

NOTES ON THE GENUS *GLENA* HULST AND
DESCRIPTIONS OF NEW SPECIES
Lepidoptera, Geometridae

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In 1874, 6th Report Peabody Acad. Sci., 51, Packard described a Cleorid species from Texas (Belfrage) naming it *quinquelinearia* and placing it in the genus *Cymatophora* Hubner. This species, not too common in collections, has given trouble to the systematists ever since.

Several years ago the author received, from North Texas, two males which proved, on comparison with the type in the Museum of Comparative Zoology, to be this species. Since my friend, Mr. L. H. Bridwell, who furnished the specimens, has gone to his reward and it seems unlikely that more material will be available to the author from that vicinity, the author feels that it may be worth while to discuss a part of the genus *Glena* and clarify the situation insofar as his knowledge allows. To this end the author has made bold to ask his friends for the loan of material and here wishes to thank Mr. Carl W. Kirkwood of Summerland, Calif., Dr. J. F. Gates Clarke of the National Museum, Dr. Eugene Munroe of the Canadian National Museum, Dr. Frederick H. Rindge of the American Museum of Natural History, Rev. Edward Guedet and Dr. Edward S. Ross of the California Academy of Sciences, Mr. Lloyd Martin of the Los Angeles County Museum, Mr. Chester A. Thomas of Zion and Bryce National Parks and my good friend Mr. Louis Schellbach of Grand Canyon National Park for their kindness in the loan of specimens and slides which has made this study profitable.

Among the specimens before the author there are five separate groups, three of which are certainly species, the other two being very close to *quinquelinearia*, separable certainly, but having genitalia which are almost identical. It is possible that *interpunctata* B. & McD. and the smaller form from the Santa Rita Mts. are environmental forms of *quinquelinearia*, however without definite proof it becomes a matter of personal opinion and the author has always hesitated to place close relatives in the same species without definite proof that there they belong. To do so would be to state, in substance that these rather readily separable insects will mate freely, the Texas population with the Arizona, that the females will lay fertile eggs and that the imagos resultant from the cross matings will be fertile. The author does not have sufficient information to make this statement and prefers to separate the insects until breeding experiments may prove the

separation erroneous, on the assumption, purely a personal opinion, that a larger number of separable species makes for less confusion than a smaller number of variable species determinable only by dissection, although it really makes little difference whether complete information changes a listed form to a species or a species to a form.

Glena quinquelinearia Packard

The author will not repeat the catalog names, this was done in an entirely satisfactory manner by McDunnough (Studies in N. Am. Cleorini, Bull. 18, Ent. Branch, Dept. of Agriculture, Dominion of Canada, 1920) suffice it to say that the drawing in Packard's Monograph is good, that the photograph in the B. & McD. Contributions III,(4) Pl. XXV Fig. 8 and the genitalia P. XXX fig. 4 do not represent this species, as noted by McDunnough (Can. Ent. LXXVII,66). Packard's description is good, the ground color is white but the species seems dark because of the heavy shading bands basal of the t.a. line and distad of the t.p. on the primaries; the females are lighter than the males. It is a small species with an average expanse of 25 mm. The habitat is central Texas.

Glena interpunctata B. & McD.

This species is separable from *quinquelinearia* by the even, smoky-gray ground color of the wings and the lack of the black and white banding dorsally on the abdominal segments; there is little shading along the lines or in the subterminal areas of the wings, the discal spots are usually but not always absent or greatly reduced. There is a constant though slight genitalic difference which will be mentioned later. It is a larger insect than *quinquelinearia* expanding from 30 to 32 mm. The habitat is the south-eastern part of Arizona.

Glena kirkwoodaria var. n

In the Santa Rita Mts. of Southern Arizona flies another member of the group; it is probably a variety of *interpunctata*, differing in its smaller size (25-26 mm) the darker, slate-gray ground color, the straighter lines with the median merely indicated or wanting entirely and the presence of distinct discal dots on both wings.

Holotype ♂ Madera Canyon, Santa Rita Mts., Arizona Aug. 2, 1947, Comstock and Martin collectors and in the Sperry Collection.

Allotype ♀ same locality and collectors, July 19, 1947 and in the Los Angeles County Museum.

