SASKATCHEWAN DAMSELFLIES AND DRAGONFLIES

by DENNIS M. LEHMKUHL*

This article, the first of a planned series on insects, is based on drawings by Arthur R. Brooks. In 1962 at the early age of 45, Art Brooks died. A highly energetic researcher at the Canada Department of Agriculture Research Station in Saskatoon, he left behind, in various stages of completion, a number of taxonomic drawings and manuscripts. In 1970 I obtained custody of the material and it sat in the Biology Department until several months ago when I discussed with Dr. Gollop, *Blue Jay* Editor, the possibility of a series of articles which would use Brooks' drawings as a nucleus. He enthusiastically agreed, and I thank him for allowing this opportunity for the drawings to be more widely appreciated. I also thank John Waddington, Biology Department photographer, for using his skills in producing the finished plates. John Waddington took the photographs of the pinned specimens; the one of the ovipositing damselfly is by the author. This article is dedicated to Arthur R. Brooks and is presented as part of a program of the Entomological Society of Canada and Entomological Society of Saskatchewan's Student Encouragement Committees.

Damselflies and dragonflies (Odonata), along with butterflies, moths and beetles, have long been the delight of entomological collectors. Unfortunately, while the latter groups retain their attractive colouration in the preserved state, the brilliant reds, blues and greens of damselflies and dragonflies usually fade to blacks and greys after death. Thus odonates in collections, while perhaps impressive in comparison to some other groups of insects, are but a reminder of the glory of living specimens in their natural habitat. (To save space, the name of the order, Odonata is often anglicized to "odonates" and used for "damselflies and dragonflies".)

While collections may fade, naturalists seeking new horizons would do well to turn to the study of damselflies and dragonflies because of the interesting and complex behaviour of the group, including territorial defense, aggression, migration and elaborate displays during courtship. Like birds, these animals are large enough that they can be identified in the field (after you have done your homework on preserved specimens) and the history of individuals or groups can be followed by marking the wings with small dots of paint in various colour combinations. To make it more interesting, the group is poorly enough known that anyone who studies them, especially in the Prairie Provinces, is likely to turn up new facts and records that can contribute to the fund of scientific knowledge.

Everyone at one time or another crosses paths with the adult Odonates. On warm summer afternoons dragonflies invade suburban backyards in search of one of their main foods, the mosquito. Large blue and black darners (Aeschnidae) with wing spans of up to 4 inches hover roads in the green tunnels of the boreal forest, sometimes ending up as a large smear on the windshield of a speeding vehicle.

Damselflies, the more refined members of the order, usually are found delicately fluttering among the grasses

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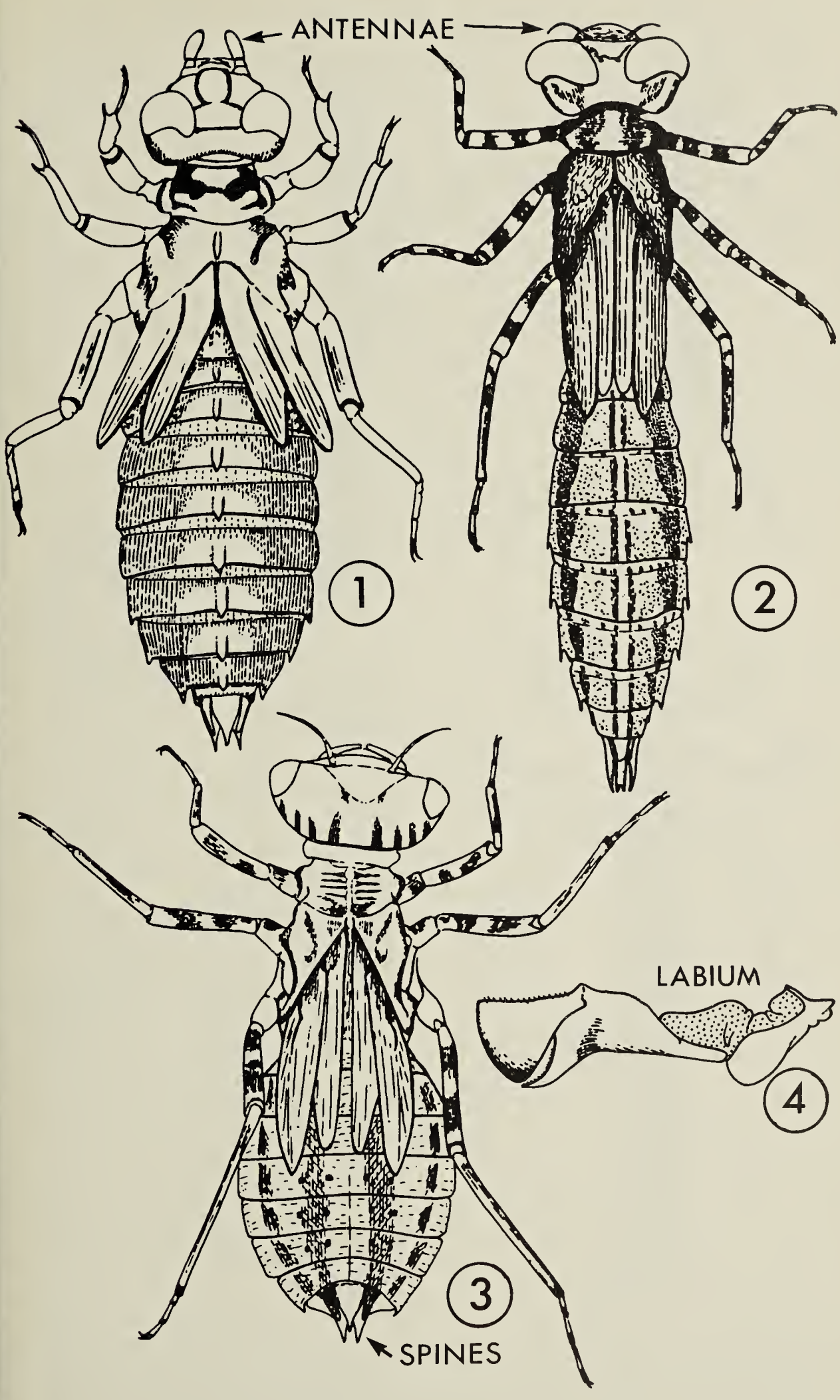

