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Locality records for 11 species, aestuans, ater, discalis, excitans, frigidus, fulvaster, furcatus, mitis, nigripes, noctifer pertinax, *and* zinzalus, *are given. A key is provided for the identification of females.*

Nous représentons la distribution de 11 espèces, aestuans, ater, discalis, excitans, frigidus, fulvaster, furcatus, mitis, nigripes, noctifer pertinax, *et* zinzalus. *Une clef pour la détermination des females de ces espèces est pourvue.*

This paper assembles locality records for the Alberta species of *Chrysops* and provides diagnoses and a key for the identification of females. Eleven species are dealt with, of which one, *Chrysops zinzalus* Philip, is recorded from Alberta for the first time. Two species previously recorded from Alberta, *Chrysops callidus* Osten Sacken and *Chrysops proclivis* Osten Sacken, are omitted as I have been unable to trace any specimens of them from Alberta.

All descriptions and comments refer to females. The male of *C. zinzalus* is undescribed. The male of *Chrysops ater* Macquart was described by Philip (1955) as *Chrysops carbonarius nubiapex.* Descriptions of the males of all other species are in Brennan (1935).

Synonymies are recorded when there has been a change in status since Philip's (1965) catalogue; i.e. for *Chrysops ater.*

Figures 1 and 2 show the parts of the head and wings used in the diagnoses and key.

Localities are listed from east to west and south to north in areas limited by 1° of longitude and 1° of latitude.

DIAGNOSTIC CHARACTERISTICS AND GEOGRAPHICAL DISTRIBUTION

Chrysops aestuans Wulp, 1867

Females of this species are distinguished from those of other Alberta *Chrysops* by having a shiny yellow frontoclypeus, no pollinose stripe, and a very narrow apical spot on the wing (Fig. 3).

Females of *C. aestuans* are similar to those of *C. callidus* but the two taxa are distinguished by differences in abdominal and wing patterns. Females of *aestuans* have sublateral black triangles on the second abdominal tergum, and the apical spot is paler than the cross-band and one-half the width of cell R_1. In females of *callidus* the sublateral marks, when present, are not triangles, and the apical spot is the same density as the cross-band and varies between one-half and the full width of cell R_1.

Chrysops aestuans appears to be rare in Alberta (Fig. 16). I have seen two specimens from Miquelon Lake (June 21, July 20) and one in the Canadian National Collection labelled "Alberta". Strickland (1946) recorded a specimen from Wild Horse.

Chrysops ater Macquart, 1850

Chrysops ater was described by Osten Sacken (1875) as *Chrysops fugax,* by Philip (1955) as *Chrysops carbonarius nubiapex,* and cited by Philip (1965) as a synonym of *Chrysops*

carbonarius. The specific name, *Chrysops ater,* was erected as the senior synonym by Pechuman and Burton (1969).

Females of *ater* are likely to be confused with those of *mitis.* They can be separated by their, usually, smaller size and the hyaline area at the proximal end of cell Cu_1 (Fig. 4). In females of *ater,* body length is from 7-9 mm and wing length 8.06 ± 0.47 mm (mean ± S.D.); while in *mitis* females, body length is from 8.5 - 11 mm and wing length 9.44 ± 0.41 mm.

The distribution of *C. ater* in Alberta is shown in Fig. 15.

Locality Records

Elkwater June 10-July 18 (CNC); Manyberries June 4 (CNC); Purple Springs June 18 (LLP); Lethbridge June 15-July 21 (CNC, UASM, LLP); Pincher July 10 (UASM); Cowley June 19 (CNC); Coleman reared (CNC); Medicine Hat June 12-July 16 (CNC); Hayes July 11 (CNC); Scandia July 9 (CNC); Milo July 1 (AWT); Hartell reared (AWT); Turner Valley reared (AWT); Calgary 35 miles sw June 16-18 (AWT); Calgary 20 miles w June 23 (CNC); Seebe June 10 (LLP); Menaik July 26 (UASM); Rocky Mountain House May 29 (UASM); Nordegg July 10-July 31 (AWT, UASM); Leduc July 7 (AWT); Edmonton May 30-June 9 (UASM); Edmonton 2 miles w June 12-20 (AWT); Wabamun reared (AWT), June (UASM); Lac La Biche June 30-July 5 (UASM); Athabasca 20 miles e June 30 (AWT); Flatbush June 22 (UASM); Westlock 14 miles s July 5 (AWT); Valleyview 45 miles sw June 17 (UASM); Calling Lake June 22 (UASM); Ft. McMurray June 6-26 (CNC); Manning 43 miles n July 12 (UASM); High Level 50 miles n July 10 (UASM).

Chrysops discalis Williston, 1880

Females of this species are distinguished from those of other Alberta *Chrysops* by having a shiny yellow frontoclypeus (with 2 or 4 black spots) with a wide median pollinose stripe, and by their wing pattern (Fig. 5).

