

A SYNOPTIC REVISION OF THE GENUS *ACIURINA* CURRAN, 1932  
(DIPTERA, TEPHRITIDAE)

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*Abstract.*—The genus *Aciurina* is concisely defined, reasons for separating it from *Tephrella* are cited, the host plants of the species are concisely cited, and one new species, *Aciurina idahoensis*, is described from Idaho. The following are cited as new synonyms of *Aciurina bigeloviae* (Cockerell), 1890: *Trypeta bigeloviae* var. *disrupta* Cockerell, 1890; *Tephrella semilucida* Bates, 1935; *Aciurina trixa* Curran, 1932.

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Among North American genera of Tephritidae, *Aciurina* may be recognized by the following combination of characters: Humeral, dorsocentral, and scutellar setae present; apex of cell *bcu* (former anal cell) closed by inwardly bent *Cu2* causing lower apex of *bcu* to be acute; dorsocentral seta anterior to halfway point between supra-alar and acrostichal setae; scutellum neither inflated nor polished; posterior upper frontorbital seta reclinate or absent; width of front greater than that of one eye; only one pair of scutellar setae present; cell *r5* of wing with bulla; abdomen polished; tip of wing in cell *r5* not hyaline with V-shaped dark mark, but wholly dark or with narrow apical dark seam in full width of cell; occipital setae stubby, whitish.

Hering (1947) has distinguished a tribe Tephrellini apart from Aciurini under a subfamily Aciurinae by the possession of stubby pale occipital setae, but Hardy (1974, p. 228-229) states, "I do not see justification for treating Aciurinae as a subfamily and am treating Tephrellini as a tribe under the subfamily Tephritinae on the basis of the head bristles and by having the 6th abdominal tergum of ♀ slightly longer than 5th." This latter character was introduced by Hering (1947) as a primary character separating the subfamily Tephritinae from the Trypetinae, which have sharply pointed black occipital setae. This has been accepted by most workers on Tephritidae. The genus *Aciurina* consequently, as Hardy states, is tephritine, while *Aciura* is trypetine. A satisfactory division of these two subfamilies into tribes has not yet been proposed and a sharp distinction of the greater part of the family into these two subfamilies alone on a worldwide basis may not be feasible.

The species of *Aciurina* have been reported outside of the continental United States only from Mexico (see *A. mexicana*).

All *Aciurina* species whose biology is known are gall-formers on plants of the family Asteraceae (Compositae). These host plants have been listed by Wasbauer

(1972), the relationships of gall-form on *Chrysothamnus nauseosus* (Pall.) Britt. to the taxonomy of the plants has been discussed by McArthur et al. (1979), and Wangberg (1981) discussed the species of *Aciurina* relative to the galls they form on *Chrysothamnus* species. However, the relationship of species of *Aciurina* and their specific or subspecific taxonomy to that of the host plants is not yet clear. It is hoped that this paper will provide a firmer basis for such study than has been so far available.

#### ACIURINA SPECIES AND THEIR HOST PLANTS

The recorded host plants of *Aciurina* species, as far as is known at present, are tabulated below. Some additional detail is to be found in Wasbauer (1972) and in this paper under the various species. The plant names have been checked by Harold E. Robinson, Department of Botany, U.S. National Museum of Natural History. The taxonomy of plants below the rank of species in several of the listed genera is apparently somewhat unsettled, and is not considered in this list.

It may be noted that the hosts of *Aciurina* species include genera of four tribes of Asteraceae: *Artemisia* of Anthemideae; *Baccharis*, *Chrysothamnus*, *Gutierrezia*, *Haplopappus*, and *Solidago* of Astereae; *Bebbia* of Heliantheae; and *Senecio* of Senecioneae.

- Aciurina aplopappi* (Coq.)—*Gutierrezia sarothrae* (Pursh) Britt. & Rusby; *Haplopappus pinifolius* Gray.
- A. bigeloviae* (Cockerell)—*Artemisia tridentata* Nutt.; *Bebbia juncea* (Benth.) Greene; *Chrysothamnus nauseosus* (Pall.) Britt.; *C. parryi* (Gray) Greene; *C. viscidiflorus* (Hook.) Nutt. Syn. *A. semilucida*—*Artemisia* sp.; *Chrysothamnus nauseosus* (Pall.) Britt. Syn. *A. trixa*—*Artemisia tridentata* Nutt.; *Chrysothamnus nauseosus* (Pall.) Britt. *C. parryi* (Gray) Greene; *C. viscidiflorus* (Hook.) Nutt.
- A. ferruginea* (Doane)—*Chrysothamnus nauseosus* (Pall.) Britt.; *C. viscidiflorus* (Hook.) Nutt.; *Haplopappus bloomeri* Gray; *Solidago* sp.
- A. idahoensis*, n. sp.—*Chrysothamnus viscidiflorus* (Hook.) Nutt.
- A. lutea* (Coq.)—*Chrysothamnus viscidiflorus* (Hook.) Nutt.
- A. maculata* (Cole)—? *Amelanchier* sp.; *Chrysothamnus nauseosus* (Pall.) Britt.; *Senecio douglasii* DC.
- A. mexicana* (Aczél)—*Baccharis sarothroides* Gray.
- A. notata* (Coq.)—*Chrysothamnus nauseosus* (Pall.) Britt.
- A. opaca* Curran—*Chrysothamnus nauseosus* (Pall.) Britt.
- A. thoracica* Curran—*Baccharis emoryi* Gray; *B. pilularis* DC; *B. sarothroides* Gray.
- A. trilitura* Blanc & Foote—*Chrysothamnus nauseosus* (Pall.) Britt.

#### HOST PLANTS OF ACIURINA SPECIES

All are Asteraceae (Compositae), except the questionable record of *Amelanchier* (Rosaceae).

- ? *Amelanchier* sp.—*Aciurina maculata* (Cole).  
*Artemisia tridentata* Nutt.—*A. bigeloviae* (Cockerell).  
*Baccharis emoryi* Gray—*A. thoracica* Curran.  
*B. pilularis* DC.—*A. thoracica* Curran.

- B. sarothroides* Gray—*A. mexicana* (Aczél); *A. thoracica* Curran.  
*Bebbia juncea* (Benth.) Greene—*A. bigeloviae* (Cockerell).  
*Chrysothamnus nauseosus* (Pall.) Britt., and subtaxa—*A. bigeloviae* (Cockerell);  
*A. maculata* (Cole); *A. notata* (Coq.); *A. opaca* (Coq.); *A. trilitura* Blanc & Foote.  
*C. parryi* (Gray) Greene—*A. bigeloviae* (Cockerell).  
*C. viscidiflorus* (Hook.) Nutt., and subtaxa—*A. bigeloviae* (Cockerell); *A. ferruginea*  
 (Doane); *A. idahoensis*, n. sp.; *A. lutea* (Coq.).  
*Gutierrezia sarothrae* (Pursh) Britt. & Rusby—*A. aplopappi* (Coq.).  
*Haplopappus bloomeri* Gray—*A. ferruginea* (Doane).  
*H. pinifolius* Gray—*A. aplopappi* (Coq.).  
*Senecio douglasii* DC.—*A. maculata* (Cole).  
*Solidago* sp.—*A. ferruginea* (Doane).