. 1-4. Nymphs of Dragonflies. 1. Clubtails; 2. Darners; 3. Common Skimmers; 4. Side iew of labium of Common Skimmers (compare with Fig. 7 for orientation).

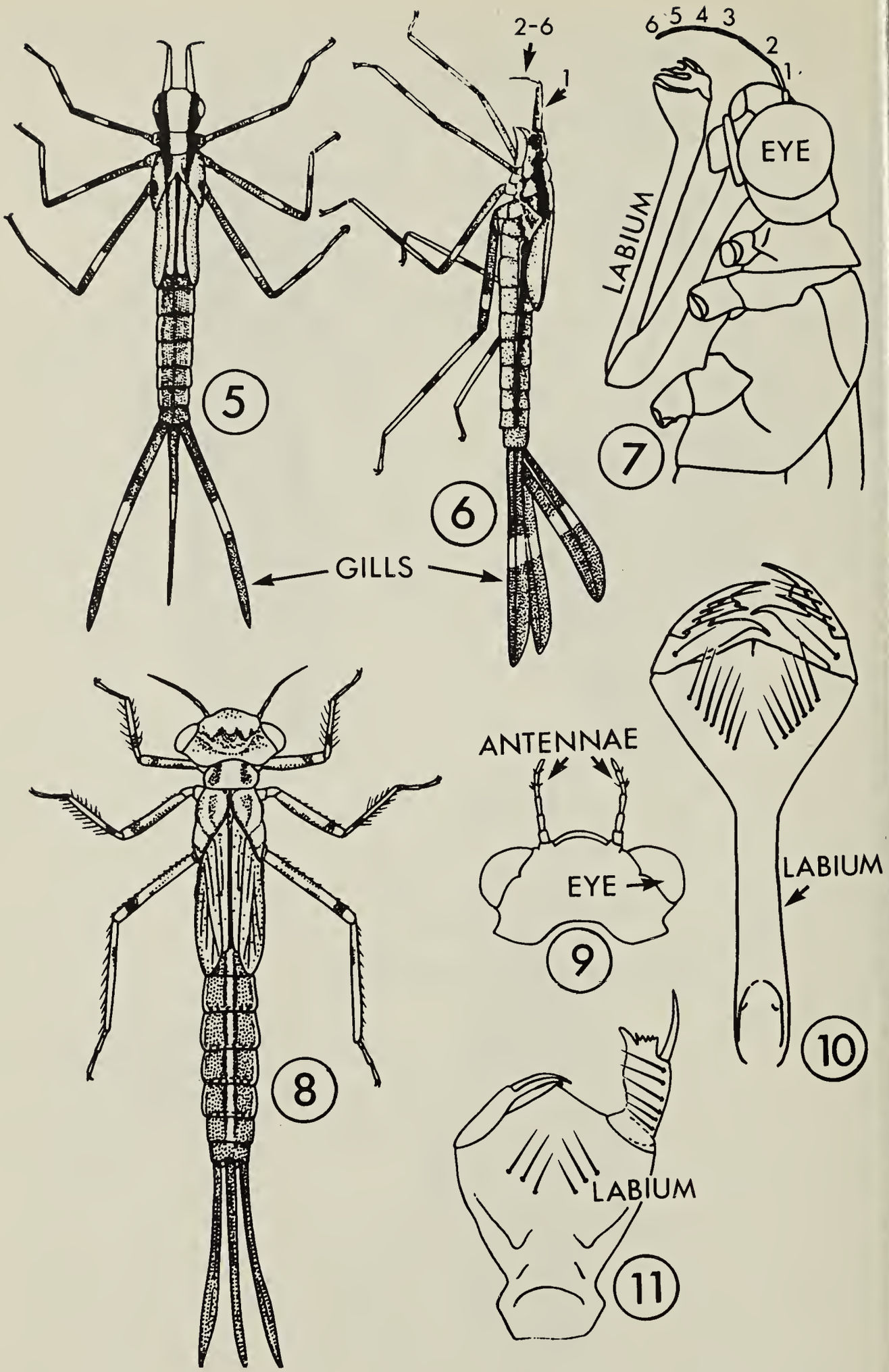

Fig. 5-11. Nymphs of Damselflies. 5. Broad-winged Damselflies, dorsal view; 6. Sam
side view; 7. Generalized odonate head and thorax, side view, showing especially th
elbowed labium; 8. Body shape found in Spread-winged and Narrow-winged Dam
selflies; 9. Antennae of these families with segments of even length; 10. Labium
Spread-winged Damselflies, extended and in dorsal view; 11. Same, Narrow-winge
Damselflies.

nd reeds on shores of lakes and ponds
f all descriptions — also in search of
osquitoes and other insects. In early
utumn, bright red Common Skimmers
Libellulidae) patrol sidewalks of
uiet parks and campuses. They may
o this because light reflected from
ement resembles that reflected from
ater, thus confusing these basically
quatic insects, or because parks and
mpuses are just good hunting
ounds. There are a number of obser-
tions of these insects attempting to
y eggs on a shiny car roof instead of
water.

The immatures are less often seen.
donates have three stages to the life
cle: the egg (Fig. 15), nymph (or
niad or larva — take your choice;
gs. 1-3 and 5, 6, 8) and adult (Figs.
, 21, 22). Nymphs live in water and
ne species or another can be found in
most any unpolluted natural aquatic
bitat. Clubtails (Gomphidae, Fig. 1)
e abundant in the Saskatchewan
iver; scorpion-like, Broad-winged
amselflies (Agriidae; Figs. 5 and 6)
efer streams at the edge of the boreal
rest; ponds in prairies and parklands