Chrysops discalis appears to be confined to the south-east portion of the province in the vicinity of alkaline lakes (Fig. 16).

Locality Records

Orion August 9 (UASM); Lethbridge July (UASM); Medicine Hat July 14 (CNC); Scandia July 25 (CNC); Milo reared (AWT), June 30-July 11 (AWT); Consort July (UASM); Czar July 19 (UASM).

Chrysops excitans Walker, 1850

Females of this species are the largest of the Alberta *Chrysops* species. Body length averages 11 mm and wing length 10.07 ± 0.23 mm. Most females have the apex of the wing, beyond the cross-band, hyaline (Fig. 6), and extensive lateral yellow/orange areas on the first two or three abdominal terga. I have seen 5 females which differ from typical females in the following: body length ranges between 8-9 mm, the lateral pale areas on the abdomen are small, there are no mid-dorsal pale triangles on the abdomen, a vague infuscation is present in cell R_1 past the cross-band, and the anal cell is hyaline at its proximal end (Fig. 7). There are 56 similar specimens in the Canadian National Collection from various localities in Canada (Teskey, *in litt.*). Many workers, including Osten Sacken (1875), have remarked upon the great variation in abdominal colour pattern in specimens of *C. excitans.* However, Osten Sacken (1875) noted (p. 374) that the wing pattern was remarkably uniform in all specimens. Philip (1931) reported on the difference in eye pattern between the larger, typical females of *excitans* and the smaller darker specimens. I am not fully convinced that *C. excitans,* as presently understood, is monospecific.

The typical specimens are abundant in the northern and western parts of the province (Fig. 17) and readily attack man.

Locality Records

Waterton Lakes June 27 (CNC); Pincher July 10 (UASM); Calgary 35 miles sw June 18 (AWT); Morley reared (CNC); Seebe reared (CNC), June 8-18 (CFS, CNC); Banff July 6 (CNC, LLP); Banff Pk. Eisenhower Jnct. July 2-August 2 (CNC,

UASM); Lake Louise July 14 (CNC); Nordegg reared (AWT), June 24-August 3 (AWT); Jasper Pk. Honeymoon Lake August 11 (LLP); Jasper 7 miles w July 30 (LLP); Jasper Pk. Patricia Lake June 25 (LLP); Jasper July 28 (DMD); Edmonton July 24 (UASM); Edmonton 30 miles w June 15 (AWT); Fawcett June 20 (CNC, UASM, LLP); Flatbush June 16-19 (UASM); Smith July 14 (UASM); Slave Lake 20 miles se June 27-August 2 (AWT); Ft. McMurray June 11-27 (CNC); Ft. Chipewyan July 3 (CNC); 60°N June (UASM).

The small dark specimens were from Nordegg, Lac La Biche, Valleyview (45 miles SW) and Slave Lake (20 miles SE); collection dates were from June 17 to August 7.

Chrysops frigidus Osten Sacken, 1875

Females of this small (6.5-8 mm long) black and yellow species are similar to those of *C. nigripes* and *C. zinzalus*. Colour varies, from some females having large sublateral yellow areas on abdominal terga 1 and 2 and predominantly yellow legs to females with the yellow areas reduced to small spots and the legs predominantly black. The large apical spot broadly attached to cross-band (Fig. 8) serves to distinguish females of *frigidus* from those of *nigripes* and *zinzalus*.

The distribution of *C. frigidus* in Alberta is shown in Fig. 18.

Locality Records

Hartell reared (AWT); Calgary 35 miles sw June 17-August 9 (AWT); Morley reared (CNC); Banff July 11-27 (CNC, LLP); Banff Pk. Bow Summit July 21 (UASM); Nordegg July 21-August 10 (AWT); Opal June 23-August 9 (UASM); Edmonton 2 miles w reared (AWT), June 12-21 (AWT); Edmonton 30 miles w June 5-July 3 (AWT); Wabamun June 27 (UASM); Drayton Valley June 29 (UASM); Evansburg 6 miles nw June 19 (AWT); Lac La Biche June 29 (UASM); Athabasca 20 miles e June 30 (AWT); Westlock 14 miles s June 17-July 26 (AWT); Valleyview 45 miles sw June 17 (UASM); Slave Lake 20 miles se July 11-August 2 (AWT); High Level 40 miles s July 12 (UASM).

Chrysops fulvaster Osten Sacken, 1877

Females of this species are distinguished from those of other Alberta *Chrysops* by their wing pattern (Fig. 9) and by having a yellow/orange spot on the frontal callus; in all other Alberta species of *Chrysops* the frontal callus is completely black.

The distribution of *Chrysops fulvaster* in Alberta is shown in Fig. 18.

