ENTOMOLOGY.—*The genus* Myndus *Stal in North America (Homoptera Fulgoridae).*[1] E. D. BALL, University of Arizona.

The members of this genus are usually small, fragile, more or less moth-like leaf hoppers without spines on the hind tibiae, and with the vertex long, carinate margined and narrowing anteriorly. The front is narrow above and greatly widened below where it meets the clypeus in an almost straight transverse suture. In general appearance they resemble species of *Cixius* and *Oliarus* but the hind tibiae without spines and the female abdomen terminating in typical pygofers and ovipositor instead of a large wax plate with reduced genitalia will at once separate them.

Van Duzee listed twelve species in his Catalog, three of which should probably be considered as varieties. He was in error in listing *delicatus* from "Fla"; it should have been North Carolina. Fowler in "Biologia" describes the genus *Haplaxius* with two species. The type *laevis* appears to be *Myndus pictifrons* of Stal and the other species (*frontalis*) to be equal to *sordidipennis Stal* which is probably a variety of *pictifrons* lacking the color on the elytra. *M. pictifrons* seems to be congeneric with *musivus* Germ., the European type of *Myndus*, thus

[1] Received August 5, 1933.

making *Haplaxius* a direct synonym of *Myndus*. Besides these Fowler described two new species of *Oliarus* that appear to belong to this genus. His *O. chiriquensis* by the shape of the vertex is certainly a *Myndus;* he does not show the legs but the type is a female and a glance at the pygofers will be enough to determine this point. His *O. insignior* is by the head and male genitalia another *Myndus* and by the size should be very distinct and easily recognized. Metcalf added one species. The writer is adding ten more and offering a provisional key to those available for study.

PROVISIONAL KEY TO THE AVAILABLE SPECIES

A The apical portion (at least) of elytra with definite markings, often an oblique pattern, stigmal cell often widened, more or less semi-circular, with the apical venation more or less modified to conform.

B A definite oblique band from the stigma to the anal angle, no transverse band on front (*catalina* excepted).

C Shining black with white apical spots.....1-*beameri* Ball

CC Not black.

D Front extremely broad at apex, the carinae margined with dark above.

E Clypeus smoky or black.....2-*mojavensis* Ball

EE Clypeus pale, a transverse band on the suture .....3-*catalinus* Ball

DD Front less widened below. Concolorous.

F A black saddle including the mesonotum....4-*yuccandus* Ball

FF Mesonotum saffron.....5-*nolinus* Ball

BB No definite oblique band on elytra. Front usually transversely banded.

G Face ornamented but not white with black bands at base and apex.

H Face with a broad (or double) black band below, a faint tawny one above.....6-*lunatus* Van D.

HH Face white with a scarlet triangle at apex....7-*rubidus* Ball

GG Face white with a black band above and below..8-*collinus* Ball

AA Apical portion of elytra concolorous (except occasionally in *pictifrons*) the stigmal cell rarely widened.

I Face transversely banded. *sordidipennis* Stal. *radicis*. Obst., *laevis* Fowl, *frontalis* Fowl., *delicatus* Van D. and *trunctatus* Metc.[2] — 9-*pictifrons* Stal; 10-(————)

II Face concolorous

J Vertex normal, definitely narrowing anteriorly, species normally elongate.

K Species green or pale golden straw.

L Species green or greenish.

M Vertex long and narrow, more than twice longer than wide, no triangular genital projection.....11-*viridis* Ball

[2] All of these species have the two bands on front. It will take a special study with more material than is now available to determine the number of valid species involved, which is probably not more than two or three, of which *pictifrons* Stal is the oldest name and the rest are arranged in order of proposal.

MM Vertex broad, less than twice longer than broad, a definite genital projection in both sexes.....12-*viridicatus* Ball
LL Species straw color or golden.
N Species straw color.....13-*ovatus* Ball
NN Species golden.....14-*auratus* Ball
KK Species sordid or brownish (*pusillus* may be all pale)
O Species small, pale (southern).....15-*pusillus* Van D.
OO Species larger (over 1 m.m. wide) darker.
P Species brown, no dark spots on venter (Rocky Mts.)
.....16-*impiger* Ball
PP Species pale, margins of venter with black spots (Pacific)
.....17-*occidentalis* Van D.
JJ Species stout, vertex very broad and often not narrowing anteriorly.
Q Species sordid (Var. *enotatus* Van D.) or black with a light saddle
.....18-*slossoni* Ball
QQ Species golden.....19-*fulvus* Osb.