ound with nymphs of Common
kimmers (Libelullidae; Fig. 3),
read-winged Damselflies (Lestidae),
nd Narrow-winged Damselflies
Coenagrionidae; Figs. 8, 10 and 11).
ll are voracious predators and feed
n anything that moves within reach of
eir remarkable mouthparts, of which
e labium ends in a set of spiked jaws
nd can be extended or withdrawn by
eans of an elbow-like articulation
Figs. 4, 7, 10, 11). Once the prey is
ptured by the labial jaws, the victim
drawn to the mandibles where it is
newed up and devoured.

Mating in Odonata is accompanied
some strange behaviour and the
nusual method of sperm transfer ac-
ounts for several peculiarities of
donate morphology. The opening of
ne male reproductive system is at the
end of the abdomen (9th segment, Fig. 17), as is normal in insects, but once a sperm capsule is produced it is transferred to secondary genetalia on the second abdominal segment, just behind the legs (Fig. 17). Once a female is located and wooed, she is grasped behind the head with the male's clasper (Fig. 12; clasper, Fig. 17); the female then brings the tip of her abdomen forward and picks up the sperm packet from the second segment of the male. This process often takes place in flight while odonates are flying "in tandem". Sometimes the male continues to hold the female while she is depositing eggs (Fig. 16). Details of reproductive behaviour vary among species and much remains to be discovered concerning the Saskatchewan species.

Eggs usually are laid below the water surface (Figs. 13, 19), often inserted into plant tissues by means of the bladelike female ovipositor.