Locality Records

Lethbridge reared (CNC), July 14 (CNC); Cowley July (LLP); Medicine Hat July 8-23 (CNC, UASM); Milo July 11 (AWT); Consort July 18(UASM); "Red Deer River" July 12 (CNC).

Chrysops furcatus Walker, 1848

Females of this species are distinguished from those of other Alberta *Chrysops* by having a shiny yellow frontoclypeus, no pollinose stripe, and a broad apical spot separated from the cross-band (Fig. 10). Females of *C. proclivis* are similar to those of *C. furcatus* but can be separated from them by the completely infuscated cell R.

Dark females of *C. furcatus* were described by Philip (1955) as subspecies *chagnoni*. These differ from typical *furcatus* in having the antennae, fore coxae, and fore and hind femora black, and by having two isolated sublateral upright black dashes on the second abdominal tergum. In Alberta there is a full intergradation between typical *furcatus* and *chagnoni*. Recognition of the darker specimens of *furcatus* as *chagnoni* seems unnecessary. It is possible that Brennan's (1935) and Strickland's (1938) records of *C. proclivis* from Alberta refer to the dark form of *furcatus*.

The distribution of *C. furcatus* in Alberta is shown in Fig. 19.

Locality Records

Waterton June 30 (CNC); Maycroft reared (CNC); Hartell reared (AWT); Turner Valley reared (AWT); Calgary 35 miles sw June 18-August 7 (AWT, UASM); Morley 8 miles e July 3 (CNC); Morley reared (CNC); Seebe reared (CNC), June 23-July

(CFS, CNC); Banff June 23-August 11 (CBP, CFS, CNC, UASM, LLP); Banff Pk. Eisenhower Jnct. July 2-25 (UASM, CNC); Banff Pk. Moraine Lake August 16 (LLP); Nordegg reared (AWT), June 10-August 10 (AWT, CBP, CNC, UASM); Nordegg 35 miles sw reared (AWT); Jasper Pk. Sunwapta Falls July 28-29 (DMD); Jasper June 26-July 29 (CBP, UASM); Opal July 5 (UASM); Coronado June 23-July 22 (UASM); Edmonton June 7-July 24 (AWT, UASM); Devon July 3 (AWT); Golden Spike July 11 (UASM); Edmonton 30 miles w June 5-15 (AWT); Wabamun reared (AWT); Sundance July 8 (UASM); Evansburg 6 miles nw June 19 (AWT); Grande Cache reared (AWT); Westlock 14 miles s reared (AWT), June 18-July 26 (AWT); Lac La Biche July 6 (CFS); Athabasca 20 miles e June 30 (AWT); Fox Creek July 8 (UASM); Valleyview 45 miles sw June 17 (UASM); Athabasca 28 miles n June 22 (UASM); Hondo July 31 (AWT); Slave Lake 20 miles se July 5-August 2 (AWT); Ft. McMurray July 23 (CNC); Manning 15 miles n July 12 (UASM); Ft. Chipewyan July 5 (CNC).

Chrysops mitis Osten Sacken, 1875

Females of *mitis* can be separated from those of *ater* (*q.v.*) by size, and by cell Cu_1 being infuscated at its proximal end (Fig. 11). Some females of *mitis* have grey mid-dorsal triangles on abdominal segments 2, 3, and 4.

The distribution of *C. mitis* in Alberta is shown in Fig. 20.

Locality Records

Cpress Hills June 25-July (CNC, UASM); Elkwater June 10-July 20 (CNC); Aden June 28 (CNC); Taber June 27 (CBP); Lethbridge June 8-July 14 (CBP, CNC, UASM); Waterton larvae (Shamsuddin 1966), July 22 (CNC); Spring Point reared (CNC); Cowley June 16 (CNC); Maycroft reared (CNC); Frank June 15 (CNC); Medicine Hat June 14-July 8 (CNC, UASM); Vauxhall larvae (Shamsuddin 1966); Hartell reared (AWT); Turner Valley reared (AWT); Calgary 35 miles sw June 16-July 27 (AWT); Morley 15 miles e June 23-July 19 (CNC); Morley 8 miles e June 26 (CNC); Morley reared (CNC); Seebe reared (CNC), July 11 (CNC); Banff July 11-August 7 (CNC, LLP); Banff Pk. Johnston Canyon July 18 (CNC); Banff Pk. Eisenhower Jnct. July 11-14 (CNC); Pine Lake July (UASM); Brazeau Dam July 9 (UASM); Nordegg July 7-August 10 (AWT, CNC, UASM, LLP); Opal June 23 (UASM); Millet June 6 (UASM); Leduc reared (AWT), July 7-11 AWT); Edmonton June 23 (UASM); Edmonton 2 miles w June 11-July 7 (AWT); Wabamun reared (AWT), June 16-July 5 (AWT, UASM); Evansburg 6 miles nw June 19 (AWT); Lac La Biche July 14 (UASM); Athabasca 20 miles e June 30 (AWT); Clyde reared (AWT); Flatbush June 21 (UASM); Valleyview 45 miles sw June 17 (UASM); Calling Lake June 22 (UASM); Slave Lake 20 miles se June 27-July 20 (AWT); Ft. McMurray June 3-22 (CNC); Steen River July 11 (UASM).

