17-Aug.26 (4 days: 11L, 35E, D); L. phlaeas June 18-Oct.26 (18 days: 30E, 17L, D); Everes comyntas July2-Oct.1 (26 days: 21L, 18E, D); Lycaenopsis argiolus May 18-Aug.10 (20 days: 4E, 12E, I); Epargyreus clarus May 25-July 14 (11 days: I); Achalarus lyciades June 29-July 15 (2 days, none 1950); Thorybes pylades May 19-July 14 (28 days); Pyrgus communis July 21-Oct20 (14 days: 46L, 43L, D); Pholisora catullus May 31-Aug.20 (11 days: 4L, 8E, D); Erynnis icelus June 16 only, none 1950); Ancyloxypha numitor June 5-Oct.4 (60 days: 8E, 27L, I about 100%); Poanes hobomok May 22-July 19 (32 days, none 1950). A male and female Strymon liparops strigosa were reared from Prunus serotina (det. A.B.Klots), a new food-plant record.

KATONAH (Klots). Strymon m-album ♀ Sept. (Ruth Gortner), believed the first authentic N.Y. record.

SOUTHFIELDS (Klots). Crambus youngellus July 2 (A.B.K.) and July 5 (A.B.K. and Rindge), believed the first record of the species since the type series was taken in 1908 near Ottawa, Ont.

EASTERN SUFFOLK COUNTY (Latham). Temperature from Jan. to Sept. normal. Snowfall was light and frost out of ground early. Rainfall was normal to June 1 but late summer and early fall were dry. Most species were recorded on or before normal dates. Due to cold, rain, and wind most of the rarer late species of moths were not recorded at all. Alabama and Anticarsia were as scarce as in 1950, a year of more normal weather at this season, but Sunira, scarce as the other two last year, appeared in large numbers. Of diurnal migrants Danaus plexippus, fall flight 2/3 increase over 1950, 2/3 max. year; Apr.17 is 2nd earliest spring record; last appearance Nov. 29; Phoebis sennae no record for 17th consecutive year; Vanessa cardui, single Aug.29. Among species found more commonly than in 1950 were Vanessa virginiensis, Hesperia leonardus, Ceratomia amyntor, Automeris io, Diacrisia virginica (common after 4 yrs. scarcity), Acronicta rubricoma, A. americana, Ochropleura plecta, Lacinipolia renigera, Ulolonche modesta, Nephelodes emmedonia, Leucania pseudargyria, Pseudaletia unipuncta, Cucullia asteroides; Oncocnemis riparia, Procus modicus, Leuconycta diphteroides, Anorthodes tarda, Euthis anotia grata and unio, Autographa falcigera, Catocala ultronia, Euparthenos nubilis, Scolecocampa liburna, Plathypena scabra, Datana ministra, Melanolophia canadaria, Erannis tiliaria, Pero unusually common, Patalene dyzonaria, Prochoerodes transversata, Nomophila noctuella, Eucosma lathami (most common year), Prionoxystus robiniae, Trichotaphe iothalles. Those rarer than in 1950 include Celerio lineata, Hyalophora cecropia, Actias luna, and Eacles imperialis very scarce; Euxoa detersa, Agrotis vetusta, A. gladiaria, A. volubilis, A. ypsilon, Feltia subgothica, F. annexa, F. geniculata, Peridroma margaritosa, Graphiphora c-nigrum, Scotogramma trifolii, Polia grandis, Leucania multilinea, each in numbers only half of 1950; Ceramica picta; Apamea inordinata, Procus bridghami, none for 3rd year; Amphipyra pyramidoides rare for 12th year; Prodenia ornithogalli, Laphygma frugiperda, Autographa biloba, A. precationis, and Agrapha aerea; all Catocala except ultronia rare; Hemerocampa leucostigma, Tolype laricis, Biston cognataria, Cingilia catenaria, Parasa and Euclea, Lagoa crispata, Pyrausta nubilalis, Atteva aurea. Other items of interest were: Papilio philenor (Oct.31, first in 7 years and latest date); Speyeria idalia (holds own at Montauk, about 300 seen Aug.29, latest Oct.10); Limenitis arthemis "albofasciata" (Sept.14, first in 11 years); Cisthene subjecta (one taken for third successive year); Loxagrotis acclivis (six); Protoleucania rubripennis (Aug.4); Lemmeria digitalis (a first record Oct.21); Zale coracias (new record, May 22); Sudariophora acutalis (appeared after 3 yrs. absence); Ambia striatalis (first record, 12 seen, 6 taken in August).

SUFFOLK COUNTY (Wilcox). June 28 at Watermill a single Calpodes ethlius was captured. A number of collectors took the species in 1911 but it has apparently not been seen here since. A big flight of Hemileuca maia was found again this year at Westhampton; first observed Oct.12, none were to be seen by Nov.1. The peak of the flight was Oct.17 when 61 were counted in 20 minutes (11 A.M.). On the same date last year the average was 54 per hour and at the peak on Oct.19 attained 120. (I believe the ratio of ♂♂ to ♀♀ was at least 50:1, nor were any ♀♀ to be found among those resting on the foliage when clouds obscured the sun. S.A.H.). An 8-mile strip of beach from Quogue to Shinnecock inlet was checked for Danaus plexippus on Sept.30 by driving along the dune road at 10 m.p.h. Between 3 and 3:30 P.M. 412 were counted, most of which were flying west. (This would be progressing southwards by following the coastline. S.A.H.). On Oct.3 the same stretch showed only 21 individuals and Oct.14 only 2. On Oct.3 one Monarch was paced along the road by car, being recorded as progressing one mile in 5 minutes without stopping, favored by an east wind of about 20 m.p.h. Another individual was observed for an hour on the same day, at the end of which time it had moved only 100 feet and that to the east against the wind. It had been feeding continually (11 to 12 noon) on the seaside goldenrod although others were passing westward. The following Crambus were taken: vulgivagellus, agitatellus, laqueatellus, leachellus, bidens, hortuellus topiarius, and albellus. Also captured were Eucosma robinsonana, E. adamantana, and Proteoteras naracana.

CONNECTICUT

NEW HAVEN AREA (Remingtons, Bellinger). The winter of 1950-51 once again was not severe. The mean minimum temperature for Dec., Jan., Feb. was 23° F., and on only three days did the temperature reach 0° or lower (lowest -5° on Dec.27). The mean maximum for the same period was 39° F., the temperature exceeding 50° on 12 days (highest 59° on Dec.4 and Feb.27). There was some snow on the ground con-

tinuously from Dec.16 to Jan.16, and a total of 66 days, with the last snowfall on Mar.22. However, the snowfall was not heavy, the total precipitation between the first (Dec.16) and last snowfalls being 15.5 inches. The steady killing frosts ended Mar.28 with only two later (Apr.1 and 17). Spring precipitation was rather low, the totals as follows: April - 3.4 inches; May - 4.4 inches; June 1-15 - 1.3 inches. However, the spring was very cloudy, with only 29 sunny days from April 1 to June 15, and some rain fell on 51 days during the same period. May was unusually warm, the extremes of temperature 87° and 33° F., with the means at 70° and 44° F. Such records for the summer are not yet available, but the weather seemed average. The fall was shortened by cold periods.

Spring collecting dates for key butterflies, with 1950 comparisons, follow:

	1951	1950
L. pseudargiolus	13 Apr.-17 May	19 Apr.-14 May
E. brizo	21 Apr.-13 May	6 May-13 May
E. juvenalis	28 Apr.-31 May	13 May-4 June
A. genutia	28 Apr.- 9 May	3 May-13 May
S. melinus	6 May -	6 May-
L. hypophlaeas(gen.I)	15 May-26 May (fresh)	27 May- 23 June

These figures suggest that spring flight periods in 1951 were about a week earlier than in 1950 and, a comparison with 1949 figures shows, a week later than in 1949. In each year visits were made regularly about once a week to the same localities. Mitoura gryneus was virtually absent in 1951 as in 1950, in contrast to the year of spring abundance, 1949. A. genutia seemed to show some increase over the low level in 1950. With the summer species also, such as P. glaucus, P. troilus, E. cymela, S. falacer, P. hobomok, P. catullus, and A. numitor, the 1951 flight periods were several days earlier than in 1950 but considerably later than in 1949.

No northward movement of Danaus plexippus was seen this year. The breeding population was large in late summer and adults were numerous until Sept. 16. No distinct fall migration was seen here, but M.P. Zappe reported very large numbers flying along a narrow sand spit on the northeastern shore of the State, in company with large dragonflies (Anax junius?). Not one Vanessa cardui has been seen since 1949. No other definite migrations were recognized although a lone Papilio marcellus was seen here July 14 and probably had flown in from the south.

Species found much increased over 1949 and 1950 included: Asterocampa celtis (num. worn by 14 July; adults very num. 18 Aug.-8 Sept., the 1st second brood seen here in 3 yrs.); Speyeria idalia; Isturgia truncataria; Poanes zabulon; Hesperia sassacus; Alypia octomaculata; Nymphalis antiopa; Oreta rosea (Aug. larvae); Cerura (modesta?) - num. larvae; Limenitis astyanax (Aug.); Schizura unicornis (larvae); Rhodophora florida (esp. larvae); Hydria undulata (larvae a real plague!); Cingilia catenaria (incredible numbers at light and day-flying last half of Sept.); Alsophila pometaria (countless thousands 29 Nov.-4 Dec.); Alypia octomaculata (again some defoliating, but less than 1950); Phragmatobia fuliginosa (New Preston, very num.).

Species much scarcer than in 1949 and 1950 included: Euphydryas phaeton; Thorybes spp.; Strymon falacer; Lycomorpha pholus; Anisota senatoria (heavily parasitized); Feniseca tarquinius (absent where common in 1950); Datana drexelii.

Representative species present in rather "usual" numbers included: L. pseudargiolus; L. hypophleas; E. brizo and juvenalis; P. tharos; P. glaucus and troilus; P. hobomok; E. cymela; S. edwardsii (num.), titus (num.), acadica (few); Cercyonis alope; A. conspicua (very num.); P. hobomok; P. massasoit (num.); Lethe eurydice (num.); Strymon melinus (num.); Erannis tiliaria (Oct.23 to Nov.8); Datana integerrima (defoliating widely); Cisseps fulvicollis (num.); Pyrausta (futilalis?) - many nests on Apocynum.

New or unusual records were: Papilio marcellus (one, 14 July); Atrytone dion (new State record, Lakeville, 21 and 31 July); Chlaenogramma jasminearum (New Preston, 31 July); Hyalophora angulifera (New Preston, 31 July); Papilio philenor (18 Aug.); Melittia cucurbitae (17 July); Erynnis lucilius (6 May); Cryptocala acadiensis (new State record, New Preston, 31 July); Papilio cresphontes (large larva 14 Sept.).

GREENWICH (Klots). Noteworthy records: Strymon m-album 2 ♂♂, 3 ♀♀ April 28-May 4.

PUTNAM (Klots). Incisalia henrici May 13 and Limenitis arthemis arthemis x astyanax extreme form "albofasciata" ♀ Aug.25. In unusually increased numbers were Hesperia metea May 13, Polites peckius Aug., Polygonia comma Aug.26 - Sept.8. Crambus watsonellus Aug.30-Sept.8 are first Conn. records.

NEW PRESTON (Hessel). Collecting at light June 30 and July 31 produced a surprising number of fine species, most represented by one specimen. The following were apparently previously unrecorded for the State. Autographa ampla (2), Cryptocala acadiensis, Polia imbrifera, and Habrosyne gloriosa.

MASSACHUSETTS

BARNSTABLE (Kimball). Lycaena phlaeas and Polites peckius were abundant in early June. Response to light was good but to bait poor until early Nov., when it became good. Very few strays were recorded: Erinnyis ello July 15; Herse cingulata Oct.30; Anticarsia gemmatilis (3 only); and Cataclysta plusialis (slossonalis). Among the rarer species captured were Ampeloeca versicolor 8; Citheronia sepulchralis 6; Estigmene prima 1; Acronicta lanceolaria 1; Euxoa violaris 1; Hemipachnobia monochromatea 1; Lepipolys perscripta 1; Chaetaglaea cerata 4; Xylomoia chagnoni 1; Spartiniphaga includens 1; Atethmia rectifascia 4; Eutelia pulcherrima 2; Comachara cadburyi 3; Syngrapha altera 1; Chrysanympha formosa 5; Catocala herodias 1; Mocis texana 5; Panopoda carneicosta 1; Salia interpuncta 1; Hyparpax aurora 1; Schizura apicalis 3; and Stilpnotia salicis 1.

FALL RIVER AREA (Rogers). 1949-50 was characterized by a dry spring and a hot and dry summer with a scarcity of diurnals. An average fall of snow and

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

moisture during the winter months of 1950-51 improved butterfly prospects. On Apr.27 Incisalia henrici appeared, followed on the 30th by I. augustinus and on May 2 by I. niphon and I. irus. At Waquoit Bay I. polios was in fair numbers on the Bearberry. All of these were early to normal in appearance and I. irus was still emerging on May 25 in above-normal numbers, the last few (worn) seen June 12. Flying simultaneously were Erynnis brizo, E. horatius, and E. juvenalis in usual abundance. These were followed in a week to two by E. persius, E. lucilius, and an occasional E. baptisiae. Strymon melinus and Mitoura gryneus appeared in normal abundance in the first week of May. On Apr.30 a single Danaus plexippus was observed flying vigorously in a N.E. direction, the earliest record of 30 years' observation. Limenitis archippus (May 25, early) was in company with Atrytonopsis hianna and Pholisora catullus. A fortnight later both sexes of L. arthemis astyanax were appearing in larger numbers than in 1949 and 1950. In early July Strymon titus, falacer, edwardsii, and liparops strigosus were in normal abundance. A striking male specimen with characters of S. l. liparops was captured July 9 near New Bedford. As in 1950, the past season found Speyeria almost entirely lacking. One pair of S. cybele was captured, nothing else even observed. 15 years ago at the Elizabeth Islands off Woods Hole it was a relatively simple matter to take a hundred S. idalia on a hot, sunny July day.