Myndus mojavensis Ball n. sp.

Resembling *lunatus* in pattern, much larger and more definitely marked, with an angularly excavated pronotum and semicircular stigmal cell. White with dark lines against the carinae on front, vertex and mesonotum and a dark pattern at the apex of elytra. Length 4.5–5 mm.

Vertex definitely narrower at apex than in *lunatus;* front narrower at base, broader and more foliaceous at apex with a stout carina. Pronotum much longer than in *lunatus*, over half the length of the eye, deeply angularly emarginate posteriorly, while in that species it is not over one-third the length of eye, and shallowly roundingly emarginate. Elytra longer than in *lunatus*, the nervures heavily setigerous, punctured. The cubitus forking much farther back so that the cell thus formed is scarcely longer than wide, stigmal cell almost semi-circular. Male pygofers with a long slender median, brown, projection reaching to the apices of the white hammer-like plates—dorsal "hood" one-half longer than plates, its apex circular and entire.

Color, white above including front, dark smoky brown below including clypeus, the margins of abdominal segments white, front ivory, a pair of broad oblique black stripes inside the broadly elevated lateral margins above. Vertex with the disc mostly black, the lateral and base of median carinae broadly ivory. Pronotum ivory with dark brown areas behind the eyes, mesonotum with dark brown areas outside and similar stripes inside the broadly ivory lateral carinae. Elytra creamy white, an apical cloud, dark lines bordering the stigma and the ivory transverse nervures and three dark lines radiating from the base of the cloud.

Holotype ♀ allotype ♂ and 12 paratypes Mojave, Calif. June 15, 1909 and one male paratype from the same place July 1, 1931—all beaten with much difficulty by the writer from the tip "branches" of the Joshua trees (*Yucca brevifolia*) in the mountains to the north. A strikingly distinct species the writer has been trying to get time to describe for nearly a quarter of a century.

Myndus beameri Ball n. sp.

Resembling *mojavensis* with the carinae much less prominent. Front much shorter and broader, the clypeus short, tumid and lacking the foliaceous carinate margin above of that species. Elytra with the venation similar

to *mojavensis*. The cell formed by the fork of the cubitus four or more times as long as wide instead of wider than long, the nodal cell fully half longer than wide instead of semicircular as in that species.

Color, deep shining black above and below (sometimes fading out to a dark brown), an oblique dash on the stigma, two large areas in the outer apical cells, three small spots in the inner apicals and a spot at the apex of clavus ivory.

Holotype ♀ June 17 and three paratype males in June, Chiricahua Mts., Arizona. Two paratype males Huachuca Mts., June 14, 1928 (A. A. Nichol). Allotype ♂ and four pairs of paratypes, Santa Rita Mts., Arizona, July 17, 1932 taken by Dr. R. H. Beamer. Holotype and paratypes in author's collection; allotype and paratypes in Kan. Univ. collection; paratypes in U. S. Nat. Museum collection. This remarkably distinct species was taken on a young century plant by Dr. Beamer in whose honor it is named.

Myndus catalinus Ball n. sp.

Similar to *mojavensis*, smaller, elytra hyaline with dark margins and an extra apical cell. Length 4–4.5 mm. Vertex and front slightly narrower at union than in *mojavensis*, especially noticeable on the base of front. Elytra slightly narrower, the cells formed by the forking of radius and cubitus both very short, usually shorter than in *mojavensis*, the apical nervure arising from the apex of cubitus cell again forked forming an extra (eleventh) apical cell. Male terminal abdominal segment deeply excavated, over twice the depth of that in *mojavensis*, the short hammer-like plates scarcely exceeding the notch.

Color, vertex smoky or darker with the carinae light, front ivory, a pair of narrow lateral lines above and a dark crescent at apex, clypeus yellow, the tip smoky. Pronotum creamy white with a dark collar in front, mesonotum pale with two dark stripes (all dark in female). Elytra hyaline before the stigma with definite smoky margins, the longitudinal nervures white. The outer dark marginal line turning in before the stigma and expanding obliquely across the apical cells, another dark line arising back of the stigma and joining the first in the center, a line at right angles to this back to costal margin and about 5 dots on the nervures between the oblique stripes and the apex of clavus. Below, pale yellow.

Holotype ♀ Sabino Canyon near Tucson, Arizona, June 28, 1930, allotype ♂ Patagonia, Ariz. Sept. 20, 1930. Both examples were swept by the writer from vegetation at the foot of high rock faces.

Myndus nolinus Ball n. sp.