Chrysops nigripes Zetterstedt, 1838

Females of *nigripes* are distinguished from those of other Alberta species of *Chrysops* by wing pattern (Fig. 12), and by the characters given in the key.

I have seen two specimens of this holarctic species from Alberta. Both were collected by E. H. Strickland, July 20 and August 2, 1938. Philip (*in litt.*) has a female collected by Strickland, July 8 1931; Pechuman has seen a female collected July 9. All Alberta records are from Wabamun (Fig. 21). This population is now probably extinct. The report of *C. nigripes* from Nordegg (Thomas 1970) was erroneous; the specimen is a female of *C. zinzalus*.

Chrysops noctifer pertinax Williston, 1877

Brennan (1935) considered *Chrysops noctifer* Osten Sacken and *C. pertinax* to be specifically distinct.

The black body together with the distinct apical spot on the wing (Fig. 13) serves to distinguish *C. n. pertinax* females from females of the other Alberta *Chrysops* species.

This species has been collected, in Alberta, in the mountains in the south-west portion of the province (Fig. 22).

Locality Records

Waterton June 25-July (CDA, CNC, UASM); Waterton Pk. Cameron Lake June 19 (CNC); Seebe July 11 (CNC); Banff June 23-August 7 (CNC, UASM, LLP); Banff Pk. Eisenhower Jnct. July 2-August 2 (CNC, UASM); Banff Pk. Lake Louise July 14 (CNC); Banff Pk. Bow Summit July 21 (UASM).

Chrysops zinzalus Philip, 1942

Females of this species resemble those of *nigripes* and the darkest females of *frigidus*. The apical spot dilated beyond the cross-band and the hyaline area at the proximal angle of the

discal cell (Fig. 14), and the convex upper corners of the frontal callus (Fig. 1) separate females of *zinzalus* from those of *nigripes*. Females of *zinzalus* are distinguished from dark females of *frigidus* by wing pattern and the completely black hind tibiae.

Pechuman (1972) discussed the status of *C. zinzalus* suggesting that it could be a variant of *C. nigripes*. He had seen all of the then known 16 specimens of *zinzalus* (all from northeast North America). Only one of these matched the holotype in lacking a projection from the outer margin of the cross-band toward the base of vein R_4. I have 7 females, all of which possess a projection from the cross-band (Fig. 14). Since the observation by Philip (*in litt.*, March 1973) that females of *zinzalus* have a hyaline spot at the proximal end of the discal cell, there can be little doubt as to the distinctiveness of *Chrysops zinzalus*.

The 7 females I have were all collected in Manitoba fly traps in *Sphagnum* bogs. Six came from Nordegg, July 20-31; and one from 20 miles south-east of Slave Lake, August 2 (Fig. 21).

KEY TO THE FEMALE *CHRYSOPS* OF ALBERTA

1. Frontoclypeus shiny black with median yellow pollinose stripe 2
— Frontoclypeus shiny yellow, with or without stripe. 8
2. Apical spot on wing distinct. 3
— Apical spot absent, vague infuscation in a few specimens. 6
3. Hyaline triangle extends to costa; colour black. . . . . *noctifer pertinax*
— Hyaline triangle not extending across vein R_{2+3}; not completely black 4
4. Hyaline triangle, at most, extends across bifurcation of veins R_4 and R_5; legs often predominantly yellow . . . . . *frigidus*
— Hyaline triangle extends to vein R_{2+3}; legs predominantly black. 5
5. Apical spot not wider than cell R_1; proximal angle of discal cell infuscated; upper corners of frontal callus in form of right angles . . . . . *nigripes*
— Apical spot dilated beyond cross-band; proximal angle of discal cell hyaline; upper corners of frontal callus convex. . . . . *zinzalus*
6. Abdominal terga 1 and 2 with yellow/orange sublateral areas . . . . . *excitans*
— Abdomen black, with greyish pollinose areas in some specimens 7
7. Cell Cu_1 with distinct or obscure hyaline spot at proximal end . . . . . *ater*
— Cell Cu_1 without hyaline spot . . . . . *mitis*
8. Frontoclypeus with pollinose stripe; cell R_5 infuscated at wing margin 9
— Frontoclypeus without stripe; cell R_5 hyaline beyond cross-band 10
9. Frontal callus completely black; cell 2nd. M hyaline . . . . . *discalis*
— Frontal callus with orange spot; cell 2nd. M about 1/2 infuscated . . . . . *fulvaster*
10. Cell R predominantly hyaline; apical spot narrow . . . . . *aestuans*
— Cell R predominantly infuscated; apical spot broad. . . . . *furcatus*