Paratypes 4 females same locality and collectors, July 20 to 25, 1947, May 7, 1948 and Aug. 29, 1950 Hill; 1 ♀ N. of Payson, Ariz. 7.24.51, Henne and 1 ♀ Madera Canyon, Ariz. Kirkwood & Ried, July 15, 1951 and in the collections Henne, Kirkwood and Sperry.

It gives me pleasure to name this fine insect in honor of my friend Carl W. Kirkwood, of Summerland, California, able collector and student of the Lepidoptera, with a consuming desire to know more and yet more about the insects which he studies. May he have many years of fruitful work with the insects of the southwest.

***Glena mcdunnougharia* sp. n**

This is the species pictured by Barnes & McDunnough, 1917, Contributions to Nat. Hist. Lep. III (4) Pl. XXV f. 8, but not the genitalia Pl. XXX f. 4; the photograph is excellent and but little can be added in way of description.

Palpi are short, fuscous; front brown with a gray streak low on the face; vertex and antennal shaft white; pectinations light tan from a dark base; collar dark fuscous; thorax white with fleckings of gray; abdomen gray-white, banded distally on each segment with a narrow black band edged with white.

Legs light tan. Ground color of the wings white, t.a. line distinct, from $\frac{1}{4}$ out on inner margin goes diagonally outward to the cell where it disappears, median line light from $\frac{1}{2}$ paralleling the t.p. line to vein 5; t.p. line heavy, from $\frac{1}{2}$ out diagonally to vein 6 thence curving sharply back to costa, from vein 6 to costa merely indicated, sometimes wanting. Shading of the t.a. line basad and the t.p. line distad is a light tan brown. There is an irregular s.t. shade turning outward between veins 6 and 7 and deepening into a distinct dash at the outer margin. Terminal line distinct, continuous, fringes gray-white with a median, darker shade. Discal dots usually not present or minute, occasionally strong.

Secondaries have t.a. line broad, diffuse, from .4 out on inner margin straight to median fold; t.p. line curving slightly outward to vein 6 starting $\frac{2}{3}$ out on inner margin. Shadings are, a light fuscous, following t.p. line, a darker subterminal and lighter terminal shade. Terminal line, fringes and discal dots as in primaries. Beneath both wings unicolorous light gray. Expanse δ 29 mm. η 32. mm.

Holotype δ Granite Wells, San Bernardino Co., California May 24, 1939 Grace H. and John L. Sperry collectors and in the Sperry Collection.

Allotype η Same locality and collectors May 25, 1939 and in the Sperry collection.

Paratypes 18 δ , same data May 24 and 25, 1939; 1 δ Todd's Lodge, Oak Creek Canyon, Arizona, June 12, 1941, Grace H. and John L. Sperry; 1 η same data June 15, 1942; 1 η Peach Springs, Arizona, May 29, 1934, Grace H. and John L. Sperry; 1 η Bryce Canyon, Utah, July 19, 1949, C. A. Thomas, coll.; 1 η South Rim, Grand Canyon, Ariz., June 16, 1941, Louis Schellbach, coll.; 2 δ Ibanpah Mts., Calif., April 29, 1939; 1 δ Dividend, Utah, July 1,

Tom Spalding; 1 ♂ White Mts., Ariz., May 25, 1934; 1 ♂ Gila-Pinal Co. line, Ariz., June 15-20, 1925, O. C. Poling, 1 ♂ 50 mi. N. of Eureka, Nev., June 21, 1934, J. A. Comstock, 2 ♂ 1 ♀ Grace H. and John L. Sperry, from Granite Wells, Calif., May 25, 1939, Dennison, Ariz., May 28, 1934, and Fairview, Ariz., July 3, 1935; 1 ♂ Cajon Pass, Calif., Apr. 20, 1939, Guedes; 1 ♂ Grand Canyon, Ariz., July, 1931, R. Williamson and 2 ♂ South Rim of same, June 14 and 19, 1941, Louis Schellbach and in the Grand Canyon Museum collection; also the following specimens in the National Museum collection, 1 ♂ Bellevue, Wash. Co., Utah, 25-6-17, 1 ♀ same data, July 10, 1917; 1 ♂, 1 ♀ Paradise, Cochise Co., Ariz., May 8-30, coll. Barnes; 3 ♂ Glenwood Springs, Colo., June 16-30; 2, ♂, 1 ♀ Jemez Springs, N. M., June, 1936, coll. Barnes and 1 ♂ Stockton, Utah, 6-6-1913, Tom Spalding; 2 ♂ Eureka, Utah, June 12-14, 1909, Tom Spalding.