#### TERMINOLOGY OF WING VENATION

Inasmuch as the terminology of the wing venation used here differs somewhat from that used in most current work on the family, some explanation is called for. The venation of the higher Diptera, roughly about half of the species of the Order, is a consistent reduction of the pattern found in the lower Diptera, and is quite uniform from family to family and in the Dolichopodidae, a large brachyceran (lower) family, as well. A more detailed explanation is planned, but it should suffice to state here that I am in agreement with McAlpine (1981) in recognizing that the name of the old "anal" cell is inconsistent with that of the other cells. I cannot, however, call it cell *cup* (posterior cubital) because I am convinced that vein *Cup* is not actually a vein, but, like the spurious vein of the Syrphidae, it is no more than a furrow and therefore a part of the system of convex and concave furrows of the wing. The furrow is never fully developed in the Diptera, and in the higher Diptera is greatly reduced or even wholly lacking. Vein *CuP* is therefore considered to be the claval furrow, some trace of which is found in most insect wings, and should not be considered the posterior cubital vein. Abbreviations are used for compound veins, such as  $R_5$  for  $R_{4-5}$ . "Basal cubital cell" (*bcu*) is adopted for the old anal cell in line with McAlpine's use of basal radial and basal medial for the cells costad of those veins.

#### KEY TO SPECIES OF *ACIURINA*

- 1 (2). Wing as in Fig. 2, with complete dark crossband through *Ta*, bifurcate between  $R_3$  and *C*, one branch running to pterostigma, the other to *C*. apicad of  $R_1$ ; complete crossband also through *Tp*; cell *2c* with broad median dark area . . . . . *A. idahoensis*, new species
- 2 (1). With such crossbands, if almost so (as in some specimens of *A. bigeloviae* with reduced pattern), then dark mark in cell *2c* narrow or lacking.
- 3 (4). Wing as in Fig. 3, cell  $r_1$  with 3 hyaline spots along *C*, the apical one just before end of  $R_3$ ; cell  $r_5$  uniformly dark brown, except for small roundish hyaline spot adjacent to vein *M* close to apical one of 3 separate hyaline spots in cell *am*; bulla large, last section of  $R_5$  strongly bowed costad; abdomen wholly shining black . . . . .  
 . . . . . *A. trilitura* Blanc and Foote

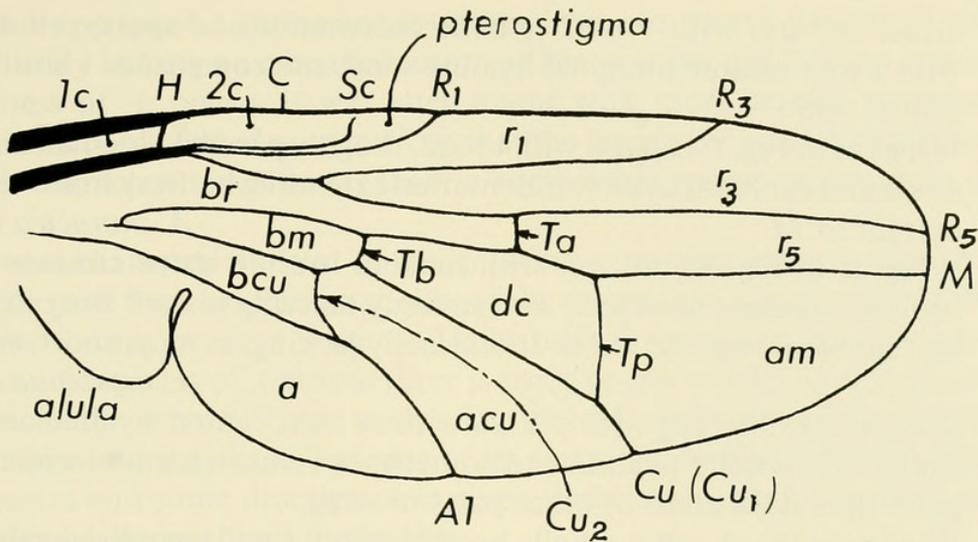


Fig. 1. Terminology of wing veins and cells in Tephritidae. Abbreviations of veins in capital and lower case letters, those of cells with all lower case letters, and all in italics. Names and equivalents in other systems:  $A_1$ —1st anal vein, anal vein, 1A + CuA<sub>2</sub>; *a*—anal cell (undifferentiated cell  $a_1$  and  $a_2$ ), 4th posterior cell; *acu*—apical cubital cell, 3rd posterior cell, CuA<sub>1</sub>; *am*—apical medial cell, 2nd posterior cell, m, 2nd m<sub>2</sub>; *bcu*—basal cubital cell, anal cell, cup, medial cell; *bm*—basal medial cell, 2nd basal cell, radial cell; *br*—basal radial cell, 1st basal cell; *C*—costal vein, costa; *Ic*—1st costal cell, basal costal cell; *2c*—2nd costal cell, costal cell; *Cu*—cubital vein (Cu<sub>1</sub>), cubitus, CuA<sub>1</sub> 5th vein, M<sub>3</sub> + Cu<sub>1</sub>; *Cu<sub>2</sub>*—branch of cubitus, CuA<sub>2</sub>, basal crossvein; *dc*—discal cell, cell dam, 1st m<sub>2</sub>; *H*—humeral crossvein; *M*—medial vein, medius, 4th vein, M<sub>1+2</sub>; *R<sub>1</sub>*—1st radial vein, 1st vein; *r<sub>1</sub>*—1st radial cell marginal cell; *R<sub>3</sub>*—vein R<sub>2+3</sub>, 2nd vein; *r<sub>3</sub>*—cell  $r_3$  ( $r_{2+3}$ ), submarginal cell; *R<sub>5</sub>*—vein R<sub>4+5</sub>, 3rd vein; *r<sub>5</sub>*—cell  $r_5$  ( $r_{4+5}$ ), 1st posterior cell; *Sc*—subcostal vein, subcosta; *Ta*—anterior crossvein, r-m; *Tp*—posterior crossvein, dm-cu, im, M; *Tb*—basal crossvein, M<sub>3</sub>, bm-cu.