NEW HAMPSHIRE

WHITE MOUNTAINS (Ferguson, Lennox, Remington, Rawson, Hessel). Gasoline lanterns used in the spruce forest zone just below timber line on Mt. Washington in late July brought interesting results. Five species of Anomogyna were taken in decreasing frequency as follows: homogena, perquiritata, speciosa, atrata and imperita. Jefferson Notch (about 3000') yielded only the first three. During the last days of July two Boloria montina were encountered on the mountain and a surprising number of worn Oeneis semidea were still on the wing. All along the road Nymphalis j-album occurred in numbers as far as the Half-way House, and one was seen in the Alpine Gardens. Sugaring in the area had proved a failure. On a trip up the mountain Aug.11, a fine day for collecting, B. montina, Carsia paludata, Autographa u-aureum were numerous. Colias interior, Polygonia faunus, Nymphalis milberti, N. j-album, and even Oeneis semidea were represented by a few individuals. An Erora laeta ♂ was taken just above timberline, most unexpectedly. At Jefferson Melitaea harrisii larvae were numerous and Arctia caja abundant at light. Vanessa atalanta larvae were common, but Limenitis arthemis fewer than 1950. A Crambus whitmerellus (det. A.B. Klots), Aug.9, at light is the first New England record; it was known from Quebec and the Rocky Mts.

VERMONT

BENNINGTON COUNTY (Klots). A normal year for most butterflies. Unusually abundant were Pieris napi May 19-June 4, Erora laeta May 19-June 21, Limenitis a. arthemis and hybrids arthemis x astyanax June 20-21. Boloria toddi May 18-26 was unusually uncommon. Noteworthy record: Pieris virginiensis May 19.

MAINE

LINCOLN AND KATAHDIN AREA (Grey, Gillham, Klots). Vanessids were about as usual, all a bit scarce, Melitaea harrisii perhaps commoner in spots, but Euphydryas phaeton colonies becoming scarcer. Incisalia lanoraieensis was plentiful at Dead Stream Bog before the heavy rains. A Strymon acadica colony at So. Lincoln was fruitful last year, but produced none this year. Oeneis polixenes katahdin was a bit more plentiful than usual but O. jutta is yearly becoming scarcer. This year heavy rains inundated the bogs with disastrous effect on collecting. Skippers were about as usual, as were Speyeria; Danaus plexippus was not seen at all. Sphingidae were in somewhat greater numbers, with two Cressonia juglandis representing unusual captures. Parasemia parthenos, extremely rare, was back this year, and Euparthenos nubilis, not seen years ago, seems here to stay. Lycaena dorcas claytoni was uncommon to scarce at Springfield, where abundant in former years Aug.5-10.

AUGUSTA, except as noted (Brower). The 1951 season was generally cold with little sunshine and poor collecting. The winter was rather mild, and warm weather produced the first moths at early dates. May through Aug. was cool, and June, July, and Aug. were also cloudy and wet. From then to the middle of Nov. was near normal, the latter part of that month cold and snowy. Lepidoptera were generally much below normal numbers. Light traps made good catches on few nights. Papilio polyxenes was first seen May 19; P. glaucus May 25; Colias eurytheme Aug. 5, scarce in Aug. and Sept.; C. philodice May 16, at Jonesboro June 1; Pieris protodice Sept.16, on wild mustard (new State record); P. rapae May 13; Danaus plexippus flew in unusually large numbers during the summer and fall; Euptychia cymela June 9; Lethe eurydice July 7; Cercyonis alope was present in fair numbers, a few as late as Sept.11; Oeneis jutta June 1 (Jonesport), June 3 (Whiting and Harrington); Speyeria cybele July 5 to Sept.16 (relatively many in mid-Sept. on thistles); S. aphrodite Sept. (small numbers); S. atlantis July 21 (Pittsfield, not found in Augusta area); Boloria toddi May 19; Euphydryas phaeton July 7 (none at hitherto best locality); Melitaea harrisii June 24 (Passadumkeag), July 7 (Augusta); Phyciodes tharos May 23 (Plymouth); Polygonia interrogationis July 13 (Oquossoc); P. faunus July 14 (all Polygonia very scarce); Nymphalis j-album not seen on wing though three found hibernating Nov. (Amherst); N. antiopa May 14 (1951 emergence), July 21 (Pittsfield); Vanessa atalanta May 30 (Lubec), none of 1951 brood; Limenitis arthemis June 24 (Lincoln), Sept.11 (Wiscasset) second brood!, scarce (Augusta); L. archippus June 10 (Palmyra) to Sept.16, scarce; Strymon melinus June 1 (Jonesport); S. acadica July 21 (Pittsfield); Incisalia augustinus May 26, June 1 (Jonesboro, common); I. henrici May 26; Lycaena thoe, July 7, (Windsor), Sept.16; L. phlaeas June 17 (Liberty), small numbers until Sept.; Lycaenopsis argiolus May 5 (Albany), May 26, (Augusta) common; Everes comyntas, scarce in late summer; Thorybes pylades June 17 (Liberty); Erynnis icelus May 31 (Dennysville); Carter-

ocephalus palaemon June 24 (Passadumkeag); Ancyloxypha numitor June 23, few in Aug.; Hesperia sassacus June 10 (Corinna), scarce; Polites themistocles June 24 (Passadumkeag); P. peckius, same; Poanes hobomok May 31 (Dennysville); Atrytone bimacula June 24 (Passadumkeag), others early July (Augusta); Amblyscirtes vialis June 1 (Jonesboro), June 10 (Corinna), none Augusta; A. hegon June 1 (Jonesboro). Of the many moth records submitted by Dr. Brower the following have been selected; the others are preserved for reference in the file at Yale: Sphinx canadensis July 6 (Moosehead); Hemileuca lucina Sept.16, in fair numbers near Augusta; Spaelotis clandestina Sept.22; Isturgia truncataria common at Augusta May 26; Apaecasia detersata May 14 (Southport), many at Jonesboro June 1; Metarranthis obfirmaria, abundant at Augusta May 26; M. broweri June 10 (Corinna); M. warneri June 10 (Bar Harbor).

NOVA SCOTIA

(Ferguson). The season again seemed an average one generally. Diurnals began perhaps a day or two ahead of schedule with the appearance of Incisalia and Lycaenopsis in full flight on May 2. Brephos infans was reported as early as April 4, and a fine series was taken near Halifax April 14, a little past their best. Nothing extraordinary was noted about the butterflies in 1951. Vanessa cardui failed to appear, and has not been seen since the big flight of 1949. A few Danaus plexippus were observed and also in late summer the presence of Colias eurytheme was noted, it having been absent in 1950. The only known colony of Glaucopsyche lygdamus couperi in N.S., discovered in Point Pleasant Park, Halifax, in 1950, continued to flourish. Like race mildredae of Cape Breton Is., this colony is feeding on Lathyrus rather than Vicia, the usual host of couperi. An extremely localized colony of Melitaea nycteis at S. Milford, Annapolis Co., was finally relocated June 27, having been originally discovered there by Dr. McDunnough in 1934. Single Strymon melinus and Hemaris gracilis were taken at the same time, both being very rare here. The season for diurnals was of normal duration, late Colias persisting into November.

The moth collecting was decidedly split into good and bad periods. Until the end of July collecting at light was very productive but, in contrast to 1950, late summer collecting was scarcely worth the effort. Weather during both seasons, considered as a factor, does not seem to explain the situation. The only good sugaring of the season was at Caledonia, Queens Co., May 16. One of the most striking comebacks of the season was Parasemia parthenos which, during late June and July, occurred commonly in almost every locality visited. It has been decidedly rare, though always present, for about 10 years. In 1950 similar abundance of the species was noted in N.B., though not N.S.

New records for N.S. include the following: Apantesis celia, Aldershot, May 18 (bred from larva); Crambidia casta, Aylesford, Sept.2; Euxoa albipennis, Auburn, Sept.1; Autricopis nexilis, near Halifax, May 20; Polia cristifera, Mt. Uniacke and near Halifax, June 20 - July 2 (4); Autographa ou, Cole Harbour, July 14; Zale cingulifera, Caledonia, Queens Co., May 16; Bombycia algens, Aylesford, Sept.2 (many); Zanclognatha pedipilalis, Cole Harbour, July 23; Sterrha rotundopennata, various localities in Nova Scotia, June 19-July 3 (many). On a bog near Halifax good series were taken of Anarta cordigera (June 7-9) and Syngrapha microgamma montana, (June 13-July 12). Only single specimens of each had been taken previously.

NEW BRUNSWICK

(Ferguson). During the first week of August a brief visit was made into northern N.B. in company with Dr. Klots and Mr. Grey. We found the Bathurst colonies of Coenonympha tullia nipisiquit and Lycaena dorcas dospassosi flourishing, and lengthy series were taken (Aug.4-6). South of Bathurst, on the road through Allardville and Bartibog, Polygonia gracilis, progne, faunus, and satyrus were all present, gracilis being the commonest (Aug.7). Boloria titania was also found, though not as commonly as in 1949, and a number of rather worn Strymon liparops and fresh S. acadica were noted. B. titania was again taken in fair numbers near Dorchester. B. toddi was taken at Covered Bridge, near Fredericton, Aug.4 (Klots), believed first positive N.B. record. Excessively cold nights in N.B. made moth collecting futile.

QUEBEC

BAIE D'URFE, MONTREAL REGION (Gray). June, July, and Aug. temperatures were a little below normal, with markedly low daytime temperature, unusually frequent light rain, and with unusually little sunshine in June and Aug. Some records of species follow: Pieris rapae and Nymphalis antiopa, April 27; Lycaenopsis argiolus, May 1; Papilio polyxenes, Xanthorrhoe emendata, May 22; Pieris napi, May 24; Papilio glaucus, May 26; Colias philodice, Scotogramma trifolii, Autographa falcifera, June 1; Phyciodes tharos, Procus mactatus, Autographa precationis, Palthis angulalis, June 5; Limenitis archippus, Unca carneola, Chytolita morbidalis, Olethreutes constellatana, June 12; Leuconycta diphtheroides, Polites themistocles, June 13; Danaus plexippus, Hypsopygia costalis, Perispasta caeculalis, Desmia funeralis, Loxostege chortalis, Menopsimus caducus, Exartema fasciatanum, June 18; Lethe eurydice, Boloria toddi, Lycaenopsis argiolus, Atrytone ruricola, Nymphalis antiopa, Speyeria cybele, S. atlantis, July 18; Haploa confusa, Calcaria bilineata, Menopsimus fractilinea, Epinotia similana, July 19; Colias eurytheme, Catocala cerogama, Pyrausta fumalis, Cisseps fulvicollis, Mesoleuca rufocillata, Dyspteris abortivaria, Oidaematophorus monodactylus, Aug.9; Acentropus niveus, Aug.25; Papaipema marginidens, Scoparia basalis, A. niveus, Aug.30; Graptolitha laticinerea, Papaipema inquaesita Oct.1; Erannis tiliaria, Oct.8, numerous on Oct.21; Colias philodice was still flying on Oct. 22; Acleris sp. was taken on Oct.30. Many other records from Dr. Gray are on file.

LAC MONDOR, NEAR ST. FLORE, ST. MAURICE COUNTY (Munroe). After a moderately cold winter with rather light snow cover, spring weather began at the normal time. The first Lepidoptera appeared in April. At the end of the month, when collecting was begun, the usual hibernating species, vanessids and

FIELD SEASON SUMMARY 7. NORTHEAST - cont.

various Cuculliinae, were present, but in small numbers. May was warm and sunny, and collecting was excellent. June, July, and Aug. were all exceptionally cool and wet, with the proportionate number of Lepidoptera declining gradually until they were well below the expected values by the beginning of Aug. Collecting was very poor throughout Aug. but comparatively good weather in Sept. was accompanied by good emergences of some autumnal species. Larvae were very abundant throughout the early part of the summer, but were less evident after July. In general, groups characteristic of open country occurred in very small numbers as compared with those associated with forests. Such forms as Crymodes devastator, Apamea arctica, the Leucania group, and most spp. of Crambus were exceptionally scarce; Euxoa spp. were scarce, but occurred in larger numbers than in 1945 and 1946. Migrant Lepidoptera were in general scarce; only one individual of Danaus plexippus was seen, in late Sept., flying south. Vanessa cardui and virginiensis were not seen; V. atalanta was rare. Three Magusa orbifera were taken at light in Aug., when Laphygma frugiperda was present in some numbers, but worn.

The most numerous species was Malacosoma disstria, which flew from early July to the end of Aug. During this period an estimated 40,000 individuals were attracted to the two lights in operation. On many nights the numbers were so great as to interfere with normal collecting, the moths congregating in clusters on the sheet and covering the bottom of the light trap. M. americana was about one-twentieth as numerous. After M. disstria in abundance was Choristoneura fumiferana with between 5000 and 10,000 individuals observed, followed by Sparganothis pettitana (the basswood-feeding form, the maple-feeding form being much scarcer), and Archips cerasivorana which defoliated many choke-cherry trees.

The first Lepidoptera taken were Feralia jocosa and Eupithecia sp. on the day of arrival, April 29; on May 1, 44 specimens were taken, including such species as Orthosia revicta, Cerastis tenebrifera, Metalepsis salicarum, Xylomyges dolosa, Homoglaea hircina, Pigalia titea, Bapta glomeraria, Eupithecia ravocostaliata, Semioscopis spp., and some worn hibernating Cuculliinae. Adela purpurea was seen on this date, but did not become abundant until later in the month. A similar assemblage of species persisted until about the third week of May. The most numerous species during this period were Xylomyges dolosa, Orthosia spp. (especially revicta), Nyctobia limitaria, Lozogramma subaequaria and Bapta glomeraria. Some other interesting or significant species were: Zale minerea (first appeared May 6, fairly common); Z. unilineata; Epirrhanthis substriataria (May 6-15, many); Cladara atroliturata (fairly common); Aethalura anticaria (May 7, abundant later); Euthyatira pudens (May 7 and later, few); Ectropis crepuscularia (becoming numerous); Abbottana clemataria (common); Melanolophia signataria and canadaria (common); Gluphisia avimacula (May 11, abundant by May 25, over 100 taken); Morrisonia spp.; Palpita arsaltealis, spring generation, not previously known north of Penna. (May 15); Ellida caniplaga (May 15 and later, becoming numerous).

The second period began about May 21 and extended to about the end of June, with some species that first appeared in early May carrying over into the earlier part of the second period. This was a period of increasing abundance of Lepidoptera. Notodontidae were remarkably well represented and some, such as Heterocampa, Schizura, and Melalopha spp., Notodonta basitriens, and Nadata gibbosa, very numerous; Gluphisia septentrionis replaced G. avimacula after about June 1. Some species taken in numbers in this period were: Anisota rubicunda (numerous, all form alba); Estigmene congrua (very abundant); Smerinthus cerisyi and jamaicensis; Pachysphinx modesta; Polia latex (several melanic); Tortricidia testacea; Crambus luteolellus; Melanolophia spp.; Unca spp.; Nymphula maculalis, allionealis, and badiusalis. Among many interesting captures were: Feralia comstocki (4 in late May); Tacparia zalissaria (4); Unca concinnimacula (fairly common in June); Sphinx canadensis (1 in June); Estigmene prima (1 in June); Baileya doubledayi (1 or 2); Panthea acronyctoides, June 16; Leucania inermis, several.