Whether one's main interest is ecology, behaviour or taxonomy, for positive identification of what you are looking at, it is necessary to make a collection of odonates. Immature stages are best preserved in 70 or 80% ethyl alcohol (rubbing alcohol will also work). Adults can be preserved in alcohol but the colour pattern will be lost and so they are usually kept dried. Those who have extensive collections, perhaps numbering in the hundreds or thousands of specimens, find the most economical way to keep their collection is in clear cellophane packets (such as are used for coins); these can be loosely stored in a filing cabinet (Fig. 20). For smaller collections, specimens may be pinned in the normal way, either lying on the side as in the broad-winged damselfly (Agriidae, Fig. 21) or with the wings spread as in the Common Skimmers (Libellulidae, Fig. 22). Pinned specimens are kept in boxes with cork, cardboard or

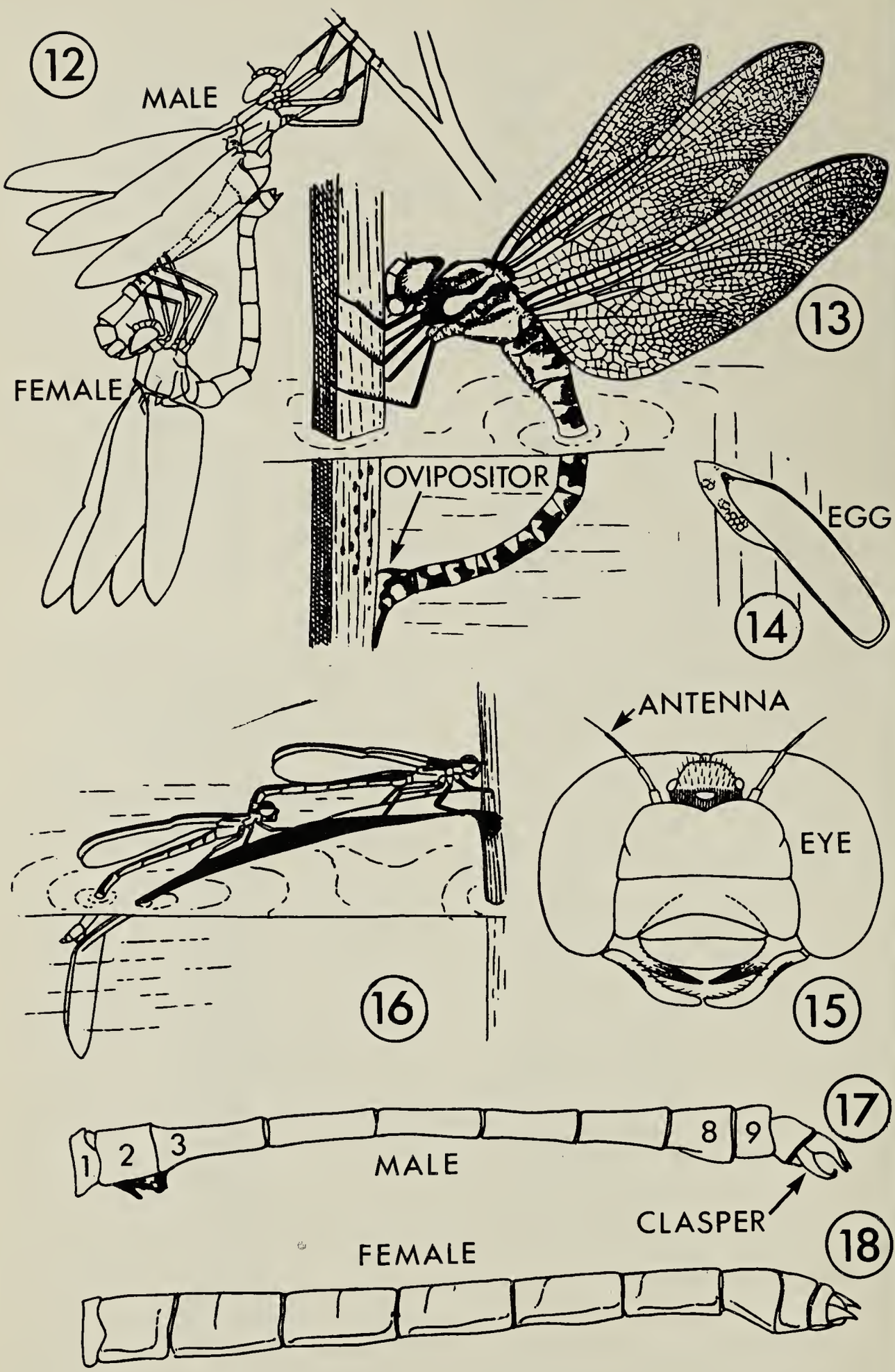

Fig. 12-18. Adult Odonata, behaviour and structure. 12. Mating dragonfli
13. Dragonfly laying eggs; 14. Egg implanted in plant tissue; 15. Face of dragon
showing eyes which meet on top of head; 16. Damselflies "in tandem", fema
depositing eggs on leaf; 17. Abdomen of an adult male odonate; 18. Same, female.