- 4 (3). Cell *r<sub>1</sub>* with only 2 hyaline spots along *C* or with markings in cells *r<sub>5</sub>* and *am* otherwise.
- 5 (14). Wing (Figs. 4 to 8) with cell *Ic* dark brown, similar to dark areas of other parts of wing.
- 6 (7). Wing as in Fig. 4, with cell *r<sub>5</sub>* crossed gby obliquely transverse preapical hyaline band; cell *am* with small subapical and large subbasal hyaline indentations, latter sometimes V-shaped by presence of marginal brown spot . . . . . *A. maculata* (Cole)
- 7 (6). Wing with cell *r<sub>5</sub>* wholly brown or with 1 or 2 small round hyaline spots; otherwise differing.
- 8 (9). Alula hyaline or yellowish; cells *am* and *acu* (Fig. 5) each with very large subbasal hyaline blotch and small subapical hyaline spot, latter sometimes lacking in cell *acu* . . . . . *A. lutea* (Coquillett)
- 9 (8). Alula brown, sometimes with central hyaline spot . . . Aplopappi Group
- 10 (11). Wing as in Fig. 6, cells *r<sub>3</sub>* and *r<sub>5</sub>* apicad of *Tp* with at most 1 paler brown spot in dark brown area, cell *acu* with basal hyaline spot as well as at least 3 roundish hyaline spots apicad thereof, cell *am* with 2 hyaline indentations, cell *al* with 3 to 5 round hyaline spots. . . . . *A. aplopappi* (Coquillett)
- 11 (10). Wing as in Fig. 7 and 8, cells *r<sub>3</sub>* and *r<sub>5</sub>* apicad of *Tp* with several small, round paler brown spots, cell *acu* with 1 or 2, rarely 3, hyaline

- areas, cell *am* with 1 or 2 hyaline indentations or spots; cell *am* with 1 to 3 minute marginal hyaline spots and sometimes 1 similar central spot.
- 12 (13). Wings as in Fig. 7, cell *am* with broad, roughly parallel-sided median stripe and subbasal hyaline indentation extending halfway from wing margin to *M*. . . . . *A. thoracica* Curran
- 13 (12). Wing as in Fig. 8, cell *am* with median hyaline stripe cuneate or broken, broadest anteriorly and strongly tapering toward wing margin, subbasal indentation or spot usually lacking, at most short-oval . . . . . *A. mexicana* (Aczél)
- 14 (5). Wing (Figs. 9 to 16) with cell *1c* with at least central hyaline area, sometimes wholly hyaline and sometimes yellowish and decidedly paler than dark areas of other parts of wing.
- 15 (16). Wing as in Fig. 9, cell *r*<sub>5</sub> wholly brown or with small roundish hyaline spot near wingtip adjacent to *M*; cell *2c* broadly hyaline distally, with transverse median brown bar; *dc* with preapical hyaline spot not extending to veins at sides of cell . . . . . *A. ferruginea* (Doane)
- 16 (15). Wing with cell *r*<sub>5</sub> with preapical hyaline mark occupying at least half of width of cell, sometimes with additional subbasal mark, and sometimes largely hyaline.
- 17 (18). Wing as in Fig. 10, cell *2c* brown in distalhalf, a little pale apically in very pale specimens; uniform parallel-sided hyaline band extending from *C* at midlength of cell *r*<sub>1</sub> to lower third of *dc* . . . . . *A. opaca* (Coquillett)
- 18 (17). Wing as in Figs. 11 to 15, cell *2c* hyaline at tip, with median transverse brown bar or even wholly hyaline, if complete transverse brown band is present through *Tp*, there is also marking apicad thereof in addition to costal marking.
- 19 (20). Wing as in Figs. 11 and 12, pterostigma along *C* no more than 1.5 times as long as greatest width, *Tp* nearly straight, lower apical angle of *dc* about 60°, wing predominantly hyaline . . . *A. notata* (Coquillett)
- 20 (19). Wing as in Figs. 13 to 16, highly variable in extent of dark markings; pterostigma at least twice as long as greatest width; *Tp* usually bowed apicad, lower apical angle of *dc* seldom less than 80° . . . . . *A. bigeloviae* (Cockerell)

The male postabdomen conforms closely to the general type shown in Fig. 18A–C, all of which have been considered as referable to *A. bigeloviae*. Specimens taken at the same time and place and with identical wing pattern, etc., were found to have as much variation in the length and outline of the epandrial process, profile of epandrium, size of cerci, size and shape of prensistae, etc., as shown in the three figured specimens. A careful, extensive study of single populations may lead to recognition of useful differences, and therefore to finer taxonomic distinctions, but none were found in this study.

It was at first thought that the ovipositor and associated structures of the female would also contribute little to species recognition and distinction. The size and outline of the ovipositor of most species is quite similar, and the tip is simply aciculate (Figs. 23A, B, D–J). The ovipositor of *A. opaca* (Fig. 23C) differs greatly

from other species of *Aciurina* and is unique in known North America Tephritidae in completely lacking an extended, more or less pointed tip. Besides revealing the distinctness of *A. opaca*, it was later found with more careful examination of additional slide-mounted preparations that the female ovipositor complex yielded excellent characters, even better than in some other genera, although in different parts.

The most characteristic part of the *Aciurina* ovipositor in most species is to be seen in the soft flaps on the lower side of the ovipositor at each side of the mesal line where the egg emerges. In most Tephritidae the tissue at this point is simple, but in several species of *Aciurina* there is more or less wrinkling and development of ridges, teeth, or both. There is also considerable difference in the development of the rasper and the shape and size of its teeth. These characters are figured for most species and some description is given under each species heading, although the characters are not used in the key.

The terminology of the ovipositor complex is as in Fig. 17. The term taenia (dorsobasal and ventrobasal; pl. taeniae) has not been used previously in this sense. The dorsobasal and ventrobasal taeniae are two pairs of flexible strips of more or less darkened tissue at the base of the ovipositubus, reinforcing and supporting the tubus during retraction within the sheath and during extension when the rasper teeth are gnawing at the host epidermis.