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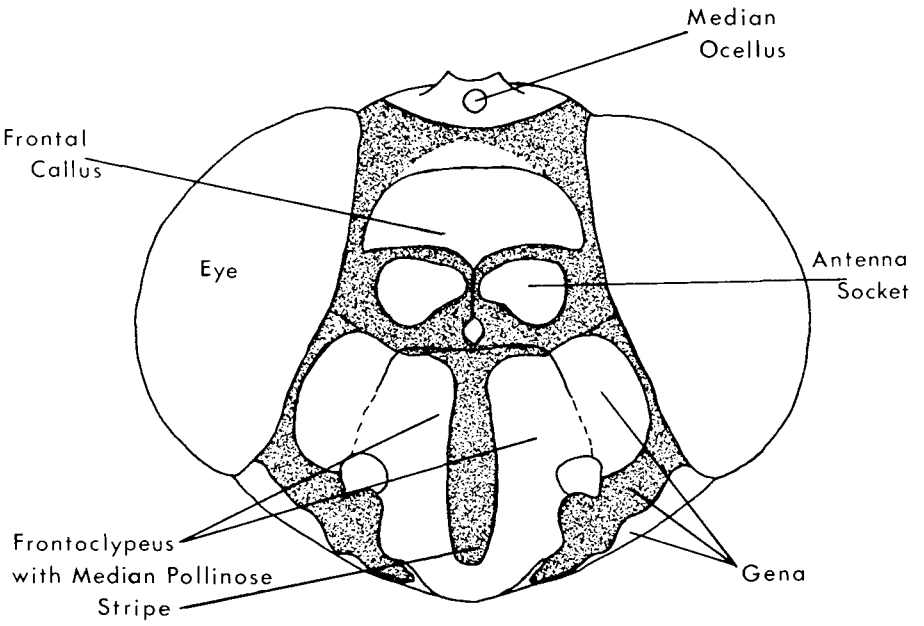

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Fig. 1. Anterior view of the head of a female *Chrysops zinzalus;* antennae and mouth parts removed.

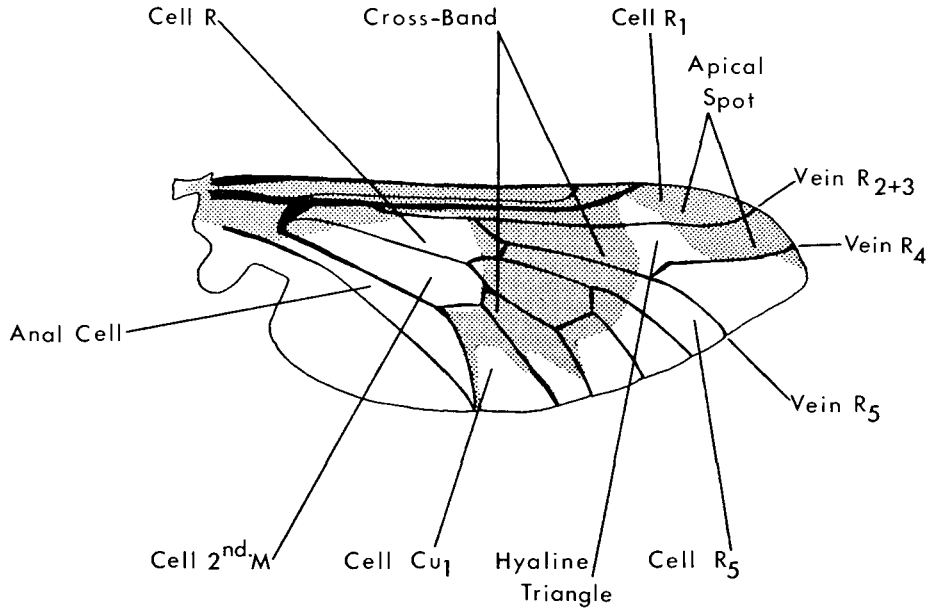

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Fig. 2. Right wing of a female *Chrysops furcatus* showing names assigned to those cells and veins used in this paper.