These are in the collections of the National Museum, American Museum of Natural History, Los Angeles County Museum, California Academy of Sciences, Canadian National Museum, British Museum, French National Museum, Grand Canyon Park Museum, Bryce Canyon Museum and collection Sperry.

The best distinguishing characters of this species are the continuous terminal line and the white expanse of the wings.

Since Dr. McDunnough has done most of the preliminary work in this group of the Geometridae it seems fitting that this species, the finest of the Glenas, should bear his name. It gives me fond pleasure to name this beautiful insect for one more largely responsible for our present knowledge of the North American Geometridae than is any other entomologist, our guide upon the labyrinthine paths of this difficult family and counselor when the way becomes hard, my friend Jim.

Glena thomasaria sp. n.

There is still another member of this group found through northern Arizona and New Mexico and southern Utah. The size, ground color and arrangement of the lines of the wings are nearly as in the preceding species with the following distinct differences: the median line on the primaries starts at the inner margin touching the t.p. line, diverges slightly as it crosses the wing to the cell, thence turns sharply away from the t.p. line to the costa. This line is heavier than in any other member of the group, being about as dark and wide as the t.p. line, with which it makes a narrow, irregular V.

On the secondaries the t.a. line is distinct and broad, curving evenly from inner margin almost to costa. The terminal line is made up of dots between the veins from 2 to 7. Discal dot wanting or lost in the median line of primaries wanting or minute in

secondaries. Fringes white. The male genitalia are pictured in the Barnes & McDunnough Contributions, 1917, Vol. III, No. 4 Pl. XXX, fig. 4.

Holotype ♂ South Fork of Little Colorado River, White Mts., Ariz., June 25, 1947, Grace H. and John L. Sperry, collectors, and in the Sperry collection.

Allotype ♀ Chavez, N. M., July 2, 1935, Grace H. and John L. Sperry, collectors, and in the Sperry collection.

Paratypes, 1 ♂ same collectors, South Fork of Little Colorado River, Ariz., June 25, 1947; 3 ♂ Vernon, Apache Co., Ariz., July, 1936, Guedet Coll.; 1 ♂ Grand Canyon, Ariz., July, 1931, R. Williamson, coll., 1 ♂ N. Rim of same, July 12, 1939, Schellbach; 1 ♂ Simpson's Ranch, 5 miles east of La Jara, Sandoval Co., New Mexico, July 20, 1950, T. Cohn, P. Boone and M. Cazier; 2 ♀ Bryce Canyon, Utah, July 14, 1949, C. A. Thomas, coll.; 2 ♀ South Fork of Little Colorado River, White Mts., Ariz., June 20-25, 1947, Grace H. and John L. Sperry, collectors. These are in the U. S. National Museum, Am. Museum of Nat. History, Canadian National Museum, Los Angeles County Museum, California Acad. of Sciences, Bryce and Grand Canyon Museums and collection Sperry.

It gives me great pleasure to name this interesting species in honor of Mr. Chester A. Thomas of Zion and Bryce National Parks, an excellent entomologist in his own right and a friend of long standing to Grace and the author, he has done much to further the knowledge of the New Mexican and Southern Utah Geometridae.

This completes the *quinquelinearia* complex as represented in the author's collection, although there are at least two South American species which undoubtedly belong in this genus. There is yet another species which, coming from North Texas and resembling *pexata* Swett belongs in the genus.

Glena minor sp. n.

Palpi short, $1\frac{1}{2}$ times the diameter of the eye, dark fuscous brown, flecked with white at the tips, thin scaled. Front black-brown with white line low on the face, antennae fuscous. the pectinations black at the base, vertex, collar, thorax white, flecked with fuscous scales, abdomen same, with dorsal fuscous bands distally on each segment. Legs outwardly dark gray-brown, inwardly creamy white. The male hind tibia is swollen, with strong hair pencil. Both wings are heavily irrorate with fuscous gray atoms, gathered into shade bands beyond the t.p. lines.