### Genus *Aciurina* Curran

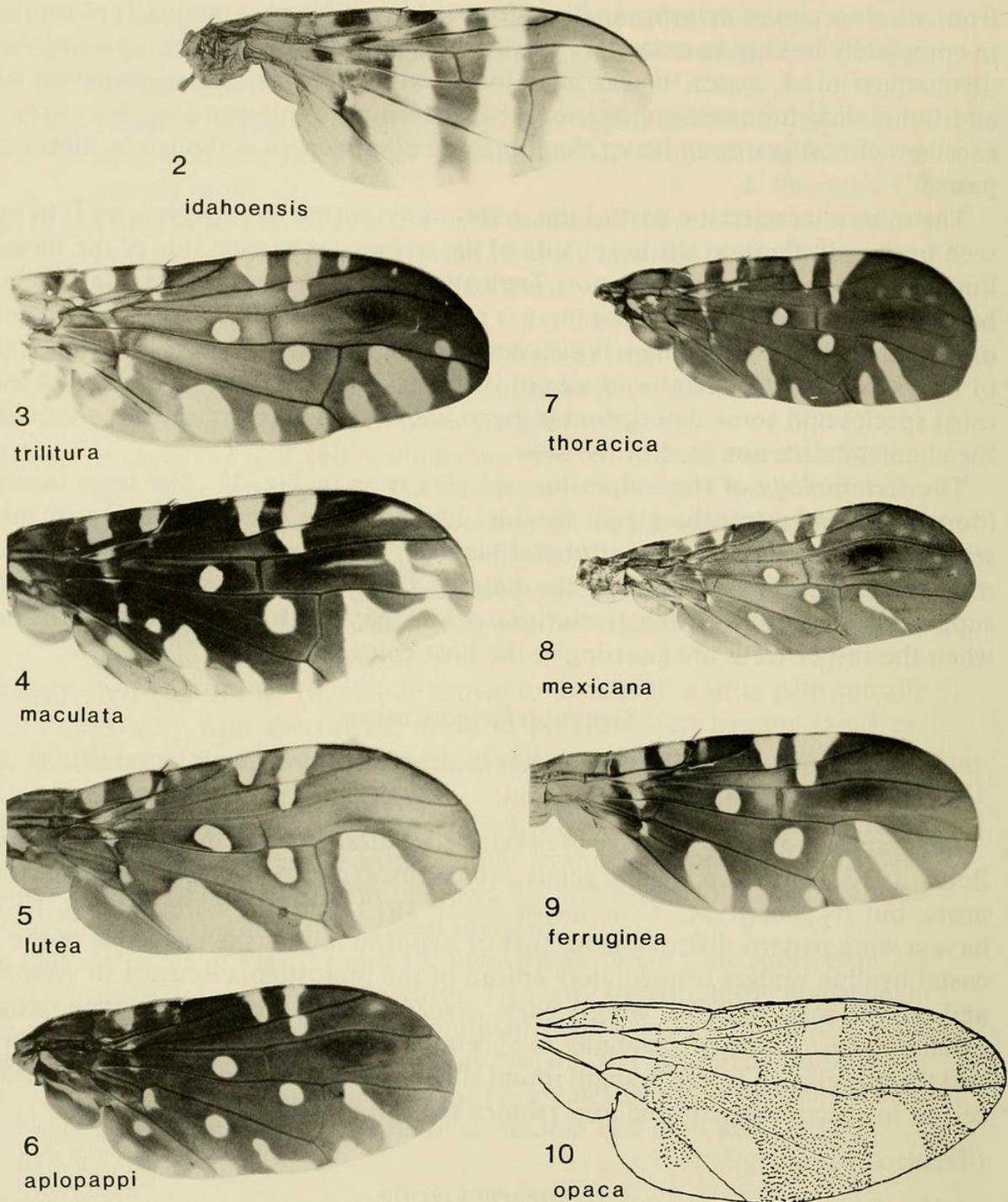
*Aciurina* Curran, 1932: 9. Type-species, *Aciurina bigeloviae* (Cockerell), as *A. trixa* Curran, by original designation.

Some species of *Aciurina* have been referred (Bates, 1935) to the genus *Tephrella* Bezzi, 1913. This is an Asiatic genus, which does indeed strongly resemble *Aciurina*, but its generitype, *T. decipiens* Bezzi, 1913, and *T. heringi* Hardy, 1970 have a wing pattern differing from that of *Aciurina* in that the basal one of the 2 costal hyaline wedges immediately apicad of the pterostigma extends to vein  $R_5$  and cell *br* (basal radial) is wholly dark. *Aciurina* species have the hyaline wedge extending to  $R_5$  only occasionally in specimens with very reduced wing pattern and there is always at least a small round subapical hyaline spot in the basal radial cell or in specimens with reduced pattern the cell may be mostly hyaline.

### APLOPAPPI GROUP

Three species are so similar in general appearance and wing venation that at least two of them (*aplopappi* and *mexicana*) may eventually prove to be phenotypical variations of one species. The three species are *A. aplopappi* (Coquillett, 1894), *A. thoracica* Curran, 1932, and *A. mexicana* (Aczél, 1953). Inasmuch as *aplopappi* is the senior name under which the other species must be synonymized in case that course may be taken, it is proper that the group be called the *Aplopappi* group. *A. aplopappi* is so far known to feed on *Haplopappus pinifolius* (whence its name) and *Gutierrezia sarothrae* in the larval stages; the other two species feed on species of *Baccharis*.

The group is also distinguished by lack of surface specialization on the ventral side of the ovipositor, which is 0.9 to 1.0 mm long; taeniae of ovipositubus very



Figs. 2-10. *Aciurina* species, wings. 2, *A. idahoensis* Steyskal, n. sp., a variation found in ♂ specimens, 3, *A. trilitura* Blanc and Foote. 4, *A. maculata* (Cole). 5, *A. lutea* (Coquillett). 6, *A. aplopappi* (Coquillett). 7, *A. thoracica* Curran. 8, *A. mexicana* (Aczél). 9, *A. ferruginea* (Doane). 10, *A. opaca* (Coquillett), holotype.

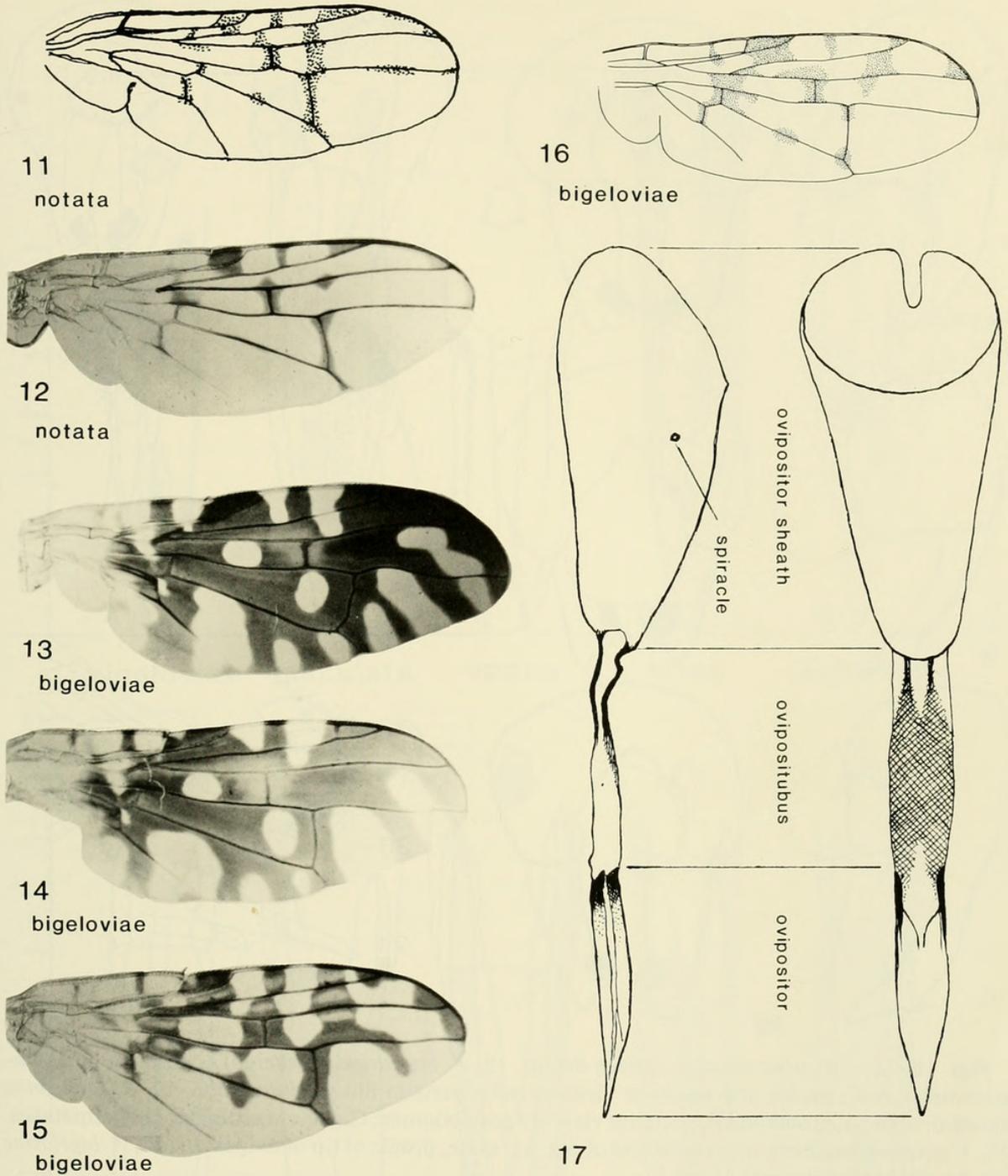
short; less than  $\frac{1}{4}$  of length of ovipositubus; rasper teeth more or less acute; and similar outline of ovipositor in all three species.