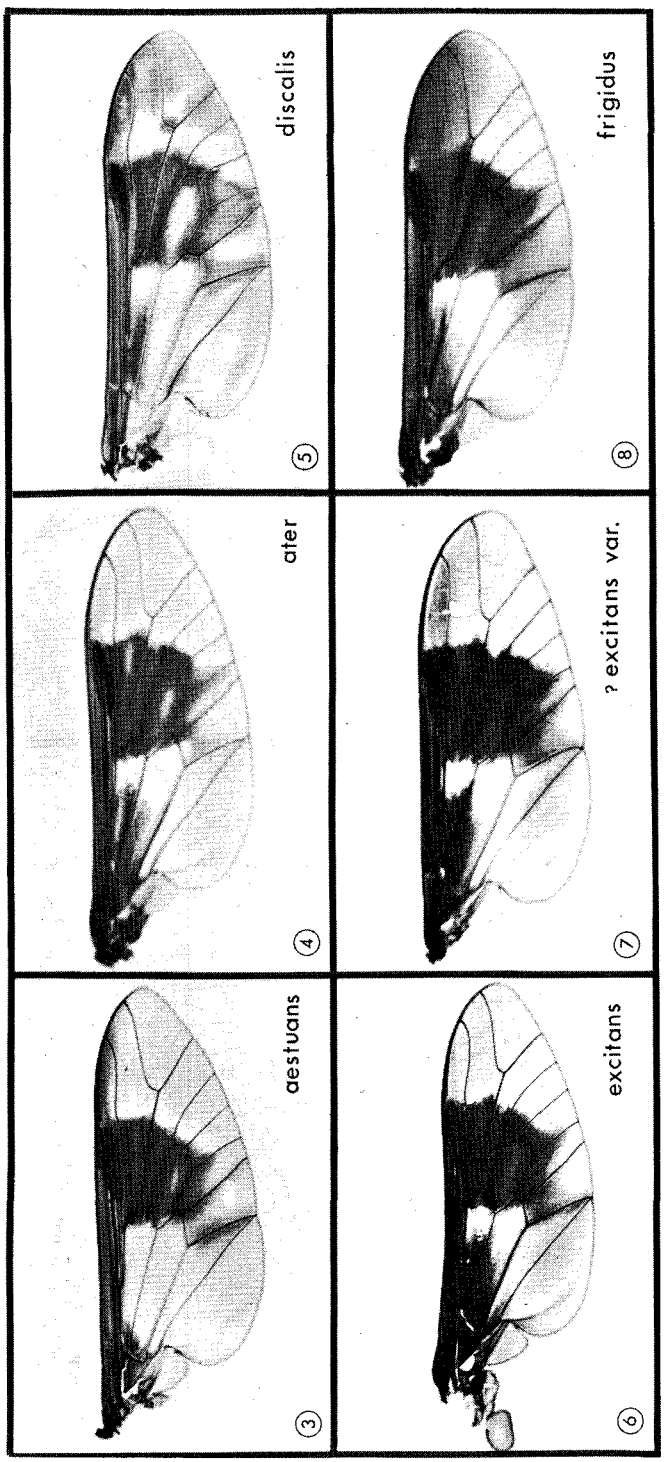

Fig. 3-8. Wings of females of *Chrysops aestuans, C. ater, C. discalis, C. excitans, ? C. excitans* var., and *C. frigidus.*