July brought in not only the pest species such as M. disstria, S. pettitana, C. fumiferana, and Archips cerasivorana, but a general increase of microlepidoptera, which became very numerous, while macros declined somewhat. Unusually numerous for the region were Scoparia, of several species but notably S. cinereomedia, and Crambus elegans. In the macrolepidoptera Enargia spp. and Zenobia pleonectusa were unusually abundant, as were Sicya macularia and Hesperumia sulphuraria. These species persisted well into Aug., and Enargia into Sept. Some interesting captures were: Cataclysta magnificalis, July 22; Oneida lunulalis, several in July; Eubaphe laeta, many; Cryptocala acadiensis, several; Argyria auratella, July 8; Lexis bicolor, several; Phlyctaenia (n.sp.); Pseudeva purpurigera; Lygris propulsata; L. testata; Loxostegopsis merrickalis; Lygropia rivulalis, July 15; Argyria critica, July 31; Udea itysalis, July 18; Pyrausta nicalis, July 18; Panopoda rufimargo, July 10. A massive flight of Acentropus niveus took place on July 31; the moths were struggling on the ground under the lights in large numbers, and one or two hundred specimens were picked up. Sthenopis quadriguttatus, Acossus centerensis, Oreta rosea, Ctenucha virginica, Apantesis spp., Leucania pseudargyria, Apamea arctica, Crymodes devastator, and many other species were scarcer than expected. The smaller quadrifid Phalaenids were numerous and varied.

August did not bring as marked a change in fauna as expected. Catocala were unusually late, C. praeclara being taken July 25, followed by C. sordida on July 31 and C. ilia on Aug.1. The commonest were: C. unijuga, semirelicta, relicta, and cerogama. C. briseis and concumbens were unexpectedly scarce. Towards the end of the month, second broods of a number of moths appeared, among them several species of Nymphula, and Crambidia pallida and casta. In general, collecting in Aug. was disappointing.

September was frost-free, and many summer species persisted nearly to the end of the month, among them Catocala spp., especially relicta. Autumn species mostly emerged about on time. Cingilia catenaria was unusually numerous; Tolype velleda was common, but late. Many other species were taken before the

end of the month. Unusual captures were: Eosphoropteryx thyatiroides, Sept.3; Hymenia perspectalis, Sept.22; and Lemmeria digitalis, Sept.21.

Butterflies were not collected very seriously. Pieris napi was rather common in May, and Lycaenopsis argiolus was phenomenally abundant. Pieris rapae was rather numerous, appearing after napi; Glaucopsyche lygdamus was a little below normal numbers, and appeared about June 1. A single Oeneis jutta was taken, five miles away from the nearest bog. Coenonympha tullia and Euptychia cymela were common in June; Papilio glaucus was rather scarce, P. polyxenes was not seen. Limenitis and Speyeria spp. were well below normal numbers. Among skippers Poanes hobomok was the most common. Melitaea harrisii and Euphydryas phaeton were common. Ancyloxypha numitor was present in small numbers, one being taken as late as Sept.22. Colias were common, though below normal numbers; C. eurytheme appeared later in the fall and in smaller numbers than C. philodice.

Contributors (those reporting directly only): O. Ackermann; P.F.Bellinger; A.E.Brower; G.Ehle; P.R.Ehrlich; D.C.Ferguson; N.Gillham; P.H.H.Gray; L.P.Grey; J.A.Kelt; C.P.Kimball; A.B.Klots; R.Latham; J.Mueller; E.G.Munroe; E. and J. Preston; G.W.Rawson; C. and J.Remington; W.P. Rogers; L.R.Rupert; L.Wilcox; J.B. Ziegler.

8. FAR NORTH - ALASKA TO LABRADOR

by T.N. Freeman
Ottawa, Ontario

Eleven field parties were established by the Northern Insect Survey for 1951. These parties were stationed at the following localities:

ALASKA	Seward	NORTHWEST TERRITORIES
	Big Delta	Coppermine
	Nome	Bathurst Inlet
	Ft. Richardson	Hay River
		Spence Bay
YUKON	Rampart House	Alert
NEWFOUNDLAND	St. Anthony	

The Alaskan investigations were conducted at the request of the officers of the Anchorage laboratory of the United States Public Health Service, and the office of the Surgeon General, United States National Defense, Washington, D.C. The splendid assistance of the officers of those organizations is gratefully acknowledged.

The Division of Botany and Plant Pathology, Canadian Department of Agriculture, co-operated with the parties at Seward, Big Delta, Coppermine, and St. Anthony.

The Lepidoptera contained in the collections of the field parties are no indication of the seasonal abundance at the various localities. A good collection of butterflies from one area may actually represent a poor season and it might be possible to assemble a much larger collection the following year. The collections of insects from northern localities are often strongly flavored by the interests of the collector. The Lepidoptera contained in the collection of a coleopterist, for example, is often no indication of lepidopterous abundance. Therefore, no attempt has been made to summarize the lepidopterous abundance at the various survey stations. Instead, a short discussion of the type of fauna at each locality will be given.

The Lepidoptera collected at Nome consisted of about equal numbers of boreal and arctic insects. The remainder of the Alaskan collections were essentially boreal and northern transition*, with a few arctic species taken at altitudes near or above the tree-line.

Rampart House is situated at the Alaska-Yukon border on the Porcupine River. The insects are essentially boreal with a few northern transition and arctic species. With the exception of Hay River, which lies well within the boreal region on the south shore of Great Slave Lake, all the remaining localities in the Northwest Territories possess an arctic fauna. At Bathurst Inlet several boreal species were captured; however, the food plants of those species apparently do not occur in the Arctic region, and it would appear that certain meteorological conditions exist and transported those species many miles north of their normal habitat. Coppermine and Bathurst Inlet are on the arctic coast of the continental land mass south of Victoria Island. Spence Bay is at the neck of the Boothia Peninsula, near the type locality of the Curtis species described from specimens taken by the Ross Expedition in 1829-33. Alert is on the northernmost point of land in Canada, at the northern tip of Ellesmere Island.

At Alert, Bruggemann took only 3 species of Lepidoptera: Boloria polaris, the liparid Byrdia groenlandica, and the geometer Psychophora sabini. [All 3 were also taken there in 1950 by J.P. Johnson, Jr. - C.L.R.]. St. Anthony is near the northern tip of Newfoundland. The Lepidoptera consist of boreal species with a few northern transition and arctic intrusions.

I hope that these notes, while not dealing with seasonal abundance, will be of interest. The notes by Paul Ehrlich on collecting at Hay River, as well as Paul F. Bruggemann's experience at Alert will be described in a later issue of the News.

*The term "northern transition" is used here as approximately equivalent to "Hudsonian" of the Merriam classification.

SOCIETY AFFAIRS

PROPOSED AMENDMENTS TO THE CONSTITUTION

The following alterations and amendments of the Constitution of the Lepidopterists' Society have been transmitted by the Secretary for publication, as provided in Article XII, Section 1:

A. Replace Art.III, Sec.4 with: "Section 4. Application for membership in the Society, received by the Secretary or Treasurer and accompanied by the annual dues for the current year, shall constitute formalization of membership, and no nomination or election to membership shall be necessary. This section shall be retroactive."

B. Art.III, Sec.6, add: "Life Membership fees shall be placed in a Permanent Publication Fund."

C. Add to Art.III: "Section 9. The Executive Council may expel any member of the Society for such cause as it may deem sufficient for expulsion. This action may be taken only after unanimous approval by the members of the Council. Petition for expulsion shall be presented to the Secretary for presentation to the Council. On expulsion, the departing member shall be refunded all dues paid for the current year. An expelled member may be reinstated by unanimous affirmative vote of the Council."

D. Change "Committee" to "Council" in the following sections:

Article IV: Secs.2, 3 (twice), 4, 5(thrice);
Article V: Secs. 1 (twice, 2;
Article VI: Secs.4, 5, 7 (twice);
Article VII: Sec.1;
Article IX: Sec.1;
Article XI: Sec.1;
Article XII: Sec.2.

E. In Art.VI, Sec.1, delete: ", except the Executive Committee,"; change "Chairman of the Executive Committee" to "Chairman of the Executive Council."

F. Art.IV, Sec.2, add: "Action on all amendments to the By-laws and all appointments and elections by the Executive Council shall be obtained by a canvass by the Secretary of all members of the Council."

G. Art.V, Sec.1, add: "For each office, the nominee receiving the highest number of ballots shall be elected. Officers shall take office at the beginning of the calendar year for which they are elected."

H. Art.VI, Sec.2, add: "before the first of July" in first sentence between "shall" and "appoint". Delete "with the issue of The Lepidopterists' News". Transfer this section as amended, to become Section 1 of Article V, the original "Section 1" becoming "Section 2" and the original "Section 2" becoming"Section 3".

I. Art.VI. Change original Sections "3", "4", "5", "6", "7", "8", "9" to "2", "3", "4", "5", "6", "7", "8" respectively. In the resultant "Section 2", change "Senior Vice President" to "First Vice President".

J. Art.VIII, Sec.1, delete second sentence and substitute: "Each volume shall be issued for a calendar year, the number of issues to be fixed by the Editors in consultation with the President and Secretary. In it shall be published the proceedings of the annual meetings. A list of the members of the Society shall be issued each year."

K. Art.XI, Sec.4: delete entire section (to be replaced as a By-law if at all).

L. Art.XII, Sec.1, insert at end of first sentence: ", or voting by mail ballot".

M. Art.XII, Sec.1, insert after first sentence: "Each proposal for amendment must be signed by not less than five members of the Society and submitted to the Secretary who will promptly transmit it to the Editor-in-Chief."

N. Art.XII, Sec.2, replace entirely as follows: "The By-laws may be altered, amended, or repealed, by a majority vote of the members voting, at any meeting of the Executive Council or in a mail-canvass of the Council by the Secretary. All changes so validated shall be published in The Lepidopterists' News."

DUES INCREASED IN BY-LAW AMENDMENT

By action of the Executive Council (January, 1952), Section 1 of the By-laws is replaced by the following: "Section 1. Beginning with 1952, the annual dues for Active Members shall be Three Dollars, U.S.A. (U.S.A. $3.00), except that students less than twenty-five (25) years of age shall be required to pay only Two Dollars ($2.00), U.S.A., per annum. Active Membership shall include a subscription to The Lepidopterists' News."

The Council ruled that 1952 dues of members outside North America received before this change became known shall be regarded as paid in full even though at the 1951 rate.

NEWS TO BE LETTER-PRESS PRINTED; ASSISTANT TREASURER APPOINTED

The Executive Council also approved the publication of The Lepidopterists' News by letter-press printing, beginning with Volume 6. Further, as provided in Art.IV, Sec.3 of the Constitution, the Council appointed JOSEPH MUELLER, of Short Hills, New Jersey, U.S.A., as Assistant Treasurer. Mr. Mueller will render important service to the Treasurer and Editor-in-Chief.

(continued from page 66)

by F. Martin Brown
Colorado Springs, Colo.

V. DISTRIBUTION CURVES

All of the statistics outlined in sections I through III are based upon what is called "The Normal Curve of Error". When this curve is plotted graphically it is found to be symmetric about the mean. It is the curve that would be formed by plotting n for each class of a perfect variable. Tables for constructing this curve are found in most books on statistics and in many books of mathematical tables.

So long as the data being examined conform to the Normal Curve of Error the standard statistical procedures will yield satisfactory results and conclusions based upon them carry weight. As soon as the array of data deviates SIGNIFICANTLY from the pattern of the Normal Curve the simple statistical procedures give way to more complicated ones.

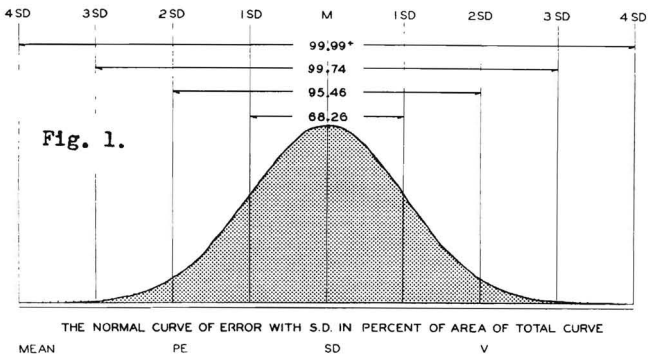


Fig. 1.

THE NORMAL CURVE OF ERROR WITH S.D. IN PERCENT OF AREA OF TOTAL CURVE

Since this curve seems to be so important let us look at it (Figure 1, above) and at some of its properties. The area of the curve that lies between the lines indicating one standard deviation either side of the mean is 68.26% of the entire surface of the curve. This means that 68.26% of the individuals composing a perfect variable will differ from the mean of all of the individuals by no more than one S.D. Areas of the Normal Curve in terms of the mean, plus and minus certain fractions of S.D., are converted to percent of the total area of the curve in Table 9.

TABLE 9.

The Areas of the Normal Curve of Error in S.D. and Percent

Area in S.D.	Equivalent percent
M ± 0.5 S.D.	38.30
M ± 1.0 S.D.	68.26
M ± 1.5 S.D.	86.64
M ± 2.0 S.D.	95.46
M ± 2.5 S.D.	98.76
M ± 3.0 S.D.	99.74
M ± 3.5 S.D.	99.96
M ± 4.0 S.D.	99.99

From this table it can be seen that the mathematical chance for the occurrence of an individual differing by 4 S.D. from the mean of the population to which it belongs is 1 in 10,000; by 3 S.D. about 26 in 10,000; by 2 S.D. about 454 in 10,000; and by 1 S.D. about 3,174 in 10,000. Another way of looking at Table 9 is to say that if you have a perfectly random sample of 100 specimens from a homogeneous population, then on the average, 5 specimens will differ from the mean of the sample by more than 2 S.D.

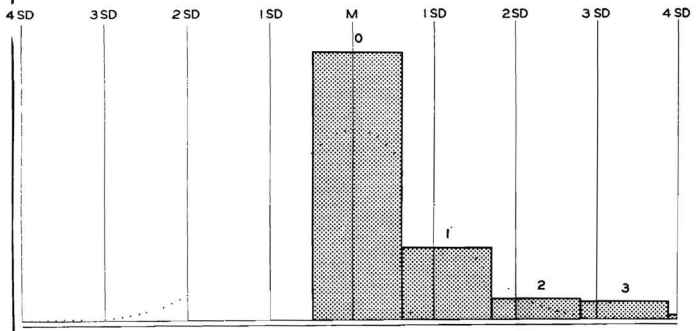
In section III certain percent limits were used, i.e., 95% limits and 99% limits. In section I the factor 0.6745 was used in calculating $p.e._m$. These limits and factors are related to the area of the curve cut off by definite amounts of S.D. either side of the mean.