***Aciurina aplopappi* (Coquillett)**

Figs. 6, 23F

*Trypeta* (*Aciura*) *aplopappi* Coquillett, 1894: 72.

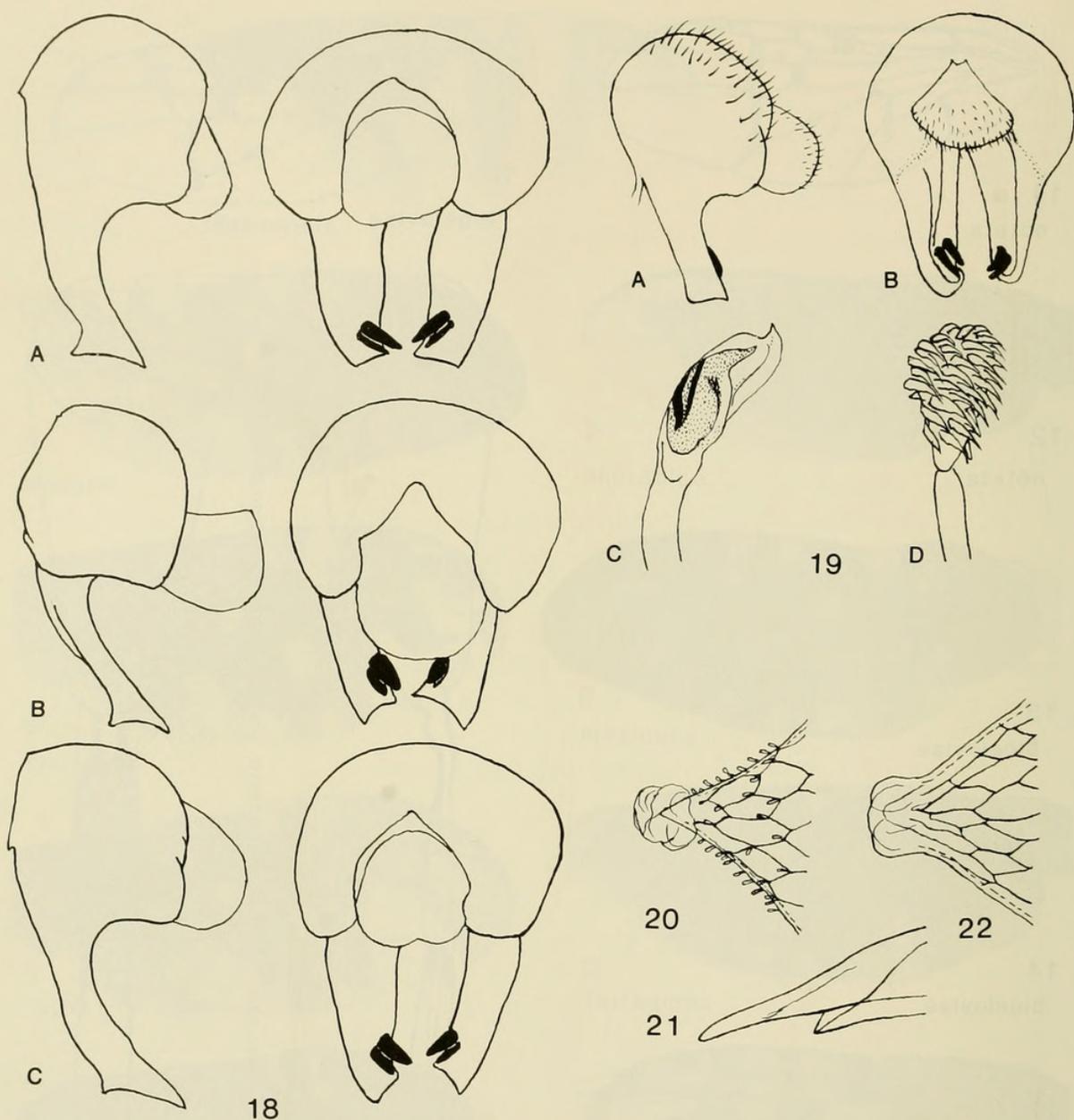
*Aciurina aplopappi* (Coquillett) Foote and Blanc, 1963: 7.



Figs. 11-17. *Aciurina* species, wings and (17) female postabdomen. 11-12, *A. notata* (Coquillett). 14-16, *A. bigeloviae* (Cockerell), illustrating variation (Fig. 16 copied from Bates, 1935, *semilucida*). 17, *A. ferruginea* (Doane), extended postabdomen, diagrammatic.

Ovipositor as in Fig. 23F, rasper teeth acute, largest at midlength of oviposittubus.

This species differs externally from the 2 other members of the group, as shown in the key, only in details of the wing pattern. The food plants, *Haplopappus pinifolius* and *Gutierrezia sarothrae*, as known so far, are different from the other species of the group, which feed on *Baccharis* species. Specimens have been examined only from California (Los Angeles County: "Los Angeles County" and



Figs. 18–22. *Aciurina* species, various details. 18, *A. bigeloviae* (Cockerell) ♂, postabdomen, diagrammatic: A–C, profile and posterior views of outer parts to illustrate variation. 19, *A. idahoensis* Steyskal, n. sp.: A, profile and B, posterior view of ♂ postabdomen; C, glans of aedeagus; D, spermatheca. 20, *A. notata* (Coquillett), micropilar end of egg. 21, same, profile of tip of ovipositor. 22, *A. bigeloviae* (Cockerell), micropilar end of egg.

Claremont; Riverside County: Blythe and Riverside; Santa Clara County). A male from “Los Angeles Co.” in USNM is herewith designated lectotype. The few dates associated with these specimens indicate that adults appear in March and April.

***Aciurina mexicana* (Aczél)**

Figs. 8, 23G

*Tephrella mexicana* Aczél, 1953: 194.

*Aciurina mexicana* (Aczél) Foote and Blanc, 1979: 161.