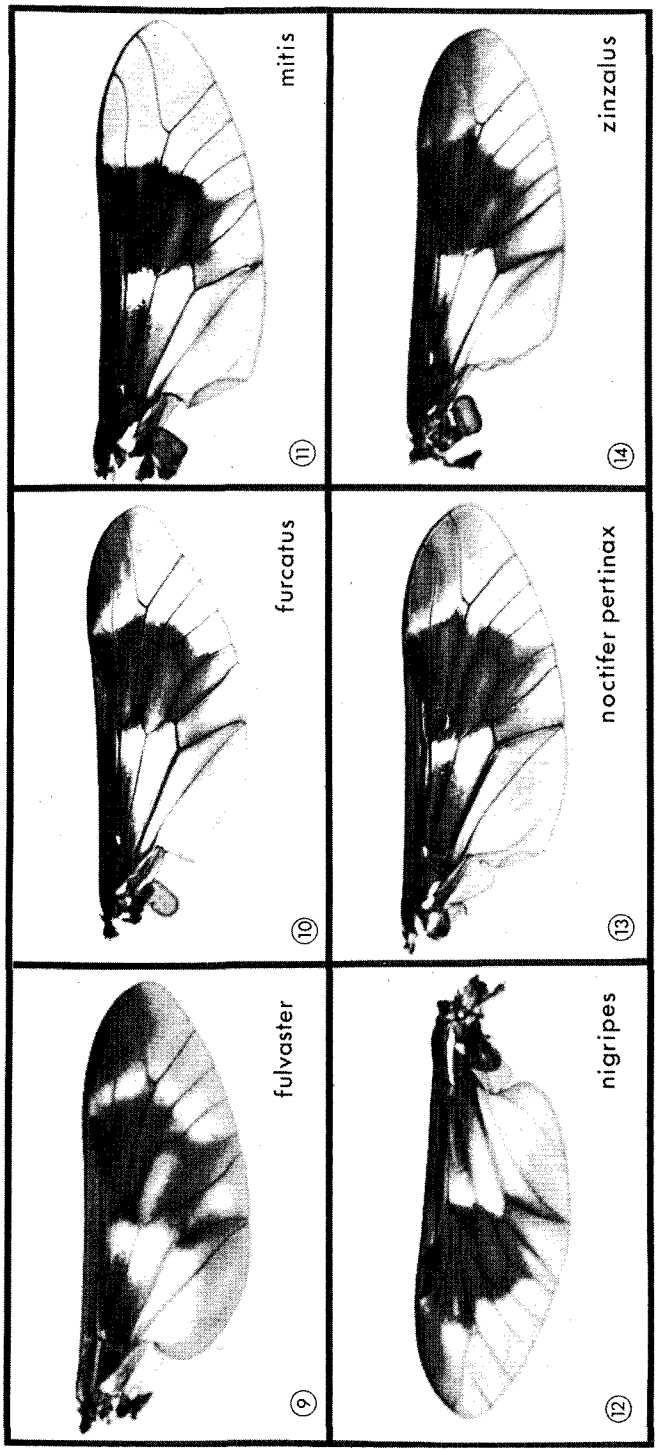

Fig. 9-14. Wings of females of *Chrysops fulvaster, C. furcatus, C. mitis, C. nigripes, C. noctifer pertinax,* and *C. zinzalus.*

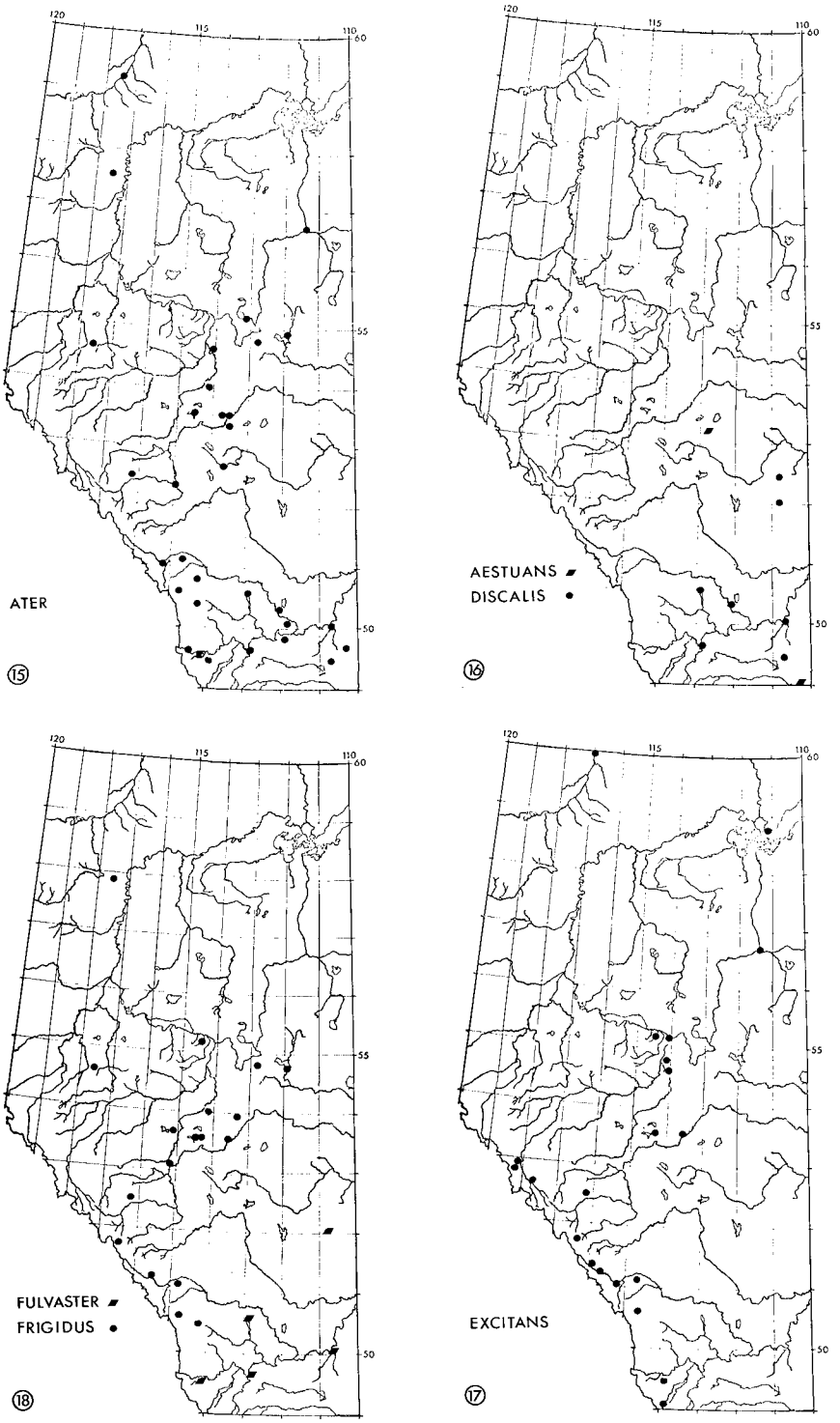

Fig. 15-18. Alberta distributions of *Chrysops ater, C. aestuans, C. discalis, C. excitans, C. fulvaster,* and *C. frigidus.*