Primaries: there are three broken indefinite lines starting at black spots on the costa. T. a. line from $\frac{1}{4}$ out goes at right angles to costa to cell, thence curving back past the outer edge of the fovea in the ♂ to inner margin $\frac{1}{5}$ out. Median line merely indicated by the largest costal spot at nearly $\frac{1}{2}$, a spot at junction of

cell and vein 2 and a diffuse line from cell to inner margin at $\frac{2}{5}$. T.p. line from spot on costa st $\frac{2}{3}$ weak or nearly wanting except on the veins where it is distinctly toothed outwardly, subparallel to outer margin goes to inner margin at $\frac{2}{3}$; three irregular shade bands in subterminal area, darkest opposite the cell, no lines evident; tiny terminal spots between the veins from 1 to 8 in δ , in η these spots are heavy. Fringe gray, discal dash obscure, median line.

Secondaries: t.a. line a broad, irregular curved band from $\frac{1}{3}$ on costa to $\frac{1}{2}$ out on inner margin; t.p. better developed than primaries, heavily toothed on the veins, subparallel to outer margin $\frac{2}{3}$ out, the three subterminal shades also are heavier than in primaries as are also the terminal triangular dots between the veins. Fringe as in primaries. Discal spot distinct.

Beneath fuscous gray, with discal spots evident, secondaries lighter than primaries. Expanse δ 27 to 30 mm. female 28 mm. to 30 mm.

Holotype δ Montague Co., Texas, May 12, 1941, L. H. Bridwell, coll. and in the Sperry collection.

Allotype η same locality and collector, Sept. 30, 1940 and in the Sperry collection.

Paratypes 1 δ Forestburg, Texas, July 15, 1941, L. H. Bridwell coll. 1 η same data, Aug. 20, 1941; 1 η Montague Co., Tex., June 22, 1940; 1 η Montague Co., Tex., Aug. 28, 1940, all collected by L. H. Bridwell. 1 δ Hinton, Okla., July 25, 1937, Standish-Kaiser; 1 η Montague Co., Tex., Aug. 28, 1940, L. H. Bridwell, in the U. S. and Canadian National Museums.

This species is probably closest to *pexata* Swett. It is considerably smaller and much more heavily shaded. The ground color of the wings is darker both above and below. The η genitalia separate the species readily.

It gives me great pleasure to name this fine *Glena* in honor and in fond memory of my friend, Arthur Jacob Minor, 1886-1960, student of the natural sciences, philosopher, mathematician without a peer and friend to all the little creatures of the woods and fields. Probably my best friends, he has gone to his reward and in passing has left to me, until death do us part, his dearest treasure.

The δ genitalia in the *quinquelinearia* group are relatively simple, the uncus is short, hollow, truncated, with the edges seeming to form a notch. The tegumen is broad, the costal arm of the valve is finger-like, curved and covered, for over $\frac{3}{4}$ of its length from apex to base, with stiff, colorless bristles. The sacculus is produced in a flat, chitinized pencil to nearly the length of the costal finger, the tip swollen roughly spoon shaped and armed with dark curved spines. The aedeagus is short and blunt, rather broad and straight and the vesica is armed with a brush of many fine short bristles and a long heavy, hollow spine, curved back

upon itself at the open base. This latter part of the organ is deciduous and so not too useful as a diagnostic character.

In *quinquelinearia* the arm of the sacculus reaches about $\frac{3}{4}$ of the way to the tip of the costal finger, the spoon-like sacculus tip is heavily armed with perhaps 20 long, dark, curved spines curving to a point at the apex; the gnathos is equilaterally triangular, toothed on the rounded edge with tiny cornuti and roughened dorsally. The base of the costa makes a chitinous point where the transtilla joins. The brush of spines on the vesica are heavy and dark.

In *interpunctata* B. and McD. the sacculus arm reaches to within $\frac{2}{3}$ of the way to the tip of the costal finger, the spoon-like end is armed with about twice the number of spines which are much shorter than those of the preceding species. The gnathos is narrower with a dorsal ridge, the costa runs smoothly into the transtilla and the brush of bristles on the vesica is weak.

In *kirkwoodaria* sp. n. the brush of bristles on the vesica is heavier than in *interpunctata* otherwise the δ genitalia is much like *interpunctata*.

In *thomasaria* sp. n. the whole organ is more heavily chitinized and narrower than the others and the sacculus arm is heavily spined for most of its length. This is pictured in the B. and McD. contributions, III (4) Pl. XXX f. 4.