The ovipositor and associated structures are virtually the same as those of *A. aplopappi*.

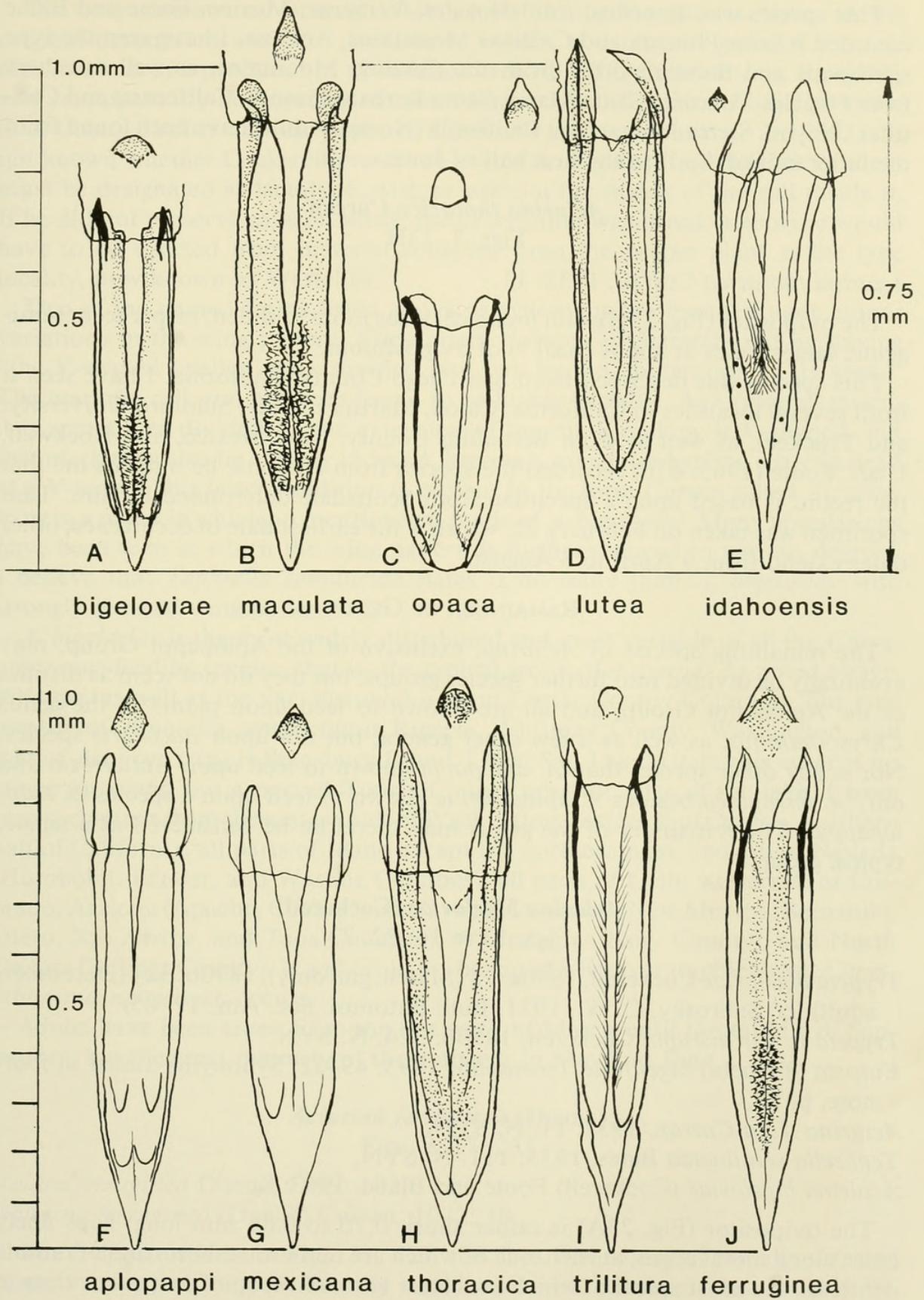


Fig. 23. *Aciurina* species, ventral views of ovipositors with more enlarged view of typical larger rasper tooth (all at same magnification for size comparison. A, *A. bigeloviae* (Cockerell). B, *A. maculata* (Cole). C, *A. opaca* (Coquillett). D, *A. bigeloviae* (Coquillett). E, *A. idahoensis* Steyskal, n. sp. (somewhat lateral). F, *A. aplopappi* (Coquillett). G, *A. mexicana* (Azcél). H, *A. thoracica* Curran. I, *A. trilitura* Blanc and Foote. J, *A. ferruginea* (Doane).

This species was described from Nogales, Veracruz, Mexico. Foote and Blanc recorded it from Phoenix and Catalina Mountains, Arizona. I have seen the type specimens and those reported from the Catalina Mountains, as well as others from Nogales, Arizona; Santa Maria, Santa Barbara County, California; and Cantillas Canyon, Sierra Juarez, Baja California (Norte). Adults have been found from the latter half of April to the first half of June.

***Aciurina thoracica* Curran**

Figs. 7, 23H

*Aciurina thoracica* Curran, 1932: 11.

The ovipositor (Fig. 23H) with preapical sides more rounded; rasper teeth semi-acute, largest ones at about basal  $\frac{1}{3}$  of ovipositubus.

This species was described from San Diego County, California. I have seen it from several localities in California (Cajon, Martinez, Otay, Stanford University, and Truckee), as well as from Bernalillo County, New Mexico, and Rockwell, Utah. Foote (1965: 670) recorded the species from Arizona; he informs me that the record is based upon a specimen from Scottsdale determined by him. That specimen was taken on February 22, which is the earliest date of occurrence; other dates extend from 9 April to 3 August.

REMAINDER OF GENUS

The remaining species of *Aciurina*, exclusive of the Aplopappi Group, may eventually be divided into further species groups, but they do not seem as distinct as the Aplopappi Group, and all are known to feed upon plants of the genus *Chrysothamnus*, as well as a few other genera, but not upon *Baccharis* species. Nor is any other species than *A. aplopappi* known to feed upon *Gutierrezia* and only *A. ferruginea* besides *A. aplopappi* is known to feed upon a species of *Haplopappus*. The remainder of the genus may therefore be considered as a single, typical group.

***Aciurina bigeloviae* (Cockerell)**

Figs. 13 to 16, 22, 23

*Trypeta bigeloviae* Cockerell, 1890a: 75 (March, gall only); 1890b: 324 (December, adult) (cf. Sabrosky, C. W., 1971, Bull. Entomol. Soc. Am. 17: 85).

*Trypeta b.* var. *disrupta* Cockerell, 1890b: 324. N. SYN.

*Eurosta* (*Trypeta*) *bigeloviae* Townsend, 1893: 49–52. Synonymy stated in footnote, p. 52.

*Aciurina trixa* Curran, 1932: 11. N. SYN.

*Tephrella semilucida* Bates, 1935: 111. N. SYN.

*Aciurina bigeloviae* (Cockerell) Foote and Blanc, 1963: 8.