Resembling *mojavensis* in structure, pale saffron without black markings before the stigma. Length 3.4–4 mm.

Vertex much broader than in *mojavensis* with the lateral and median carinae only slightly elevated. As seen from the side the clypeus is much elevated above and angled with the lower half. The venation is similar to *mojavensis* with ten apicals. The cells at the forks of the radius and cubitus are rarely longer than wide.

Color, saffron yellow above and below, the mesonotum almost tawny, elytra hyaline before the stigma with the longitudinal nervures slightly embrowned, the claval suture and costa light. There is an oblique dash before the stigma, an oblique line arising at the apex of stigma and ending in

the ninth apical, the lines radiating from the center of this to the margin smoky brown. The nervures in the anal area are alternately ivory and dark.

Holotype ♀ allotype ♂ and seven paratypes, Williams, Ariz. July 13, 1929 and one ♀ paratype Tombstone, June 14, 1932; all taken by the writer sweeping under the margins of the clumps of bear grass (*Nolina*). The saffron color alone is quite distinctive.

Myndus yuccandus Ball n. sp.

Much smaller than *nolinus* with a still broader, blunter head. Saffron with the mesonotum and a semicolon on each elytron black. Length ♂ 3 mm.

Vertex broad almost parallel margined, slightly widening and almost conical where it joins the front without a carina. Front almost half as wide at base as at apex, where it is folicaceously expanded before joining the small and little inflated clypeus. Pronotum extremely long and only shallowly excavated posteriorly, almost parallel margined and as long as the width of the vertex. Elytra long and narrow, only slightly arcuated at base. The venation simple, the forks of radius and cubitus much longer than their width. Two apical nervures arising from the posterior margin of the cubitus cell. Apex of terminal segment of male roundingly produced over a triangular projection which is exposed only about its own width, plates broad and short with a broad obliquely rounding apex.

Color, face and below tawny or saffron unmarked, head and pronotum pale saffron or straw color, with two dark stripes on posterior portion of vertex. Mesonotum deep black with an ivory scutellar line on each side and a waxy depressed spot before the apex. Elytra subhyaline, the nervures saffron, a pair of large commas back to back against the scutellar angles and a pair of round dots beyond forming a pair of black semicolons. The first set of cross nervures white with more or less of dark margins, the second set dark with a dark cloud in the inner angles.

Holotype ♂ and one paratype male taken from *Yucca* at the Grand Canyon Bridge, Ariz., Aug. 30, 1930 by the writer. A strikingly distinct little species.

Myndus collinus Ball n. sp.

Resembling *sordidipennis*, slightly longer with a pair of dark stripes on the white mesonotal tablet and the second apical nervure dark. Length 5.5–6 mm.

Vertex as in *sordidipennis*, the front slightly broader and with the upper black markings decidedly oblique. Elytra longer and narrower, the outer anteapical longer and narrower than in that species and usually less definitely angled. Male pygofers with a smaller, narrower triangular projection and much broader and more evenly rounding plates than in *sordidipennis* where they are long and obliquely truncate. The lateral margins of the pygofers very slightly uniformly rounding while in *sordidipennis* they are acutely angled and usually black tipped.

Color of *sordidipennis* nearly, smoky brown, the face creamy with two black bands, the upper one consisting of two oblique dashes. Mesonotal tablet white with two black stripes adjacent to the median carina. Elytra milky subhyaline, the nervures smoky with dark stripes along the sutural margin to the middle, dark margins on nodal cell and the second apical dark,

a dark cloud in the inner angles emphasized on the nervures. These markings present in the males while in *sordidipennis* the male elytra are usually smoky subhyaline.

Holotype ♀ and allotype ♂, Fort Collins, Colo., July 7, 1898, and one paratype male July 2, 1898; all taken by the writer. This material was placed with *sordidipennis* until the striking difference in the shape of the pygofers was noted. When sorted on this character other differences were apparent.

Myndus rubidus Ball n. sp.

Resembling *collinus* in size and form but lighter and more definitely marked, face ivory white with a large scarlet triangle. Length 5–5.5 mm.

Vertex much narrower than in *sordidipennis* and its allies, the carinae as high and the vertex as narrow as in *catalinus*, the face longer and narrower than in either species. Elytra with the subcostaradial fork wider than its length before the nodal cell, nodal cell short and rounding, the tumid stigma occupying fully half its width.