TABLE 10.

Useful Percent Limits in Terms of Mean ± S.D.

50% limits	equal	Mean ± 0.6745 S.D.
95% limits	equal	Mean ± 1.96 S.D.
99% limits	equal	Mean ± 2.575 S.D.
99.9% limits	equal	Mean ± 3.29 S.D.
99.99% limits	equal	Mean ± 3.86 S.D.

The great majority of natural variables fall into the pattern of the Normal Curve of Error. However, some do not. The data from such a variable are crowded to one end of the curve and the curve is asymmetrical. Such a curve is called a skewed curve (Figure 2). I will not attempt to show the mathematics involved in treating data from such a curve. It is not simple!



NUMBER OF OCELLI ON UNDERSIDE HINDWING OF 96 *C. TULLIA BENJAMINI* MC DUNNOUGH.

MEAN 0.45; SD 0.91; CHI SQUARED 78.3; d.f. 6; P <0.001;

Figure 2.

Brown: SIMPLE STATISTICS FOR THE TAXONOMIST - cont.

VI. CHI-SQUARED TESTS

Sometimes the limited sample available does not allow the investigator to decide by inspection whether or not the data form a normal or a skewed curve. If there is any reason to doubt the curve being normal the data can be tested for "Goodness of Fit" to the normal curve by the Chi-squared test (χ^2). This test produces a convenient index of the deviation of the data from a Normal Curve. It is a simple test to apply but it does involve a number of steps. Here is how it is done.

THE PROBLEM: Do the data concerning the radius of the forewing of Plebejus s.saepiolus (Bdv.) fall into a Normal Curve of Error? (Figure 3)

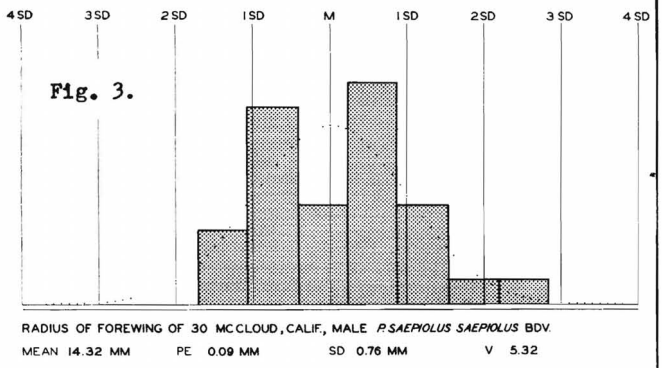


Fig. 3.

THE SOLUTION: Let us take the data from the McCloud series that was used in the first article. This is treated as though it was a normal curve sample and the S.D. determined. Once this is done, these data may be laid out on an eleven-column work sheet -- I use regular accountant's ruled work sheets.

Before doing anything else let me explain how Table 11 was constructed. It really is not as formidable as it looks!

Class: Divide the actual measurements into uniform classes so no class contains no example. At each end lump the rest of the curve into single classes to fill out the curve.

f_o : This is the observed frequency. It is the number of specimens that fall into each class.

d_m : The difference from the mean, calculated by subtracting the mean from the lower limit of each class (or vice versa).

$\frac{d_m}{S.D.}$: The difference from the mean translated into S.D. This is done by dividing d_m by S.D.

AREA: The data for this must be taken from a table of areas for the Normal Curve of Error. The information wanted is the area of the Normal Curve between the lower limit of each class and the mean.

Class Area: This is the area of the Normal Curve occupied by each class. This is found by subtracting adjacent AREAS. Take care as you come to the class containing the mean. In this case it is the sum.

TABLE 11.

Calculation of Chi-squared for Goodness of Fit to the Normal Curve of Error

Example: Radius of the Forewing of the McCloud, Calif., series of 30 male P. s. saepiolus

N = 30 mean = 14.32 mm. S.D. = 0.76 mm.

Class	below 12.9	13.0-13.4	13.5-13.9	14.0-14.4	14.5-14.9	15.0-15.4	15.5-15.9	16.0-16.4	above 16.5
f_o	0	3	8	4	9	4	1	1	0
d_m		-1.23	-0.82	-0.32	0.18	0.68	1.18	1.68	2.18	
$\frac{d_m}{S.D.}$		1.74	1.08	0.42	0.24	0.89	1.55	2.21	2.87	
AREA	0.5000	0.4591	0.3599	0.1628	0.0948	0.3133	0.4394	0.4865	0.4980	0.5
Class Area	0.0409	0.0992	0.1971	0.2576	0.2185	0.1261	0.0471	0.0125	0.0020	
f_c	1.23	2.98	5.92	7.98	6.56	3.78	1.41	0.37	0.06	
f_o	0	3	8	4	9	4	1	1	0	
f_c-f_o	1.23	0.02	2.08	3.98	2.44	0.22	0.41	0.43	0.06	
$(f_c-f_o)^2$	1.5129	0.0004	4.3264	15.8404	5.9563	0.0484	0.1681	0.3969	0.0036	
$\frac{(f_c-f_o)^2}{f_c}$	1.23	neg.	0.74	1.98	0.91	0.01	0.12	1.07	0.06	

Chi-squared = 6.12 d.f. = 8 P = 0.63

f_c : The calculated frequency is found by multiplying the number of specimens in the entire series being studied by the Class Area, a decimal fraction. Slide-rule accuracy is sufficient.

f_o : The observed frequency noted above.

$f_c f_o$: The difference between the calculated frequency and the observed frequency. Take no notice of the algebraic sign (+ or -).

$(f_c-f_o)^2$: The square of the difference just calculated.

$\frac{(f_c-f_o)^2}{f_c}$: The square just calculated, divided by the calculated frequency. The sum of these quotients is called Chi-squared, the number we are seeking.

To interpret Chi-squared it is necessary to use prepared tables. A reference to a full set of them is given after my much abbreviated Table 12. To use these tables two things must be known, Chi-squared and the number of degrees of freedom (d.f.) used. If you subtract 1 from the total number of classes used, including the terminal ones with no examples in them (nine classes were used in my Table 11), you will have d.f. From Chi-squared and d.f. you find in the Table of Probabilities the chance that your sample was drawn in such a way that it conforms with the Normal Curve of Error.

TABLE 12.

Chi-squared for Various Degrees of Freedom and Probabilities that Data Fit Normal Curve

d.f.	P=0.99	P=0.95	P=0.50	P=0.05	P=0.01
1	.000	.004	.455	3.841	6.635
2	.02	.10	1.39	5.99	9.21
3	.11	.35	2.37	7.82	11.34
4	.30	.71	3.36	7.49	13.28
5	.55	1.15	4.35	11.07	15.07
6	.87	1.64	5.35	12.59	16.81
7	1.24	2.17	6.35	14.07	18.48
8	1.65	2.73	7.34	15.51	20.09
9	2.09	3.33	8.34	16.92	21.67
10	2.56	3.94	9.34	18.31	23.21
15	5.23	7.26	14.34	25.00	30.58
20	8.26	10.85	19.34	31.41	37.57
25	11.52	14.61	24.34	37.65	44.31
30	14.95	18.49	29.34	43.77	50.89

In our example Chi-squared is 6.12 and d.f. is 8. Using these we find from the tables that P equals 0.63. This means that 63 out of 100 random samples of 30 with a d.f. of 8 drawn from the same population will differ more than does our sample from the Normal Curve of Error. I am not too critical of my sample until Chi-squared yields a P that is 0.01 or less.

It should be evident from the method involved in the calculation of Chi-squared that Chi-squared is an expression of the difference between the observed sample and a perfect sample with the same parameters drawn from a population that falls into a Normal Curve of Error.

This is the way the table is read: Suppose we have calculated Chi-squared as 16.24 with 8 degrees of freedom. Then P will be closer to 0.01 than to 0.50 and some doubt may be cast upon the chance that the data fit the Normal Curve of Error. If with 8 degrees of freedom we get a Chi-squared of 25.09 we know that there is less than 1 chance in 100 that the data fit the Normal Curve. (Full tables for this will be found as Table III in Fisher's Statistical Methods for Research Workers, Oliver and Boyd, Edinburgh, 1944.)

There are other uses of Chi-squared to test the Goodness of Fit of theory to observation. One of these that is very useful is the "Four-fold Table". It can be used when there are two pairs of attributes. For example, a character that I call "rusty" occurs among specimens of Heliconius charitonius. It is a dusting of rusty scales over the yellow bands and the upper surface of the wings.

PROBLEM: Is "rusty" linked with the female sex or is its apparent association with this sex an illusion created by my sample?

SOLUTION: The four-fold table is ideal for aiding in the solution of a problem like this. The first thing is to construct a table like Table 13.

TABLE 13.

The Observed Frequency of "Rusty" in the Florida Population of H. charitonius

	Males	Females	Totals
With "rusty"	5 (4%)	62 (62%)	67
WITHOUT "rusty"	119 (96%)	38 (38%)	157
Totals	124	100	224

The next step is to think out clearly the implications of the theory being tested. We want to know this: Is "rusty" a characteristic of the females? If this is true, then 100% of the females and none of the males should show the characteristic in question. Under these conditions the theoretical frequencies for "rusty" are those shown in Table 14.

TABLE 14.

Theoretical Frequencies for "Rusty" Under Certain Conditions

	Males	Females
With "rusty"	0%	100%
Without "rusty"	100%	0%

We want statistics to tell us the chance that we are taking in assuming from our sample that "rusty" is a female characteristic. Thus the higher the number we get for Chi-squared the less will be the chance that in an infinitely large series we would find the frequencies for "rusty" to be the same in males and females.

The equation for Chi-squared in the case of a Four-fold Table is this:

$$\chi^2 = \frac{(ad-bc)^2 N}{(a+b)(c+d)(a+c)(b+d)}$$

where the letters have these meanings

a (the northwest corner of Table 13), males showing rusty,

b (the northeast corner), females showing rusty,

c (the southwest corner), males without rusty, and

d (the southeast corner), females without rusty.

N is as usual the number of specimens involved.

A little pencil work will show that when there is perfect agreement between the observed and theoretical frequencies, Chi-squared will equal N. Similarly, when there is absolutely no agreement between the two, Chi-squared will equal 0.

Substituting our observed data in the above formula and then solving for Chi-squared we get:

$$\text{Chi-squared}\,(\chi^2) = \frac{(190-7378)^2 \times 224}{67 \times 157 \times 124 \times 100}$$

$$\chi^2 = 88.73$$

In the case of the Four-fold Table d.f. is 1. Under these conditions, Chi-squared = 3.8 is exceeded by 5 out of 100 cases and 6.6 is exceeded by 1 out of 100 cases. Thus with Chi-squared = 88.7 the chance that our thesis is wrong is very small. I think we can say with a high degree of confidence that "rusty" is a female characteristic.*

[* Mr. Calhoun makes this very pertinent remark: "Could not other hypotheses conceivably lead to the same results as the sex-linked hypothesis? Thus it is probably correct to say 'association exists', but our evidence is drawn from the poor success of the opposite hypothesis. In other words, the evidence does not help in the choice among all imaginable alternatives". My answer to Mr. Calhoun's question is: Yes, there may be other hypotheses that will explain the observed condition, but since the observed condition is of a class most frequently sex-linked the sex-linked solution is more likely correct. This is not the place to present all of the supporting data. That will be done in a publication devoted to the biometry of Heliconius charitonius.]

The occurrence of a few males with "rusty" may indicate that the gene or genes responsible for the characteristic occasionally "cross-over" or that the combination that produces "rusty" tends to be lethal in males. Only extended breeding experiments will give us the answer. It is worth trying.

There are other ways for using Chi-squared to test a theory. Any good book on general statistics will show how they are applied. The thing to remember about Chi-squared is this: "It is a statistical device to measure the deviation of a set of observations from what might be expected if the observed phenomenon is assumed to fall in line with the Normal Curve of Error.

VII. PROBITS

Mr. Calhoun has suggested that I include a brief outline of how the normality of a distribution may be tested by a simple graphical method using probits. One great advantage to the probit method is that it allows easy conversion of the raw data to some other form such as the logarithm, square, square root or any other factor. Such procedure is often most illuminating. Taking the data used in Table 11 and rearranging it we have Table 11A.

TABLE 11A

Test for Normality by the Probit Method

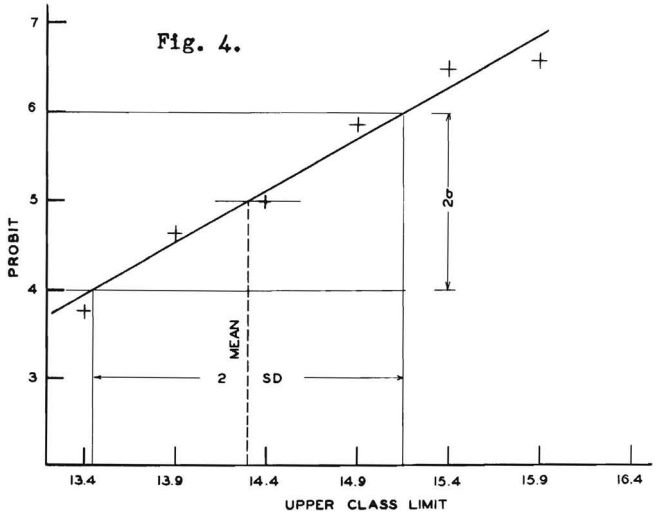
Upper Class Limit	Frequencies	Cumulative Frequencies	Cumulative Percentages	Probit
13.4	3	3	10	3.72
13.9	8	11	37	4.67
14.4	4	15	50	5.00
14.9	9	24	80	5.84
15.4	4	28	93	6.48
15.9	1	29	96	6.75
16.4	1	30	100	∞

The columns are obtained this way:

1) Upper Class Limits, this is self explanatory;
2) Frequencies, the number of cases falling within the class;
3) Cumulative Frequencies, the progressive summation of column 2;
4) Cumulative Percentage, the number in column 4 divided by the total number of cases and multiplied by 100 (in our case divided by 30);
5) The probit, from Table IX in Fisher and Yates or computed from any table of areas of the Normal Curve of Error in this manner: for cumulative percentages BELOW 50 subtract them from 50, for those ABOVE 50 subtract 50 from the cumulative percentage; for each of the remainders enter the AREA column of the table and read the x/σ opposite it; affix a minus sign to those x/σ derived from cumulate percentages less than 50; add 5 to each of these numbers taking care to observe the sign and this will give you the probit.