The ovipositor (Fig. 23A) is rather short, 0.70 to 0.86 mm long; flaps finely erose along mesal edges, at each side of which are numerous short rows of minute denticles, the most apical of which are closer to extreme tip of ovipositor than in other species; rasper teeth small, semicircular; ventrobasal taeniae well separated at base, converging apicad and usually more or less fusing, extending almost half of length of ovipositubus.

An egg found in the abdomen of a specimen whose ovipositor was being prepared is cancellate at and near micropilar end (Fig. 22).

The only statements, although validly establishing the species-name, in the original description are: “. . . the white, woolly, conspicuous *galls* of *Trypeta bigeloviae*, n. sp., produced in abundance at West Cliff, Colorado, on *Bigelovia*, and yet apparently not injuring the plant seriously at all.” West Cliff, Colorado, is in Custer County and the paper by Cockerell is dated January 12, 1980. It is not known whether Cockerell preserved any of these galls. If he did, one of them must be designated as lectotype, with or without the maker of the gall inside it. If he did not preserve galls on which the description was based, a neotype would have to be selected from material collected from the proper plant at the type locality, now known as Westcliffe.

Two of the named forms listed above as synonyms are founded upon minor variations in the wing pattern. The variety *disrupta* is characterized by having “the V-shaped hyaline mark divided into two by the obliteration of its apex.” The mark (in cell *am*) has been found to be highly variable. As Cockerell stated, it is sometimes divided by the extension of the mark making it V-shaped, but that mark may also be entirely reduced, leaving a triangular hyaline space instead of a V-mark. This latter condition is present in the form Curran called *Aciurina trixa* in a paper in which no mention was made of *A. bigeloviae*. Many populations have been seen in which the wing pattern is further reduced to various degrees; I believe that *Tephrella semilucida* Bates is no more than *A. bigeloviae* with strongly reduced wing pattern.

*A. bigeloviae* is the most widely distributed and most variable of all the *Chrysothamnus*-feeding species, that is, the typical group of *Aciurina*. As noted above, the type (as well as the var. *disrupta*) is from Custer County Colorado. The type locality of *Tephrella semilucida* is Riparia, Whitman County, Washington, and that of *Aciurina trixa* is Stansbury Island, Great Salt Lake, Utah; this latter is no longer an island but a part of Tooele County near the edge of the lake. I have seen specimens from the eastern half of Washington, eastern  $\frac{2}{3}$  of Oregon, southern half of California, all parts of Idaho except the northernmost 5 counties, Nevada (Humboldt, Lander, and Washoe Counties), all parts of Utah, western  $\frac{2}{3}$  of Colorado, Arizona (Apache, Cocino, and Yavapai Counties), New Mexico (Bernalillo, Otero, Rio Arriba, and Taos Counties), Wyoming (Albany County), and North Dakota (Billings County). It will probably be found wherever its chief host, *Chrysothamnus nauseosus*, occurs.

Adults have been taken from the last week of March until the middle of September, but the great majority of them appear in May and June.

### *Aciurina ferruginea* (Doane)

Figs. 9, 17, 23J

*Aciura ferruginea* Doane, 1899: 182.

*Aciurina ferruginea* (Doane) Curran, 1932: 10.

The ovipositor is as in Figs. 17, 12J, the flaps with zones of mesally directed teeth, very acutely tipped, broadly based, and with concave sides, roughly triangular, area of occurrence rather short and well behind extreme tip of ovipositor; ovipositor with dorsobasal taeniae only about  $\frac{1}{4}$  of total length of tubus and near base separated by about 2.5 times their width; rasper teeth acutely triangular, largest ones a little basad of middle of tubus and larger than in other species, teeth lacking for considerable distance at each end of tubus.

The type is from "Washington." I have seen specimens from Washington (Adams, Benton, Grant, and Yakima Counties), Oregon (Crook, Deschutes, and Malheur Counties), California (Inyo and Mono Counties), Nevada (Ormsby County, now Carson City), Idaho (Cassia, Franklin, Idaho, Oneida, and Twin Falls Counties), Utah (Grand, Salt Lake, Summit, Uintah, and Weber Counties), Wyoming (Sweetwater County), Colorado (Summit County) and New Mexico (McKinley County).

Available dates of capture of adults run from 7 July to 21 September, indicating a season somewhat later than that of some other species.

*Aciurina idahoensis* Steyskal, NEW SPECIES

Figs. 2, 19, 21, 23E

The very characteristic pattern of the wing, as described below and in the key and shown in Fig. 2, readily distinguishes this species from any other. The strongly scaphoid ovipositor is reminiscent only of that of *A. notata*, a species with quite different and very reduced wing pattern.

Male.—Length of wing 2.8–3.5 mm, average 3.07 mm.

Color of body largely yellowish, following parts blackish to piceous: central part of occiput (usually hidden); dorsum of thorax (exclusive of humeri, notopleura, and more or less of margin of scutellum); postscutellum and metanotum; variable amount of parts of posterior pleura (broad dorsal border of sternopleuron usually yellowish); most of abdominal tergites, including epandrium (paler specimens may have more or less of tergites yellowish starting at posterior margin and in palest specimens leaving only pairs of mesally pointed wedges of dark color). Head and legs wholly yellowish. Wing with venation and dark brown pattern as in Fig. 2, but with apicocostal band usually separated from transverse band through *tp*. All setae and hairs yellowish to whitish.

Integument subshining, lightly tomentose, to shining in a few places.

Antenna with 3rd segment 1.6 to 1.8 times as long as basal width. Upper front half total width of head. Cheek (lower edge of eye to oral margin) 0.153 to 0.18 of height of eye.

Genitalia as in Fig. 19A–C; epandrium black, shining, remainder yellowish; prenisetae black.

Female.—Length of wing 3.1 to 3.7 mm, average 3.45. Similar to mate in coloration, but black usually less extensive; abdominal tergites mostly yellowish, usually with black wedges or lateral spots and o-2 disjunct piceous spots; basal tergite usually mostly black; ovipositor sheath wholly black; mesonotum sometimes with 4 longitudinal black stripes, mesal pair discontinued well before scutellum, which then is wholly yellowish dorsally.

Wing as in Fig. 2, apicocostal band always broadly connected with transverse band through *tp*; one specimen has been seen with latter band connected along vein Cu and posteriorly to wing margin with band through *ta*.

Ovipositor (Fig. 23E) from 0.75 to 0.85 mm long; strongly scaphoid, convex above, flat to concave below; small area above flaps with minutely crenulate oblique ridges well before acute tip; dorsobasal taeniae narrow, about  $\frac{1}{3}$  length of ovipositubus; rasper teeth small, about 0.025 mm wide, fingernaillike, absent for short distance at each end of ovipositubus.