The f genitalia are similar with reasonably good separating characteristics throughout this group. In *quinquelinearia* the 8th segment is sclerotized, the ostium almost membranous, ductus bursae short, tripling in width dorsally as it enters the bursa, thence slightly expanding for a distance of about 7 times this diameter, thence angling ventrally and expanding into the bursa proper.

The organ looks exactly like a sock with heel and toe inflated, the signum in the heel. The ductus seminalis is small, rising ventrally from the bursa close to the junction with the ductus bursae. In *quinquelinearia* the 8th segment has two narrow, smooth edged, ribbon-like patches of darker schlerotization, the ostium's semicircular plate is so weak it is scarcely discernible, the signum is a heavy, half-moon shaped, chitinous pocket, heavily spined inwardly, with perhaps 18 spines. The sock leg is broad and the foot long.

In *interpunctata* the 8th segment is heavily chitinized, the ribbon is broader and the edges thereof irregular, the signum is more heavily spined with from 23 to 25 spines, the sock leg is narrowed below the ductus bursae and the foot is short with the toe shrunk well back toward the instep.

In *kirkwoodaria* the ostium is membranous, the signum narrower but still heavy, otherwise as in *interpunctata*.

In *mcdunnougharia* the 8th segment is lightly chitinized, the ostium membranous, the signum very short, rectangular and

chunky with a few heavy spines, perhaps 8 or 10, the sock has a well developed heel and an extended toe, the leg is narrow.

In *thomasaria* the 8th segment has two broad, ovate chitinous patches, the ostium is membranous, the ductus likewise and short, the bursa expanding rapidly below into an ovate organ with no trace of the sock shape. The signum is large and heavy, with long spines, the ductus seminalis rises ventrally from the bursa copulatrix, far removed from the ductus bursae and is large, at least five times the diameter of the other members of the group.

In the case of *pexata* and *minor* the author is not fortunate enough to possess a ♂ specimen of *pexata* which seems to be rather a rare specimen in collections, however, from the photograph in McDunnough's studies in N. Am. Cleoriinae Pl. III f. 11 it would seem that in *minor* the sacculus arm is longer and more heavily spined both at tip and centrally, that the aedeagus in *minor* is narrower and the long spine which is bent back upon itself is about twice as long and heavy in *pexata* as it is in *minor*. In the female genitalia there are, on either side of the vaginal opening, sack-like organs, in *pexata* oval and heavily and darkly chitinized inwardly, in *minor* these are elongate and lightly chitinized. In *pexata* the signum is heavily spined, large and almost circular, in *minor* this organ is narrow, much smaller, shaped like a peach stone and heavily spined.

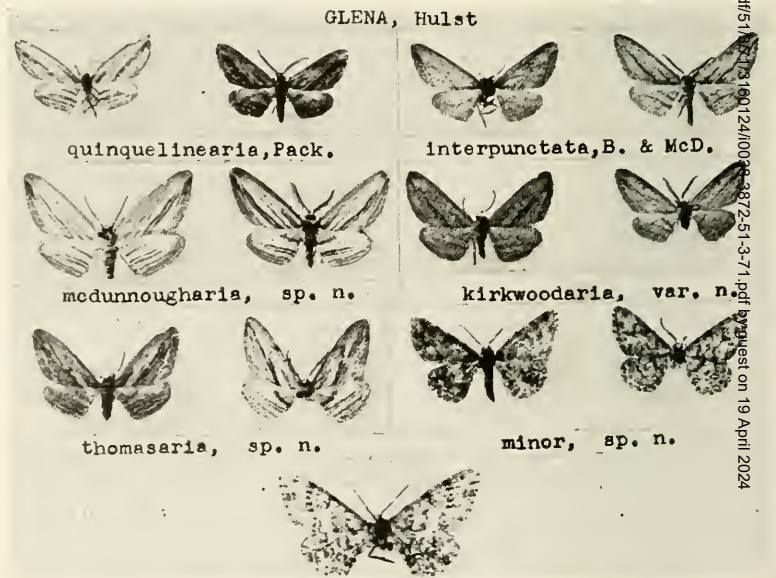


Plate 15

All figures approximately $\frac{2}{3}$ natural size