EXAMPLE: In our problem the first cumulative percentage is 10. This from 50 gives us 40 (0.40). In the area column the nearest we come to this is 0.3997 opposite which $x/\sigma = 1.28$ is found. Since our cumulative percentage was less than 50 this number is given a minus sign, -1.28 and when 5 is added to it we get 3.72 as the probit.

Fig. 4.



The next step is to lay out a graph similar to that in Figure 4. Plot as x's each upper class limit and its probit. Locate the point of the mean on the upper class limit scale and draw it in as a line. Lay off on each side of this line parallel lines that indicate the position of one S.D. each side of the mean. Where these outer lines intersect the lines for probits 4.00 and 6.00, set points. Connect these two points. If your x's lie reasonably close to this line and there is no constant tendency for them to wander from it the distribution may be considered normal. If the plot does not look normal try transforming the raw data.

VIII. COEFFICIENT OF VARIATION

Just as annoying as a qualitative statement of the difference in size between two entities is a statement like this, "Species A is a lot more variable than Species B." Immediately you ask yourself how variable is Species A? What does the author mean by "a lot more"? There is a convenient and very easily calculated Coefficient of Variation (V) that allows a precise statement of the degree to which a species varies in a particular measurement. The coefficient is the index derived by dividing the S.D. by the mean of the measurement and multiplying the resultant number by 100.

$$V = \frac{S.D. \times 100}{\text{mean}}$$

Unfortunately I do not have at hand a great deal of information about the Coefficient of Variation in insects. To convey some idea of how much V itself may vary in one species and to give a scale for comparison with insect-derived V's, let me summarize a long table that deals with variation in man. (See Pearl, Medical Biometry and Statistics, 3rd Ed., W.B. Saunders, Philadelphia, 1940, pp.356-359 for the full table.)

TABLE 15.

The Range of V for Certain Measurements on Man

Measurement	V
Oral temperature	0.49
Skeletal dimensions	2 to 7
Skeletal indices	3 to 12
Volumes and most weights	5 to 35

In Table 16 are a few V's for butterflies. Full data are being published elsewhere in various papers.

TABLE 16.

Some Butterfly Coefficients of Variation

Measurement	Species	Strain	V
radius of forewing	H.charitonius	Florida	9.5
" " "	" "	Mexico	8.2
" " "	" "	Colombia	6.7
" " "	C. tullia	Manitoba	3.9
" " "	" "	Colorado	3.7
" " "	" "	Arizona	3.6
ocelli on underside of hindwing	" "	Manitoba	1.4
" " "	" "	Colorado	5.4
" " "	" "	Arizona	2.0

Brown: SIMPLE STATISTICS FOR THE TAXONOMIST - cont.

A glance at Tables 15 and 16 immediately reveals that V for the characters enumerated in Table 16 for insects is generally rather low. It will take many hundred sets of measurements to determine if this is a general rule among insects or the result of my very small group of determinations. None of the more than 30 V's calculated for H. charitonius is greater than 15. Since all of the determinations made are based upon dimensions and indices it is suggested by Table 15 that they will be low. Compared with man the butterflies that I have studied seem to be a little more variable.

In Table 16 the last group of data is based upon frequency measurements. When computing V for frequencies a little care must be taken. For instance, Coenonympha tullia benjamini (McD.) from Manitoba showed as frequency for ocelli on the underside of the hindwing 3.8±1.3% of the total number possible. The standard formula noted at the end of the first paragraph (p.116) would give us

$$V = \frac{1.3 \times 100}{3.8}$$

$$= 34.2$$

However, lack of ocelli rather than presence of ocelli is the character of C. t. benjamini. So what we want is the frequency with which ocelli are absent, not present, for our calculation of V for the pattern. This is 96.2±1.3%. For this, V is 1.35.

With the data for C. tullia and H. charitonius before me let me digress for a few lines. It is interesting to note the effect of a strong primary pattern upon taxonomists. There is nothing bold about the pattern of C. tullia, so taxonomists have noted the details of the pattern and named dozens of "subspecies". On the other hand H. charitonius is characterized by a bold pattern of yellow bands on a black ground. This makes the species easily recognized. For a century and a half this species remained taxonomically undivided. Roeber then set aside the small broad-banded strain found on the island of Jamaica as H. c. simulator. More recently Hall cut out the St. Kitts strain, on the basis of the well developed secondary pattern of yellow dots on the forewing, as H. c. punctata. A study just published, made by William P. Comstock, recognizes seven subspecies based upon constant pattern differences that have been verified statistically.

Getting back to the Coefficient of Variation, it has been shown above that with it definite statements can be made about variability. It has been shown that the Colorado strain (ochracea) of C. tullia is almost four times as variable as is the Manitoba (benjamini) strain as far as pattern is concerned, but that as far as size is concerned the two subspecies are about equally variable. Probably it is not necessary to go further to show how this statistic can be used and interpreted.

IX. COEFFICIENT OF CORRELATION

Very often the investigator gets a feeling that two characters are in some way related. It is desirable to test this "hunch" and to be able to say with some precision how close the relationship is if it is proved to exist. Looking at the data on wing radius for H. charitonius in Table 16, one feels that there may be some relationship between latitude and variation in size.

PROBLEM: Does H. charitonius vary more in size the farther north the source of the population is sampled?

SOLUTION: The presence or absence and the degree to which this apparent relationship exists can be fixed by using the Coefficient of Correlation. There are several ways for computing this factor (r). I prefer to use a modified power-moment method and will explain it. The basic data needed are given in the first two columns of numbers in Table 17.

TABLE 17.

The Mid-latitude (L) and V for Forewing Radius for Certain Strains of H. charitonius Males

Strain	L° N	V	$L-m_L$ $(=d_L)$	$V-m_V$ $(=d_V)$	$d_L d_V$
Florida	27.5	9.5	+9.5	+1.9	+18.05
Cuba	22.0	7.7	+4.0	+0.1	+0.40
Mexico	23.0	8.2	+5.0	+0.6	+3.00
Hispaniola	18.5	8.0	+0.5	+0.4	+0.20
Jamaica	18.0	6.9	0.0	-0.7	0.0
Puerto Rico	18.0	5.9	0.0	-1.7	0.0
Virgin Islands	18.0	6.7	0.0	-0.09	0.0
Cent. America	12.0	8.8	-4.0	+1.2	-4.80
Colombia	5.0	6.7	-13.0	-0.9	+11.70
				Algebraic sum	+28.55

The first step is to find the mean and the S.D. of the two variables. For L these are 18.00° and 6.30°; for V these are 7.60 and 1.14.

During these computations the differences from the means were used. These are again used in the second step. Here it is important to note the algebraic signs (+ and -). In the case of each strain the differences from the means of V and L are multiplied. If the signs are alike the product bears the plus sign, if they are unlike a minus sign. The results of this step form the last three columns of Table 17.

The last step is to divide the algebraic sum of the products of the deviations by the product of three items, the two S.D. and the number of cases (strains in this instance), as follows:

$$r = \frac{+28.55}{1.14 \times 6.30 \times 9} = +0.446 \pm 0.24$$

The best way to test r for significance is to determine whether it is really different from r = 0. The test number is the standard error of r if it were 0 and the same number of cases had been used. The S.E. under these conditions is determined by dividing 1 by the square root of the number of cases. In our example we have 1 divided by 3, thus S.E. is 0.33. This means that with only 9 cases, r must be greater than 0.33 to be significantly different from 0. Our example with r = 0.446 is therefore possibly significantly greater than zero. When r is less than twice the S.E. for r = 0, I am inclined to hedge my statement of relationship. In this case I would feel safe in saying there seems to be a definite demonstrable tendency for H. charitonius to be more variable in size the farther north is the source of the strain.

There is something else that r indicates in addition to whether or not the relationship really exists: how completely the relationship is established. Probably the best way to explain the interpretation of this from r is to use a diagram (Figure 5), but first something about the limits of r should be explained. The Coefficient of Correlation ranges from -1.0 to +1.0. In either case unity is the measure of perfect correlation. When r is -1.0 it means that the larger is one of the variables, the smaller is the other. When r is +1.0 it means that as one variable increases the other does. When r is 0 there is no relationship between the two variables. In our sample r was +0.45. This is a measure of the dispersal from a straight-line relationship expressed by r = +1.0.

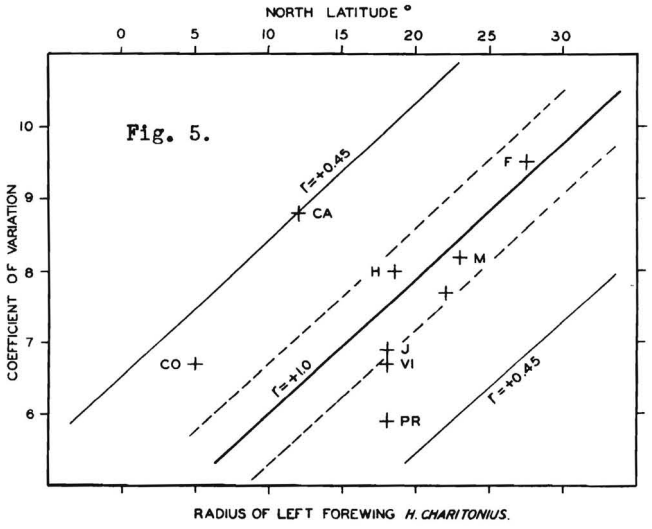


Fig. 5.

On the diagram the intersection for V and L has been plotted for each of the 9 cases. If r had equaled +1, then all of the intersections would have fallen on the central diagonal line labelled r = +1.0. As it is, the data fall within a rather broad band, the limits of which are marked by the solid lines paralleling the central diagonal. The Coefficient of Correlation is a measure of the width of this band. If r had been +0.9 then all of the cases would have fallen between the boundaries established by the parallel broken lines. As it is, two-thirds of the samples fall within a band of the width required for r = 0.90. This suggests that some other factor may be present and more effective than latitude for the samples from Colombia, Central America, and Puerto Rico.

When working with insects, I interpret significant Coefficients of Correlation more or less in this fashion:

r	degree of relationship
under 0.20	of little importance
0.21 - 0.30	some tendency toward a relationship
0.31 - 0.50	a well-developed tendency toward a relationship
0.51 - 0.70	a definite but somewhat vague relationship is evident
0.71 - 0.85	a well-defined relationship
0.86 - 0.95	a sharply defined relationship
0.96 - 1.0	an absolutely dependable relationship.

Such phrases are helpful for persons not too familiar with the philosophy behind r. It must be borne in mind that this interpretation is based upon TRUE CORRELATION and that we can calculate only an ESTIMATE OF CORRELATION. This demands of the interpreter careful additional consideration of the situation from points of view other than the statistical. To researchers well-versed in statistics the numbers alone tell more than these phrases or any other phrases can.

By using the mean radius for each of the above samples and substituting it for V in the problem, r proves to be +0.65 ±0.19. This is definitely significant and indicates a definite direct relationship between size and latitude. It is of more than passing interest to note at this point that so far as H. charitonius is concerned this is a reversal of Bergmann's Law. It would be worth the time of students to go more deeply into the relationship of size to northing and southing of latitude. Bergmann's Law has a good physiological basis for warm-blooded animals. Perhaps in cooler climates larger size affords insects more area for absorption of the sun's energy.

The technique for arriving at r that has been outlined is all very well and easy to use when there is a limited number of cases. When I have a series that runs above 30 I use a system that groups my examples into classes. This is not quite so accurate as dealing with each example separately but is much less time-consuming. Any good text-book on statistics will explain how it is done. The fundamental

formula for the Coefficient of Correlation is

$$r = \frac{S(d_1 d_2)}{N \times S.D._1 \times S.D._2}$$

and for its Standard Error (S.E. is equivalent to the S.D. of a mean) is

$$S.E. = \frac{1 - r^2}{\sqrt{N}}$$

X. LUTZ' COORDINATES

When studying the community of species of a particular area rather than a sample drawn from the population of a single species, the investigator may be confronted with the problem of expressing the geographic affinities of the association of species. A method proposed by the late Dr. Frank E. Lutz that has always impressed me with its possibilities was, I believe, outlined in the Bulletin of the American Museum of Natural History during the first decade of the Century.

Dr. Lutz suggested approaching the problem this way. List the normal species for the area, and adjacent to each place the coordinates of the geographic center of the SPECIES range. Then the average of the longitudes and the average of the latitudes will give the coordinates that express the geographic focus of the association. I believe that the reason Lutz' coordinates have not been used is the difficulty of defining a species and the lack of concrete knowledge of the range of the members of a community. The method will be applied to two collecting localities in Colorado about 25 miles apart horizontally and 6000 feet apart vertically. The lower station is my home, Fountain Valley School; the upper station is Glen Cove, just above tree-line on Pikes Peak.

PROBLEM: What is the geographic expression for the difference in the association of butterflies (excluding Hesperiidae) found at Fountain Valley School and at Glen Cove?

TABLE 18.

Fountain Valley association			Pikes Peak association		
Species	°long.	°lat.	Species	°long.	°lat.
Papilio multicaudatus	110	30	Parnassius smintheus	125	50
Papilio rutulus	113	40			
Pieris protodice	95	38	Pieris napi	100	50
Colias eurytheme	95	35	Colias meadii	110	48
Nathalis iole	90	28			
Eumenis ridingsii	110	45	Coenonympha tullia	100	50
Minois damei	113	38	Oeneis lucilla	107	40
			Oeneis chryxus	110	48
			Erebia epipsodea	105	48
Phyciodes tharos	95	30	Speyeria eurynome	115	45
Phyciodes ismeria	100	33	Boloria helena	108	40
			Boloria aphirape	100	50
			Boloria freija	100	50
			Euphydryas anicia	117	47
			Nymphalis milberti	100	50
Plebejus melissa	105	48	Plebejus aquilo	100	50
Plebejus acmon	112	35	Plebejus saepiolus	100	50
Strymon melinus	95	40	Lycaena rubida	117	40
Hemiargus isolus	90	20	Lycaena helloides	115	50
			Lycaena snowi	117	40
Geographic centers	long.102° lat.35°			long.108° lat.47°	

SOLUTION: The characteristic members of the butterfly fauna of the two stations have been selected and as well as possible the mid-points of their geographic ranges have been determined. The geographic centers tabulated refer to the SPECIES involved and not to subspecies. They also ignore the range outside of the Americas.

The following tabulation can be prepared from the data of Table 18.