Color, vertex creamy white, the high carinae broadly dark lined, face creamy or ivory white with a large scarlet triangle with its base on the apex of front. Pronotum pale, a dark inner circle extending out on the projection below, mesonotum dark brown, the central tablet lighter, variegated. Elytra hyaline, the nervures white, a narrow dark smoky band across the stigma to apex of clavus, emphasized on the longitudinal nervures but omitting the cross nervures, the radial fork all dark. A pale smoky band at apex emphasized on seventh apical and running in on the cross nervure. Below the legs are white with two triangular spots on the pectus shining black in sharp contrast. Tergum and venter dark, the margins light.

Holotype ♀ and two paratype females taken by the writer at Brownsville, Tex., Jan. 4, 1932. The scarlet triangle on the face alone will distinguish this pretty species.

Myndus viridicatus Ball n. sp.

Resembling *viridis*, slightly smaller, broader with a shorter vertex; bright vivid green. Length 4–5 mm.

Vertex definitely broader than *viridis*, less than twice as long as its basal width. Elytra slightly broader, the nodal cell longer, with the margin thickened equally throughout, about $2\frac{1}{2}$ times as wide as the costal nervure. Female with the last ventral segment deeply triangularly emarginate, the apex of the notch with a roundingly triangular projection. Male pygofers compressed, their lower margin produced into two dark margined triangles, from the bottom of the notch between arises a compressed projection about twice the length of the notch and bearing an elongate keel on the back; plates parallel margined as far as the median projection then broadened into elongate oblique apices clothed with long hairs.

Color, deep green in life, the eyes partly darkened, below paler green, the elytra with a trace of tawny towards the apex.

Holotype ♀ allotype ♂ and 4 ♀ paratypes Huachuca Mts. Aug. 2, 1931, one ♀ paratype Santa Catalina Mts. Aug. 15, 1931, all collected in Arizona by the writer.

Myndus ovatus Ball n. sp.

Resembling *viridicatus* but a still broader vertex and slightly longer elytra with a broad stigma. Green. Length 4.5–5 mm.

Vertex broader in front and more nearly parallel than in *viridicatus*, much broader and shorter than in *viridis*. Elytra long and slender with long apicals, the nodal cell oval with a nervure at right angles to costa in the anterior portion before which the area is thickened, beyond this nervure the margin is thickened in a curved stigma which occupies nearly half of the cell. Female segment with the base of the triangle broadly rounded without a projection, male pygofers as in *viridicatus*, the lower margins projecting slightly but only slightly sinuate. The median projection with a wider keel, the plates very slender for the length of the projection then terminating in an almost round expansion four times the width of the basal portion.

Holotype ♀ July 14, 1894, allotype ♂ June 28, 1894, both taken by the writer at Ames, Iowa. These were included as paratypes of *viridis* when that species was described, but in studying the material in comparison with *viridicatus* it was discovered that there were three distinct green species, one with triangular genital projections in both sexes (*viridicatus*), the other two lacking them but easily separated by the wide vertex and round plates in *ovatus* as against a long narrow vertex and long narrow plates in *viridis*. The holotype of *viridis* is hereby fixed on a ♀ taken by the writer at Grand Junction, Colo. July 28, 1900, and now in the author's collection.

Myndus auratus Ball n. sp.

Resembling *occidentalis* slightly longer and more slender. Golden and straw color without the dark markings. Length 5–5.5 mm.

Vertex and front similar to *occidentalis*, the elytra longer and narrower, the outer anteapical cell definitely wider than the nodal with the inner margin angled at the cross nervure to the medius, the medius forked at this point but the outer fork continuing the line of the nervure. The nodal cell long and narrow, truncate in front and rounding to costa behind, the stigma $2\frac{1}{2}$ to 3 times the width of the costa.

Female segment less deeply notched than in *occidentalis*, the male pygofers with the acute projections of that species reduced to sinuations, the styles with the inner margins nearly straight and the outer ones broadly expanded apically instead of the reverse as in *occidentalis*.

Color, golden and creamy with a trace of green on the venter, elytra golden subhyaline, the nervures concolorous, no black markings on the abdominal segments as in *occidentalis*.

Holotype ♀ allotype ♂ and six paratypes taken by the writer, Bonita Canyon, Chiricahua Mts., Ariz., July 6, 1930.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

GEOLOGICAL SOCIETY

500TH MEETING

The 500th meeting of the Society, which was also the 40th anniversary of its founding, was held in the Assembly Hall of the Cosmos Club, February 22, 1933, President C. N. FENNER presiding. The program was contributed entirely by charter members.

Program: WHITMAN CROSS.—*Reminiscences concerning the founding of the Society.*