Holotype ♂, allotype ♀, and 9 ♂ and 11 ♀ paratypes, IDAHO, Murphy, Owyhee County, 8.VI.1967, 241-23A (E. J. Allen), ex pine-cone-like bud galls on *Chryse-*

*othamnus viscidiflorus* (in USNM). Other paratypes (all from Idaho and in the University of Idaho Collections): 3 ♀ 10 mi S Gilmore, Lemhi County, 24.VII.1959 (H. C. Manis), *Chrysothamnus*; 1 ♀, 6 mi SE Malta, 16.VI.1973 (J. K. Wangberg); 1 pair, 8.3 mi NW Mackay, Custer County, 21.V.1973 (J. K. Wangberg); 1 ♂, 20 mi NE Howe, Butte County, 29.V.1973 (J. K. Wangberg); 1 ♂, 7 mi E Howe, Butte County, 20.VI.1973 (J. K. Wangberg); 1 ♀, 2 mi W Carey, Blaine County, 22.V.1973 (J. K. Wangberg).

Note: Both Sp. A and Sp. B of Wangberg (1981) are likely *A. idahoensis*.

***Aciurina lutea* (Coquillett)**

Figs. 5, 23D

*Aciura lutea* Coquillett. 1899: 264.

*Aciurina lutea* (Coquillett) Curran, 1932: 10.

Ovipositor (holotype) Length 10.05 mm; dorsal taeniae about 0.4 of length of tubus, separated by about their width; largest rasper teeth just basad of midlength of tubus, small, acute; flaps without specialization, pointed, ending well basad of tip.

The type is from Parea, Utah. This locality does not appear on many modern maps, but it is on the Southwest section of the National Geographic Society's series entitled Close-Up: U.S.A. (October, 1977) and on some of the more recent official maps of the State of Utah as "Old Paria." I first found it in the Atlas section, volume X, of the Century Dictionary and Encyclopedia (1898) as Parea. It is in Kane County 35 mi ENE of Kanab and on the Paria River.

The species is scarce; the only records besides that of the type are from Idaho (Blaine County, Carey; Jefferson County, Terreton; Oneida County, Holbrook, 17.VI.1973; all in University of Idaho), Nevada (Ormsby County, July 6, collected by Baker, with 3 smooth stem galls, in USNM), and New Mexico (Bernalillo County, 4 mi N San Isidro, 29.III.1981, collected by Gary Dodson, from "woolly" galls on *Chrysothamnus* sp. The Idaho specimens were reared from *Chrysothamnus viscidiflorus* and the smooth galls were described and figured by Wangberg (1981). It is unfortunate that the species of *Chrysothamnus* on which the "woolly" galls were formed is unknown.

***Aciurina maculata* (Cole)**

Figs. 4, 23B

*Aciura maculata* Cole, in Cole and Lovett 1919: 252.

*Aciurina maculata* (Cole) Curran, 1932: 10.

*Aciurina pacifica* Curran, 1932: 10; synonymy by Bates, 1935: 108.

Ovipositor Length 0.95 to 1.0 mm; taeniae nearly half length of tubus; rasper teeth relatively large, acute, largest teeth about at midlength of tubus; broad basal zone bare, but small teeth extend to ovipositor; flaps on mesal margins with series of scalelike projections, each with 3 sharp apical teeth; similar projections on surface for some distance each side of mesal margin, but with fewer teeth.

The holotype of *A. maculata* is from Jackson County, Oregon and that of *A. pacifica* is from Yakima, Washington. I have determined material as this species from California (Yosemite Park, Mariposa County), Oregon (Jackson and Malheur Counties), Washington (Yakima County), Idaho (Blaine, Butte, Custer, Elmore,

and Owyhee Counties), and Nevada (Glenbrook, Douglas County). Dates are from 16 March (Idaho) to 7 July (Oregon).

***Aciurina notata* (Coquillett)**

Figs. 11, 12, 20, 21

*Trypeta notata* Coquillett, 1899: 262.

*Aciurina notata* (Coquillett) Foote, 1960: 254.

As shown in the foregoing key, the wing pattern and most characters are very like those of *A. bigeloviae* with strongly reduced wing pattern. The pterostigma, however, is much smaller than in *A. bigeloviae*. The ovipositor (Fig. 21) is almost round in section and gently curving to the tip; a preparation showing a ventral view was not feasible with the available material; length 0.7 mm; flaps with a few triangular teeth on surface; tubus shorter than ovipositor; taeniae about half as long as tubus; rasper teeth largest at midlength of tubus, paraboloid, largest about 0.018 mm wide; tubus bare between most of taeniae. An egg, recovered from the abdomen of the specimen from which Fig. 21 was made, shows numerous minute appendages at the corners of the reticulations at the micropilar end (Fig. 20).

The type is from Albuquerque, Bernalillo County, New Mexico, in USNM. The only other records are from Sante Fe, Sante Fe County, New Mexico, in USNM; a rearing from *Chrysothamnus* sp. in Bernalillo County, New Mexico, 3–11 May, by Gary Dodson; and one of caught specimens in that same county on 29 April.

***Aciurina opaca* (Coquillett)**

Figs. 4, 23B

*Aciura opaca* Coquillett, 1899: 263.

*Aciurina opaca* (Coquillett) Curran, 1932: 10.

*Acidia johnsoni* Thomas, 1914; synonymy by Foote, 1965: 670.

The very unusual ovipositor, with smoothly and roundly rounded tip, suggests habits considerably different from other species of the genus. Neither R. H. Foote nor I am aware of any other American Tephritidae with such a blunt ovipositor but Hardy (1973) figures a few with quite bluntly tipped ovipositors; however little to indicate details of their habits is associated with those species. Ovipositor length 0.55 mm; tip rounded; flaps widely separated, without obvious surface modification; tubus nearly 1.5 times as long as ovipositor; taeniae widely separated at base, bearing a few large, clawed, dark rasper teeth at their apices; membrane of tubus bare between taeniae, elsewhere covered with small, pale scalelike teeth.

The type of *A. opaca* is from Elko, Nevada and that of *Acidia johnsoni* is from "Colo." Only a few additional records are available: Arizona (White Mountains, collected by Parker, in USNM; Idaho (Fremont and Oneida Counties, 18 March to 27 May, in University of Idaho); and Utah (Paiute and Panguitch Counties), 1–19 June, in University of Utah).

The host of *A. opaca* is cited as *Chrysothamnus nauseosus* by Wangberg (1981).

***Aciurina trilitura* Blanc and Foote**

Figs. 3, 23I

*Aciurina trilitura* Blanc and Foote, 1961: 73; Foote and Blanc, 1963: 10.

Ovipositor length 1.0 mm; taeniae narrow, dorsal ones only about their width apart and only about ¼ length of tubus; rasper teeth very small, semicircular,

absent in most of basal intertaenial space, but becoming very small apically and extending to ovipositor; mesal parts of flaps very finely obliquely wrinkled, but with small, shallow mesal emargination.

The type is from San Bernardino County, California. Several additional California records were cited by Foote and Blanc (1963), including Inyo, Kern, Los Angeles, and San Bernardino Counties. Since that time the following extra-Californian records have accumulated: Idaho (Holbrook, Oneida County, 6.VI.1974, in University of Idaho); Utah (Bear Valley, Iron County, 9.VI.1966, and Ogden, Weber County, 10.VI.1965, in University of Utah). Capture of adults in California extends from 26 April to 26 June. The species is distinctive in both wing pattern and ovipositor characters.

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