	°W. Long.	°N. Lat.
Faunistic Fountain Valley	102	39
Faunistic Pikes Peak	108	47
Faunistic difference	6	8
Geographic difference	0.35	0.12

The faunistic difference in longitude is 17 times as great as the geographic difference and the faunistic difference in latitude is 67 times as great as the geographic difference. The latitudinal difference is of course closely related to the 6000 feet of difference in altitude. The longitudinal difference is not so easily explained. It may be related to the Pleistocene refugia from which the two faunae expanded in Recent time.

This problem emphasizes that the data being gathered by the members of the Society cooperating with THE NEARCTIC BUTTERFLIES project will be invaluable for investigators interested in the geographic aspects of butterflies in North America.

CONCLUDING REMARKS

Now that this series is at an end I hope that it has been shown how some of the problems involved in studying living things can be approached with a higher degree of precision than is generally used. Much more than mathematical precision will result from extended use of accepted statistical procedures. A certain amount of taxonomic caution should evolve from attempts to be precise. That will mean fewer synonyms and less clutter in the literature of Lepidoptera.

To me a far more important result will be the accumulation of a corpus of precise data on the variation of natural populations. In general this is lacking from biological literature. Many questions cannot be adequately answered until such information is available. All too frequently collectors of Lepidoptera forget that an equally important side to assembling and naming properly a collection is to contribute a bit of precise information that in the hands of a more serious biologist now or in the future will add to the formulation of concise and basic biological laws and knowledge. Collections and taxonomy are not an end in themselves; they are merely tools with which the biologist works.

I shall be delighted to correspond with entomologists who are applying or wish to apply statistical methods to enhance their work.

A CORRECTION: LYCAENA HELLOIDES FROM NEW YORK

by Alexander B. Klots

An unfortunate misidentification and misnomer combined occurred in the last Field Season Summary in the Lepid. News (Vol.4: p.103; 1950), when "Lycaena dorcas michiganensis" was recorded from Fishers, Ontario Co., N.Y. Through the courtesy of Mr. Charles Kimball, the collector, I have been enabled to study two of the specimens. They are males of Lycaena helloides (Boisduval) and differ in no significant way from a series of specimens of this species from Illinois. This extends the known range of helloides from Illinois into New York. The combination "L. dorcas michiganensis" is an impossible one, for michiganensis Rawson indubitably applies to a population of the species L. epixanthe (Boisduval); and there can be no question of the specific distinctness of L. epixanthe and L. dorcas (Kirby). It might be interesting to hear some opinions as to the authorship of this impossible combination. Is it Kimball, Rupert, Munroe or Remington? And what was the date of publication of the issue of the Lepid. News in which it occurred?

[Ed.note: The publication date in question will be found on a back page of this issue. The authorship is conspicuously shown on p.102 of the 1950 Season Summary, but of course Dr. Munroe was setting forth the collector's record as he received it. C.L.R.]

IMPORTANT ANNOUNCEMENT

The 1952 meeting of the Lepidopterists' Society will be a combination of field trips and regular formal sessions. At the invitation of the lepidopterists in the Canadian Division of Entomology, this meeting will be held at Ottawa, Ontario, from July 2-5, 1952. For several reasons, this will be an especially attractive meeting: 1) the promise of interesting collecting; 2) the presence of the great Canadian National Collection, assembled in large part under the Society's first President, Dr. J.H. McDunnough; 3) the host members, who together make up the largest and most active staff of research lepidopterists in any institution in the Americas; 4) the date, which will allow members from all parts of North America to include the meeting in plans for their summer vacation travels. The regular features of all Society meetings will be found, as well, - stimulating scientific papers and discussions; exhibits of specimens, equipment, and pictures; and personal contacts with numerous confrères.

Further information will follow, but this announcement is given to allow members to plan for the trip.

C.L.R.

RECENT LITERATURE ON LEPIDOPTERA

Under this heading are listed each month papers on Lepidoptera from all the scientific journals which are accessible to us and our cooperating abstractors. It is hoped that eventually our coverage of the world literature will be virtually complete. It is intended that every paper published since 31 December 1946 will be included. In the first four volumes of the Lep. News 1437 were listed. Abstracts give all new subspecies and higher categories with generotypes and type localities. Papers of only local interest are merely listed. Papers devoted entirely to economic aspects will be omitted. Reprints are solicited from all publishing members and the many regularly received are gratefully acknowledged. Initials of cooperating abstractors are as follows: [P.B.] - P.F. Bellinger; [A.D.] - A. Diakonoff; [L.G.] - L.A. Gozmány; [G.dL.] - G. de Lattin; [C.R.] - C.L. Remington; [T.S.] - T. Shirôzu. A complete set of these pages, for clipping and filing, may be obtained for Vol.4 for $0.50, and a subscription for Vol.5 for $0.50.

B. SYSTEMATIC

200. Amsel, H. G., "Eine neue deutsche Glyphipteryx-Art (Lep. Glyphipterygidae)" [In German]. Entomon, vol.1: pp.88-89. 1949. Describes as new G. schultzella (Mussen, Lippe, Germany). [P.B.]

201. Amsel, H. G., "Eine neue Ochsenheimeria-Art aus dem Libanon (Lepidoptera - Ochsenheimeriidae)" [In German]. Boll. Assoc. Romana Ent., vol.4: pp.3-4, 1 pl. 1949. Describes as new O. talhouki (Iditah, Lebanon); figures adult and ♂ genitalia. [P.B.]

202. Bernardi, G., "Recherche de la position systématique exacte de trois espèces de Pierini asiatiques (Lep. Pieridae)" [In French]. Bull. Soc. Ent. France, vol.52: pp.156-159, 9 figs. 8 Feb. 1948. Places the spp. davidis, stoetzneri and dubernardi in Pieris rather than in Aporia or Synchloe, on the basis of ♂ genitalia; figures latter for these spp. and representatives of each of the 3 genera. [P.B.]

203. Bernardi, G., "Les Rhopalocères décrits par Geoffroy (Histoire abrégée des insectes qui se trouvent aux environs de Paris, 1785)" [In French]. Rev. Franç. Lépid., vol.12: pp.278-281. "May-June" [11 Dec.] 1950. Reviews placement of 10 names of butterflies; points out that saltator must replace mendolensis for local race of Pararge achine, and regards cephalus as valid ssp. of Coenonympha areania. [P.B.]

204. Berthet, H., "Orodemnias cervini Fallou dans les Alpes françaises du Dauphiné, ssp. (ou forme individuelle?) scriniensis nova" [In French]. Rev. Franç. Lépid., vol.11: pp.369-376, 5 figs. "Oct.-Nov." [16 Dec.] 1948. Describes as new a single specimen found frozen in ice (Glacier Blanc, Hautes Alpes); discusses distribution and variation of this extraordinary alpine arctiid. Figures ♂ genitalia of scriniensis, cervini, and quenseli. [P.B.]

205. Betrem, J. G., "Het genus Lansdownia Heylaerts 1881 (Lep., fam. Psychidae)" [In Dutch, English summary]. Verslag 105e Zomervergadering Nederl. Ent. Veren.: pp.xli-xliii. 15 July 1951. Discusses spp. originally included by Heylaerts in this genus, and fixes Oiketicus fuscescens as type. Proposes walkeriana n. n. for O. boisduvalii Walk., 1855. [A.D.]

206. Bourgogne, Jean, and Jiří Paclt, "Fragmenta Lepidopterologica. 2e note. A propos de Psychidae." [In Czech and French]. Acta Soc. Ent. Čechosloveniae, vol.45: pp.47-50. 1 May 1948. Fumaria has priority over Fumea. Bibliography of literature on the biology of the Psychidae from 1918 to 1946. [P.B.]

207. Boursin, C., "Eine neue Agrotis aus Nord-Persien, Agrotis psammocharis n. sp." [In German]. Ark. for Zool., ser.2, vol.1: pp.355-356, 1 pl. 17 Jan. 1951. Type locality Keredj. Figures both sexes, and ♂ genitalia of this and three closely related spp. [P.B.]

208. Box, Harold E., "Report upon specimens of Diatraea Guild. in the Paris Museum, with description of a new species from Brazil (Lep., Pyral.)." Revista Ent., vol.19: pp.419-422, 2 figs. [31] Dec. 1948. Describes as new D. ragonoti (Petropolis). Figures ♂ and ♀ genitalia. Locality records for 8 other neotropical spp. [P.B.]

209. Box, Harold E., "Notes on the genus Diatraea Guilding (Lepid., Pyral.) (Parts IV and V)." Revista Ent., vol.20: pp.541-555, 3 maps. 31 Aug. 1949. Discusses the taxonomic history of the 4 spp. described during the 19th century; figures distribution of the 3 of these which are South American. Revises the material on Diatraea in the Biologia Centrali-Americana, from a study of the Godman-Salvin collection, giving a list of 10 spp. with localities.[P.B.]

210. Bradley, J. D., "Micropteryx kaltenbachii Wood 1890 synonymous with Eriocrania chrysolepidella Zeller 1851 (Lep. Eriocraniidae)." Entomologist, vol. 84: pp.9-10, 2 figs. Jan. 1951. Synonym based on ♂ genitalia, which are figured. [P.B.]

211. Brown, F. Martin, "The American Papilios." Lep. News, vol.4: pp.39-41, 63-66. "1950" [Jan., May 1951].

212. Brown, F. Martin, "Measurements and Lepidoptera." Lep. News, vol.4: pp.51-52. "1950" [Jan. 1951].

213. Catala, R., and P. Viette, "Capture d'un Delias intéressant en Nouvelle-Calédonie (Lep. Pieridae)" [In French]. Bull. Soc. Ent. France, vol.53: pp.150-151, 1 fig. 28 Jan. 1949. D. ellipsis, previously known only from 2 specimens of uncertain locality, is recorded and figured. [P.B.]

214. Chermock, Ralph L., "A generic revision of the Limenitini of the world." Amer. Midl. Nat., vol.43: pp. 513-569, 67 figs, 1 map. May 1950. Includes the genera Parthenos, Harma, Pseudathyma, Pseudacraea, Lebadea, Limenitis (with subgenera Limenitis and Adelpha), Neptis (with subgenera Neptis and Acea), Catuna, Hamanumida, Euphaedra, Euryphaedra, Euthalia. Synonymizes Basilarchia and Heterochroa under Limenitis and Adelpha respectively; all American spp. are in these 2 subgenera. Discusses phylogeny and distribution; describes venation, ♂ genitalia, and early stages of each genus (when known). [P.B.]

215. Cleu, H., "Une race cévenole de Maculinea alcon Schiff. - rebeli Hirscke" [In French]. Rev. Franç. Lépid., vol.12: pp.257-260. "May-June" [11 Dec.] 1950. Describes as new M. a. taranis (Tanargue, Cévennes); no type mentioned. Food plant Gentiana lutea. [P.B.]

216. Cockayne, E. A., "Two new subspecies of British Geometridae (Lep.)." Entomologist, vol.84: pp.154-155. July 1951. Describes as new: Scopula lactata scotica (Forres, Morayshire, Scotland); Eupithecia vulgata scotica (Aviemore, Scotland). [P.B.]

217. Darlington, Emlen P., "Notes on some North American Lepidoptera reared on Sweet Fern (Comptonia asplenifolia Linnaeus) with descriptions of new species." Trans. Amer. Ent. Soc., vol.74: pp.173-185, 1 pl. 16 Feb. 1949. Describes as new: Gnorimoschema confusatella, Lithocolletis comptoniella, Callisto (Parornix) peregrinaella, Gracilaria asplenifoliatella; all from New Jersey. Figures adults of first three and mines of second and third. Notes on 26 other spp. belonging to 13 families. [P.B.]

218. Dufrane, Abel, "A propos de Danaus (Limnas Hbn.) chrysippus L. (Lep., Danaidae)" [In French]. Misc. Ent., vol.45, no.5: 3 pp. Apr. 1948. Describes as new D. c. joannisi (Hoabinh, Tonkin); also 15 aberrations. [P.B.]

219. Dufrane, Abel, "A propos de Dyselpistis symmathetica Meyrick" [In French]. Bull. Ann. Soc. Ent. Belg., vol.84: p.226. Dec. 1948. Synonym of Penestoglossa dardoinella. [P.B.]

220. Dufrane, Abel, "Microlépidoptères de la faune belge (6e note)" [In French]. Bull. Inst. Roy. Sci. Nat. Belg., vol.25, no.13: 11 pp. May 1949. Describes as new: Stigmella libiezi (Colfontaine Forest, on Prunus padus); S. subtrimaculella (Mons, on 'peuplier du Canada'); also several 'forms' and aberrations. Notes on 29 spp. of various families. [P.B.]

221. Field, William D., "The International Commission on Zoological Nomenclature and the correct name for the North American Monarch Butterfly." Proc. Ent. Soc. Wash., vol.52: pp.234-236. Oct. 1950. Points out that in fixing the type of plexippus as the specimen figured in Holland's butterfly Book the Commission inadvertently affixed this name to the non-migratory South American race of the Monarch; the North American race would thus be D. p. menippe. [P.B.]

222. Field, William D., "Moths of the genus Cincia and three new and closely related genera." Proc. U. S. Nat. Mus., vol.100: pp.311-326, 13 figs. 1950. Describes as new: AMPLICINCIA (type Cincia pallida); A. fletcheri; A. lathyi; A. walkeri; PARACINCIA, P. dognini; PARVICINCIA, P. belli; all from Jamaica. Removes C. nephelistis to Paramulona and returns C. muelleri to Hypoprepia. Redescribes other species of the group; gives a key to genera and spp., and figures genitalia of all spp. [P.B.]

223. Fischer, Ch., "Espèces nouvelles pour la France" [In French]. Rev. Franç. Lépid., vol.12: pp.43-48, 1 pl. "Feb." [2 Apr.] 1949. Describes as new Deroxena venosulella gallica (Digne, Basses-Alpes). New records are 4 spp. of Eupista, Cataplectica profugella, Epermenia kroneella, Hyponomeuta stanellus. Figures ♂ genitalia of first 6 and of Eupista caespititiella. [P.B.]

224. Fleming, Henry, "The Euchromidae (moths) of Kartabo, British Guina, and Caripito, Venezuela." Zoologica, vol.35: pp.209-216. 27 Nov. 1950. Describes as new Autochloris umbratus (Caripito). Describes larva, pupa and cocoon of Poecilosoma chrysis (food plant, sp. of Moriaceae). Records 77 spp. from Kartabo and 44 from Caripito, only 15 being common to both localities. [P.B.]

225. Ford, L. T., "The Plutellidae." Proc. Trans. South London Ent. Nat. Hist. Soc., 1949-50: pp.85-93, 1 pl. Apr. 1951. Account of the 5 genera and 26 spp. found in Britain; figures adults of all. [P.B.]