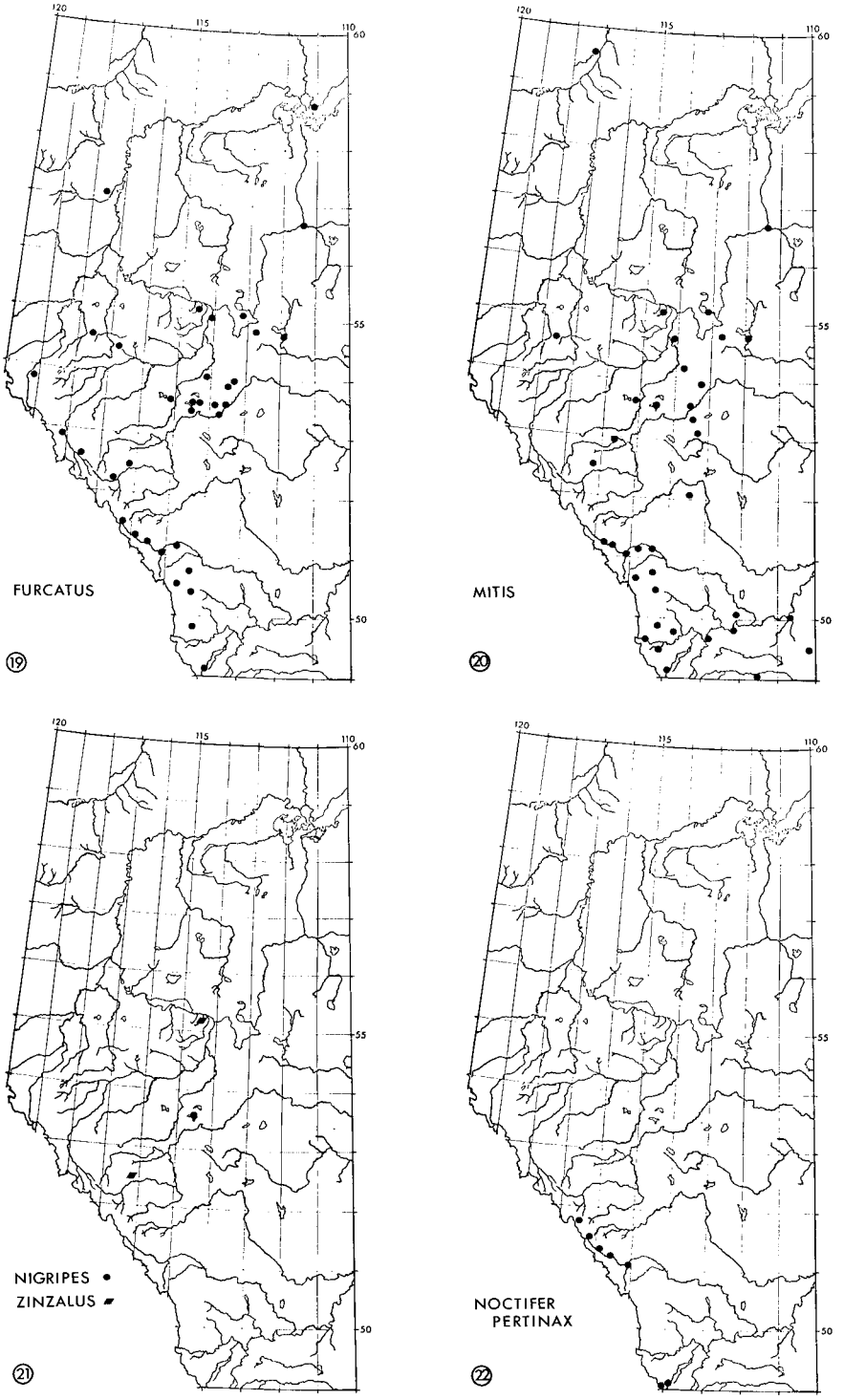

Fig. 19-22. Alberta distributions of *Chrysops furcatus, C. mitis, C. nigripes, C. zinzalus,* and *C. noctifer pertinax.*