226. Franclemont, J. G., "The occurrence of Anomis commoda Butler in the United States and its life history (Lepidoptera, Phalaenidae, Catocalinae)." Bull. Brooklyn Ent. Soc., vol.44: pp.69-71. Apr. 1949. Species has been misidentified as A. fulvida; introduced from Orient. Describes larva. Food plant Hibiscus syriacus. [P.B.]

227. Franclemont, John G., "A new moth from Patagonia." Proc. Ent. Soc. Wash., vol.52: pp.40-41, 3 figs. 14 Feb. 1950. Describes as new EUXOAMORPHA, E. eschata (Punta Arenas, Chile). Figures ♂ genitalia. [P.B.]

228. Franclemont, John G., "On the identity of Therina fervidaria Hübner (Lepidoptera, Geometridae, Ennominae)." Bull. Brooklyn Ent. Soc., vol.45: p.90. June 1950. Name must replace athasaria; Hübner's figure matches the second brood of southern "athasaria", which name may be applied to the northern, single-brooded subspecies. [P.B.]

229. Hayward, Kenneth J., "Three new genera for neotropical Hesperiidae (Lep. Rhop.)" [With Spanish abstract]. Acta Zool. Lilloana, vol.5: pp.97-102. 28 Oct. 1948. Describes as new: MELLANA, for Atrytone mella; NYCTELIUS, for Panoquina nyctelius; and EVANSIELLA, for Perichares cordela. [P.B.]

230. Hayward, Kenneth J., "Hesperioidea Argentina XIX" [In Spanish, English abstract]. Acta Zool. Lilloana, vol.5: pp.103-112. 28 Oct. 1948. Adds 8 spp. to the fauna; removes 5. Notes on synonymy include following generic changes: Atrytone urqua to Poanes, Mucia lydora to Oenus, Metrocles oropa to Metron, Vorates mabillei to Lerodea, Carystus artona and C. marcus to Vettius. New localities given for 24 spp. [P.B.]

231. Hayward, Kenneth J., "Nuevas especies de Hespéridos neotropicales (Lep. Hesperiidae)" [In Spanish, English summary]. Acta Zool. Lilloana, vol.5: pp. 175-183, 4 figs. 28 Oct. 1948. Describes as new: Ochlodes aligula decia (Misiones, Argentina); Niconiades nikko (Misiones); Thespeius xarina (Misiones); T. castor (Nova Teutonia, Brazil); Synale sylvanus (Capilla del Monte, Córdoba, Argentina). Figures ♂ of the last three and of Atrytone meridiani and describes ♀ of the latter. [P.B.]

232. Higgins, L. G., "A descriptive catalogue of the Palaearctic Euphydras (Lepidoptera: Rhopalocera)." Trans. R. Ent. Soc. Lond., vol.101: pp1435-499, 7 maps, 41 figs. 30 Dec. 1950. The genus is divided into the maturna group, with 4 spp. (and more in the Nearctic), and the aurinia group with 4 spp., all Palaearctic. These 8 spp. are described, with figures of morphological characters, and distribution maps are given for 7. [P.B.]

233. Hopkins, G. H. E., "The gender of the name Colias." Entomologist, vol.84: pp.175-176. Aug. 1951. Inconclusive comments; question has been referred to the International Commission. [P.B.]

234. Howe, Edwin W. and William H., "Ceratomia kansensis new species (Sphingidae)." Ent. News, vol.61: pp.57-60, 2 figs. May 1950. Type locality Ottawa, Kansas. Figures adult, and venation of this sp., undulosa, and catalpae. [P.B.]

235. Jacobs, S. N. A., "The British Oecophoridae (Part I) and allied genera." Proc. Trans. South London Ent. Nat. Hist. Soc., 1948-49: pp.123-141, 1 pl. Feb. 1950. Covers 8 genera of Oecophoridae, 2 of Blastobasidae, Batrachedra, and Mompha stephensi. Adults and known larvae are described; all spp. except 1 introduced blastobasid are figured. [P.B.]

236. Jacobs, S. N. A., "The British Oecophoridae (Part II)." Proc. Trans. South London Ent. Nat. Hist. Soc., 1949-50: pp.187-203, 1 pl. Apr. 1951. Covers 8 genera, plus Agonopteryx section of Depressaria. Adults of all spp. are figured. [P.B.]

237. Jacquemin, H., "Chlorissa cloraria Hb." [In French]. Lambillionea, vol.50: p.59. 25 June 1950. Differences from C. viridata. [P.B.]

238. Janmoulle, E., "Elachista pulchella Hw., bona species" [In French]. Lambillionea, vol.49: pp.119-123, 1 pl. 25 Dec. 1949. Removes sp. from synonymy under E. humilis; figures ♂ genitalia of these spp. and of E. pomerana and E. subnigrella. [P.B.]

239. Kalis, J. P. A., and L. J. Toxopeus, "Notes on some rare butterflies and moths from the Island of Celebes." Idea, vol.8: pp.92-97. 31 Jan. 1951. Gives field notes and remarks on nomenclature of 7 rare species. [A.D.]

240. Kiriakoff, Sergius G., "On the so-called "lower" taxonomic categories." Lep. News, vol.2: pp.3-4. Jan. 1948.

241. Kiriakoff, Sergius G., "The nomenclature of the specific complex." Lep. News., vol.2: pp.15-16. Feb. 1948.

RECENT LITERATURE ON LEPIDOPTERA - cont.

242. Kiriakoff, S. G., "Recherches sur les organes tympaniques des Lépidoptères en rapport avec la classification. III. Dioptidae" [In French]. Bull. Ann. Soc. Ent. Belg., vol.86: pp.67-86, 2 pl. 6 May 1950. Describes as new EUFORBESIA (type Monocreagra unimacula); divides the family into the subfamilies DIOPTINAE (rudimentary tympana) and JOSIINAE (tympana well-developed). Describes the organs in 16 genera. Regards Dioptidae as ancestral stock of the Notodontoidea, Josiinae being an early offshoot. [P.B.]

243. Klimesch, Josef, "Zur Frage der verwandschaftlichen Beziehungen einiger Stigmella-Arten auf Grund des Baues des männl. Kopulationsapparates (Lep., Stigmellidae)" [In German]. Zeits. Wiener Ent. Ges., vol.33: pp.49-82, 62 figs. 1949. Describes and figures ♂ genitalia and larval mines of 17 European spp. Reviews earlier work on the genus and revises its arrangement. [P.B.]

244. Klimesch, J., "Über die morphologischen und biologischen Unterschiede der Coleophora-Arten linariella Z. und fulvosquamella H. S. (Lep. Coleophoridae)" [In German]. Zeits. Wiener Ent. Ges., vol.34: pp.55-66, 1 pl., 4 figs. 1949. Describes and figures genitalia of these 2 spp.; discusses larval habits and distribution. Notes on some related spp. [P.B.]

245. Lamont, Norman, and E. McC. Callan, "Moths new to Trinidad, B. W. I." Zoologica, vol.35: pp.197-207. 27 Nov. 1950. Describes as new Megatomis albivia (Noctuidae; Brit.Guiana). Type specimen not identified. Records of 178 other moths, belonging to 29 families, new to Trinidad. [P.B.]

246. Le Marchand, S., "Corrigenda au Catalogue des Microlépidoptères de France et de Belgique" [In French]. Rev. Franç. Lépid., vol.12: pp.233-235. "Mar.-Apr." [25 Sept.] 1950. Atremaea lonchoptera to Lymnaecia, in Cosmopterygidae; Enolmis a synonym of Odites (Cryptophasidae). [P.B.]

247. de Lesse, H., "Étude biometrique des formes d'Erebia epiphron (Knoch), des Vosges, d'Auvergne et des Pyrénées" [In French]. Rev. Franç. Lépid., vol.13: pp.3-9, 3 figs. "Jan.-Feb." [31 Mar.] 1951. Describes as new 'race' mixta (Mont Doré). Analyzes the variation of some pattern characters in local populations. [P.B.]

248. Lhomme, Léon, "Eidophasia aereolella nova sp." [In French]. Rev. Franç. Lépid., vol.12: p.98. "May-June" [7 Dec.] 1949. Type locality "gorges du Cady, au pied sud-ouest de St.-Martin-du-Canigou". [P.B.]

249. Loritz, J., "Sur une nouvelle race locale de Thais rumina medesicaste Illiger (australia Esp.) dans la vallée du Var supérieur" [In French]. Bull. Ann. Soc. Ent. Belg., vol.87: pp.130-132. 5 July 1951. New 'race' daluisensis (Daluis, Var Valley, France) is described. Discusses the distribution and variation of the species. [P.B.]

250. Marion, H., "Contribution à l'étude des Crambus paléarctiques. I. Crambus digitellus H.-S." [In French]. Rev. Franç. Lépid., vol.12: pp.125-128. "May-June" [7 Dec.] 1949. C. petrosellus is a synonym. [P.B.]

251. Marion, H., "Mecyna auralis de Peyerimhoff, bona species" [In French]. Rev. Franç. Lépid., vol.12: pp.203-206, 2 figs. "Jan.-Feb." [12 July] 1950. Distinguishes sp. from M. trinalis; figures ♂ genitalia of both. [P.B.]

252. Marion, H., "Contribution à l'étude des Crambus paléarctiques. II. - Crambus craterellus Sc. et cassentiniellus Z." [In French]. Rev. Franç. Lépid., vol.12: pp.236-240, 1 pl. "Mar.-Apr." [25 Sept.] 1950. Distinguishes these 2 spp., figuring adults and ♂ genitalia. [P.B.]

253. Marion, H., "Contribution à l'étude des Crambus paléarctiques. III. - Le groupe craterellus en Europe occidentale et en Afrique du Nord" [In French]. Rev. Franç. Lépid., vol.12: pp.261-277, 1 pl. "May-June" [11 Dec.] 1950. Describes as new C. m. maghrebellus (Rabat, Morocco); C. m. rungsellus (Aguelmane de Sidi, Atlas Mts.). Revision includes, in addition, C. craterellus, C. kobelti, C. sardiniellus, C. cornutellus, C. cassentiniellus, C. tingitanellus and C. similimellus; author employs Kiriakoff's terms 'ultraspecies' and 'semispecies' to express rank of some forms. New entities and ♂ genitalia of several spp. are figured. [P.B.]

254. McDunnough, James H., "Two unrecorded homonyms in the genus Euxoa (Lepid. Phalaenidae)." Bull. Brooklyn Ent. Soc., vol.45: p. 84. June 1950. Smith's names orbicularis and incallida.

255. McDunnough, James H., "Species of Euxoa of Eastern North America, with particular reference to genitalic characters (Lepidoptera, Phalaenidae)." Bull. Amer. Mus. Nat. Hist., vol.95: pp.359-408, 11 pls. 29 Dec. 1950. Describes as new Euxoa servita novangliae (Franconia, New Hampshire). Describes and figures ♂ and ♀ genitalia of 32 spp. and sspp. Gives a key based on ♂ genitalia. [P.B.]

256. McElvare, Rowland R., "A new heliothid from New Mexico." Bull. Brooklyn Ent. Soc., vol.45: pp.83-84, 1 fig. June 1950. Describes as new Dasyspoudea zuni (Black Rock, McKinley Co.). Figures adult. [P.B.]

257. McElvare, Rowland R., "A new Grotella from southwest Texas (Lepidoptera, Phalaenidae)." Bull. Brooklyn Ent. Soc., vol.45: pp.117-118, 1 fig. Oct. 1950. Describes as new G. vauriae (Tornillo Creek, Brewster Co.). Figures adult. [P.B.]

258. Moeck, Arthur H., "A new subspecies of Speyeria atlantis (Edwards) from Nevada (Lepidoptera: Nymphalidae)." Ent. News, vol.61: pp.61-64, 4 figs. May 1950. Describes as new S. a. greyi (E. Humboldt Range). Figures both sexes. [P.B.]

259. Munroe, Eugene, "The generic positions of some North American species commonly referred to Pyrausta Schrank (Lepidoptera: Pyralidae)." Canad. Ent., vol. 82: pp.217-231, 28 figs. Nov. 1950. Describes as new: MIMOPHOBETRON (type Pyrausta liopasialis); MACROBOTYS (type Botys aeglealis). Discusses genera Blepharomastix, Palpita, Udea, Polygrammodes, Sameodes and Mecyna and gives generic keys. [P.B.]

260. Obraztsov, N., "Two new palearctic genera of the tribe Laspeyresiini (Lepidoptera, Tortricidae)." Tijdschr. Ent., vol.93: pp.99-100, 2 figs. 20 Mar. 1951. Describes as new EUCOSMORPHA (type Tortrix rheediana Hw.) and CIRRIPHORA (type Grapholitha pharaonana Koll.). [A.D.]

261. Olthof, J. T., "Some Neptis hordonia subspecies from Indonesia." Idea, vol.8: pp.97-98. 31 Jan. 1951. Describes as new N. h. dubiosa (Kangean Is.) and N. h. anna (Flores). [A.D.]

262. Orfila, Ricardo N., "Orneodes riggii sp. nov." [In Spanish]. Commun. Inst. Nac. Invest. Cienc. Nat., Cienc. Zool., vol.1, no.10: 8 pp., 1 pl, 2 figs. 1949. Type locality La Rioja, Argentina. Figures adult and ♂ genitalia. Brief account of family Orneodidae. [P.B.]

263. Pastrana, José A., "Una nueva peste en Araucarias de Misiones (Republica Argentina) (Lepidoptera - Grapholitidae)" [In Spanish]. Rev. Invest. Agric. Argentina, vol.4: pp.243-244, 2 pl. 1950. Describes as new Laspeyresia araucariae (San Antonio, Misiones, Argentina). Figures adult, ♂ and ♀ genitalia, and other structural details. Larva, not described, on Araucaria angustifolia. [P.B.]

264. Picard, J., "Note sur les Hesperiidae français" [In French]. Rev. Franç. Lépid., vol.12: pp.23-31. "Jan." [28 Feb.] 1949. Notes on generic concept, on the application of the names fritillarius and fritillum (synonyms of Pyrgus malvae), and on Pyrgus armoricanus corsicus and Thymelicus acteon. [P.B.]

265. Picard, J., "Pyrgus carlinae Rbr. et sa sous-espèce cirsii Rbr." [In French]. Lambillionea, vol.50: pp.53-58, 1 map. 25 June 1950. Concludes, on the basis of distribution, morphology, and the existence of intermediate populations, that cirsii and carlinae are conspecific. [P.B.]

266. Picard, J., "Petite étude sur Pyrgus bellieri Obth." [In French]. Rev. Franç. Lépid., vol.12: pp. 49-58, 2 figs., 1 map. "Feb." [2 Apr.] 1949. Taxonomic history, distinction from P. alveus, distribution, geographical and individual variation. [P.B.]

267. Remington, C. L., "Principles of taxonomy." Lep. News, vol.2: pp.26, 38, 50, 62, 102. "Mar." [June], "Apr." [June], "May" [July], "June" [Aug.], "Nov." [Dec.] 1948.

268. Remington, C. L., "Procedure in taxonomy." Lep. News, vol.2: pp.26, 38, 50, 78, 102; vol.3: p.14. "Mar." [June], "Apr." [June], "May" [July], "Oct." [Nov.], "Nov." [Dec.] 1948; "Feb." [Apr.] 1949.

269. Smelhaus, Jiří, "Polyommatus hybr. cormion Nabokov (Pol. meleager Esp. x Pol. coridon Poda). (Lep. Lyc.)" [In Czech, French summary]. Acta Soc. Ent. Čechosloveniae, vol.45: pp.50-55, 10 figs. 1 May 1948. Concludes, on the basis of ♂ genitalia, that this hybrid (see Lep. News, vol.4: abs. no. 135) is the same as Nabokov's 'species'. [P.B.]

270. Sperry, John L., "Geometrid notes, a new genus and species from Arizona." Bull. Brooklyn Ent. Soc., vol.44: pp.158-162. Dec. 1949. Describes as new: HERRESHOFFIA, H. gracea (Todd's Lodge, Oak Creek Canyon, Ariz.). Notes on 5 Ennominae. [P.B.]

271. Stempffer, H., "Description de quelques Lycaenidae (Lep.) nouveaux de la faune éthiopienne" [In French]. Bull. Soc. Ent. France, vol.56: pp.66-71, 4 figs. May 1951. Describes as new: Liptena rochei (Lagos, Nigeria); Hewitsonia magdalenae (Eala, Belgian Congo); Lepidochrysops desmondi (Olarisi Hill, Chepalungu Distr., Kenya); L. victoriae vansomereni (Athi R. bridge, 18 mi. from Nairobi, Kenya). Transfers Triclema quadricaudata Beth. to Neurellipes on basis of description of previously unknown ♂. Figures ♂ genitalia of last and of new spp. [P.B.]

272. de la Torre y Callejas, Salvador Luis, "Notas suplementarias a nuestro trabajo sobre el género Danaus (Lepidoptera, Rhopalocera)" [In Spanish]. Mem. Soc. Cubana Hist. Nat., vol. 10: pp.93-103. June 1951. Summarizes American spp. and sspp. of genus; notes on 8 Cuban and Central American forms. [P.B.]

273. Viette, P., "Essai d'un tableau de détermination des familles de Tinéides de la faune française" [In French]. Rev. Franç. Lépid., vol.12: pp.16-23. "Jan." [28 Feb.] 1949. Key to the 27 families of 'tineids' (i.e. the Monotrysia and lower Ditrysia) found in France. [P.B.]

274. Viette, P., "Sur les genres Cocytodes Gn. et Arcte Koll. (Lepid. Noctuidae)" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.27-29, 10 figs. Feb. 1949. Describes as new PSEUDOARCTE (type Cocytodes maura Holl.). Cocytodes a synonym of Arcte. Key to the 4 spp. of Arcte, based on ♂ genitalia. [P.B.]

275. Viette, P., "Contribution à l'étude des Micropterygidae (3me note). Rectification et description, d'une espèce et d'une forme nouvelles" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.87-89, 3 figs. May 1949. Describes as new Micropteryx lambesiella (Lambèse, Algeria); figures wing pattern, and ♂ genitalia of this sp. and M. myrtetella. [P.B.]

276. Viette, P., "Note sur la position systématique de Laelapia notata Btlr. (Lépid.)" [In French]. Bull. Mens. Soc. Linn. Lyon, vol.18: pp.170-172, 7 figs. Oct. 1949. Redescribes this arctiid, figuring venation and genitalia; genus originally placed in Lymantriidae. [P.B.]

277. Viette, Pierre E. L., "Contribution to the study of Hepialidae (9th note): the genus Phassodes Bethune-Baker (Lepidoptera)." Proc. Hawaiian Ent. Soc., vol.14: pp.189-190, 4 figs. Mar. 1950. Redescribes genus; figures ♂ genitalia. P. nausori a synonym of P. vitiensis. [P.B.]

278. Viette, P., "Contribution à l'étude des Hepialides (16e note). Sur quelques espèces de la collection Pfitzner" [In French]. Bull. Soc. Ent. France, vol. 55: pp.116-119, 6 figs. Oct. 1950. Describes as new: PFITZNERIELIA (type Triodia remota); PSEUDOPHILAENIA (type Philaenia omagua). Describes ♂ genitalia of Philaenia fasslii and P. sanguanmachica. [P.B.]

279. Walkden, H. H., "Cutworms, armyworms and related species attacking cereal and forage crops in the central Great Plains." U. S. Dept. Agric. Circ. no.849: 52 pp., 7 figs. Oct. 1950. Account of distribution, biology and economic importance of 53 spp. of Noctuidae, with a key to the larvae of 31. Good figures illustrate the key characters. [P.B.]

280. Wehrli, Eugen, "Die Einteilung der Gattung Dyscia Hbn." [In German]. Ent. Berichten, vol.13: pp.77-79, 6 figs. 1 May 1950. Describes as new the subgenera EUDYSCIA (type D. fagaria); WARNECKEELIA (D. malatyana); IBERAFRINA (D. penulataria); CALODYSCIA (D. sicanaria); CATADYSCIA (C. atlantica); RJABOVANA, and type D. (R.) negrama. Figures ♂ genitalia of all except D. atlantica, and of D. conspersaria, the generotype. No locality is given for D. negrama, and the species is not completely described. [P.B.]

281. Wiltshire, E. P., "A year on a Tigris island." Journ. Bombay Nat. Hist. Soc., vol.49: pp.637-660, 3 pls., 2 figs., 1 map. Apr. 1951. Describes as new Celama harouni (Karradah Is., Tigris R., Iraq); figures ♂ genitalia, compared with those of C. centonalis. Lists 50 permanent or temporary resident spp. of the island, and a number of casual visitors; discusses the biology and ecology of the former and of the island fauna as a whole. Island is periodically submerged, except for the treetops, by floods. [P.B.]

282. Wykes, N. G., "The African Charaxes." Proc. Trans. South Lond. Ent. Nat. Hist. Soc., 1948-49: pp.165-168. Feb. 1950. General account of the genus, with notes on a number of African spp. [P.B.]

283. Zikan, J. F., "Observações sobre os componentes dos gêneros Phaenochitonia Stichel e Pterographium Stichel, com a descrição de uma nova espécie e criando um novo gênero (Riodinidae, Lepidoptera)" [In Portuguese]. Revista Ent., vol.20: pp.535-539, 3 figs. [31 Aug.] 1949. Describes as new STICHELIA (type Phaenochitonia bocchoris Hewitson); Pterographium similatum (São Gabriel, Rio Negro, Amazonas, Brazil). Figures both sexes and venation of new sp. Comments on 10 other spp.; 5 are transferred from Phaenochitonia to Stichelia. [P.B.]

284. Zimmerman, Elwood C., "A new Protaulacistis from Kauai (Lepidoptera: Pyraustinae)." Proc. Hawaiian Ent. Soc., vol.14: pp.337-340, 7 figs. Mar. 1951. Describes as new P. swezeyi (Kokee, Kauai, Hawaiian Is.); figures adult and ♂ and ♀ genitalia. [P.B.]

285. Zimmerman, Elwood C., and J. D. Bradley, "A new genus and species of Elachistidae mining Lonicera leaves in Hawaii (Lepidoptera)." Proc. Hawaiian Ent. Soc., vol.14: pp.191-196, 5 figs. Mar. 1950. Describes as new SWEZEYULA lonicerae (Honolulu, Hawaii); figures adult, ♂ and ♀ genitalia and other structures. [P.B.]

NOTICES

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Catocala herodias Stkr., Automeris pamina Neum., and A. pamina f. aurosea Neum. in series, many other rare moths, offered in exchange for the following nos. from the McD. list: 31d; 35b; 46a; 52b,d,e,g; 79a; 206d,e; 207a,b; 215; 241; 243; 245; 254; 270c; 337b; 423c; 430a; 455h; 456a; 467c; 469. Also want any nearctic Oeneis or Erebia including common species in series. Send list of desiderata to Paul R. Ehrlich, 538 Academy St., Maplewood, N.J.

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12 topotypes of POLITES MARDON offered in exchange for nearctic Catocala and Sphingidae new to my collection. Also Parnassius clodius claudianus topotypes offered in series of six pair for similar series of Parnassius and Papilio of the world. Don Frechin, Route 5, Box 838, Bremerton, Wash.

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Lepidoptera from PERU for scientific purposes collected on order by professional field entomologist for many years serving research entomologists. Felix Woytkowski, Francisco Zela 1067, Letra "L", Lima, PERU.

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Wish to contact those desiring Lepid. for art work. Taking '52 orders. M. Eugene Smith, Newnan, Georgia.

Rarities from Spain and rare endemic spp. from Atlas Mts. of Morocco. Will sell, or exchange for better Palearctic and Nearctic Rhop., esp. Alpine and Arctic spp. C.W. Wyatt, Cobbetts, Farnham, Surrey, ENGLAND.

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LIVING MATERIAL

Wanted: fertile ova, larvae, and less common moths of the genus Catocala; also Aegeriidae. Offer in exchange many spp. of Lepidoptera or other insects. Or will try to secure your needs in this part of the country. A.E. Brower, 5 Hospital St., Augusta, Maine.

Chrysalids of EUPHYDRYAS EDITHA TAYLORI available in March and April at $1.00 per 20. Orders over $2.00 postpaid. Order now, send money after delivery. Don Frechin, Route 5, Box 838, Bremerton, Wash.

Expect to have available at their season, eggs of P. cecropia, C. promethea, A. luna, A. io and C. regalis. Would like to trade for adult Lepidoptera. List of desiderata and terms of trading upon request. Otto Ackermann, 639 Walnut St., Irwin, Pa.

Living pupae, cocoons, and chrysalids from Europe and cocoons of Actias selene (India) for sale or exchange for native pupae, especially Sphingidae and Saturniidae. Native and exotic ova in season. Duke Downey, 51 West 4th St., Sheridan, Wyoming.

Wild (Conn.) cocoons of SAMIA CYNTHIA, in refrigeration, offered in exchange for living pupae of other Lepidoptera. Esp. need cocoons of Actias luna, for each of which ten S. cynthia cocoons will be sent. C.L. Remington, Osborn Zool. Lab., Yale University, New Haven 11, Conn.

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Eggs and living chrysalids of THEOPHILA MANDARINA required. In order to make arrangements, please write first. J.M. Legay, Assistant in Zoology, Station de Recherches Séricicoles, Ales (Gard), FRANCE.

Q. "Can you tell me how Phyciodes batesii may be distinguished from ♀ tharos and if Holland's figure of tharos ♀ is correct? I have tried to solve the problem by getting all the pairs I can of either tharos or batesii copulating. I now have three pairs of tharos and two pairs of batesii found copulating. I can distinguish between the pairs when found copulating as the tharos ♂ is quite distinctive. Holland in his book shows figures of ♂ and ♀ tharos and his ♀ looks just like the ♂ and in the three pairs I have this is not so. All my females look like what he figures as batesii. The two copulating pairs which I have concluded are batesii all look alike and are similar to Holland's figure of batesii. I cannot help concluding that Holland's figure of a ♀ tharos is incorrect."

A. Holland's figures are of the correct species, but his figs.3 and 4, supposed to be marcia, are more like typical tharos. Batesii female is distinguished by the less brown shading about the silver crescent on the border of the hind wing (none in the male), the much heavier black spotting of under side of fore wing, and almost always by the presence of a median band of much paler (usually straw yellow) spots on upper side and under side of fore wing. Also they have a different flight time, in New York at least: fresh male batesii flying with late battered specimens of the first brood of tharos, while rubbed female batesii fly with early specimens of the second brood of tharos. In the far north, where tharos is single-brooded, batesii is believed not to occur.

Q. "What evolutionary relationship can one attach to the presence of two female genital openings in the Hepialidae and most other Lepidoptera, but one opening in the Micropterygidae, Eriocraniidae, and a few "Micros"? Some recent papers give the single opening a very large significance, but I am puzzled by the hepialid condition."

A. This feature serves mainly to indicate how much we do not yet know on the morphology and relationships of the insects. The double female reproductive outlet is of a distinctive type in the higher Lepidoptera (Ditrysia) unlike that of the Hepialidae, which may well have arisen independently, as it has in some other insects. There is also the possibility of reduction in the families with a single outlet, since they are all minute forms, - with reduced male external structures. Intermediate forms need further study, notably the Tischeriidae, Opostega, Eudarcia, and many exotics.

W.T.M.F.

The third part of the Prof. W.T.M. Forbes' The Lepidoptera of New York and Neighboring States will deal with the huge family Noctuidae. The manuscript has now been completed. Prof. Forbes writes: "I have no idea how long it will take in press, almost certainly a year, and Part I was four years!"

In Connecticut, during the interim, we are finding the two most useful reference works on our noctuids to be Forbes' "A Table of the Genera of Noctuidae of Northeastern North America" (Journ. N.Y. Ent. Soc., vol.22: pp.1-33; 1914) and "The Noctuidae of Pennsylvania. A Manual", by H.M. Tietz, (Penn. State Coll. Sch. Agr. and Exper. Sta., Bull.335: 164 pp.; 1936). The latter gives references to figures and descriptions and to all life-history notes.

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DECEASED

Bridwell, L.H. (Texas).
Federley, Harry (Finland).
Forsyth, Marguerite (Mrs.) (Florida).
Williams, Evelyn G. (Mrs.) (California).

RESEARCH REQUESTS

For my revisionary study of the genus Cymothoë, I need little series (♂-♀) of all East and South African species. I purchase, exchange, or borrow. Specimens received for study generally had been misdetermined. Acknowledgments on publication. Please write: F.G. Overlaet, 9 Chaussée de Louvain, Kortenberg, Brabant, BELGIUM.

I have begun a revisionary study of the world Euphydryas. Distribution and flight-period data, and particularly life history notes and accurate data on any hybridization experiments will be greatly appreciated. Pupal material of either Palaearctic or Nearctic species much desired. I am also interested in borrowing series of Euphydryas. Help will be acknowledged upon publication. Please write: Nicholas W. Gillham, 4 Washington Square North, New York, N.Y.