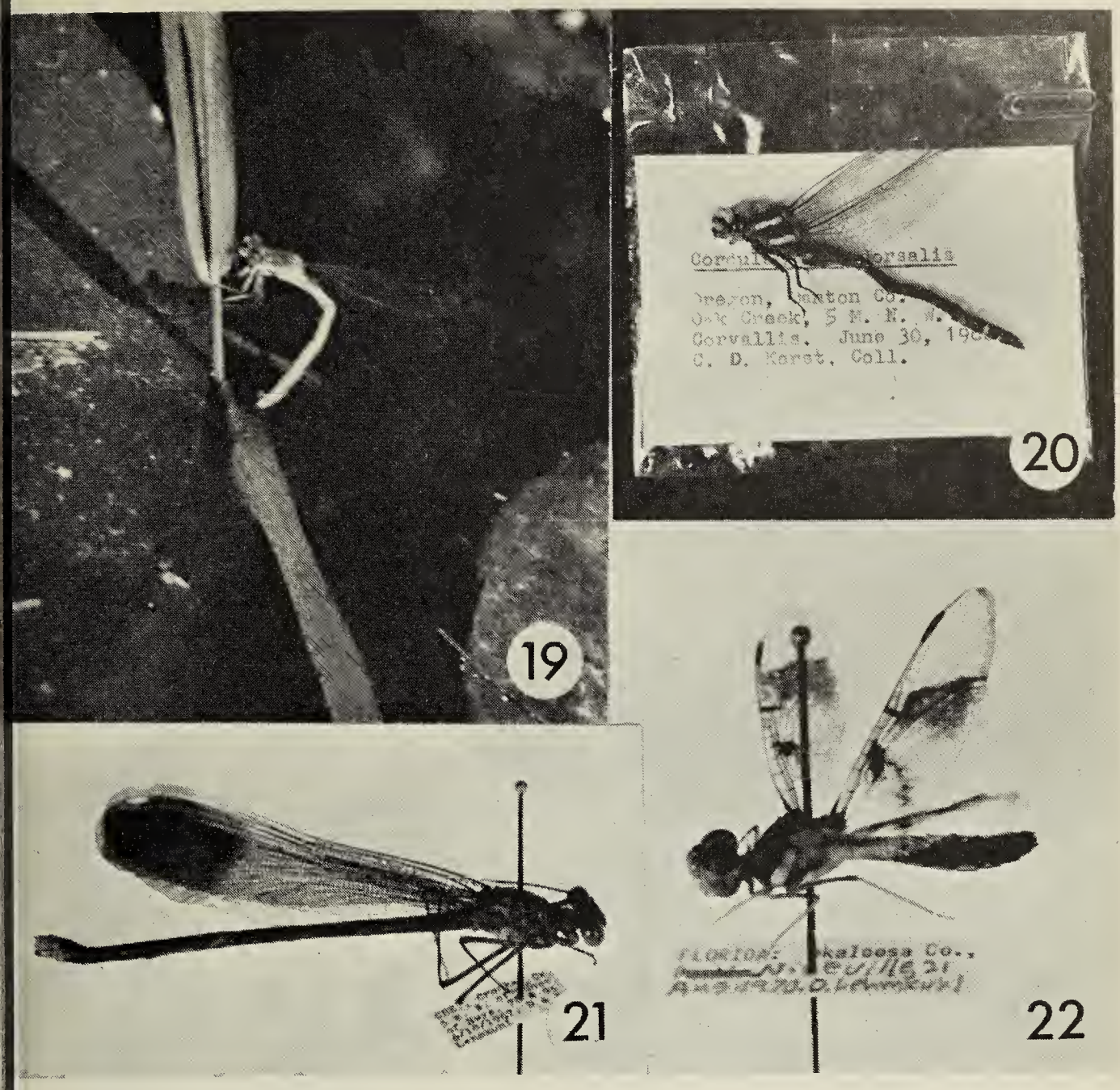

Fig. 19-22. 19. Female damselfly depositing eggs on a stem; 20. Adult dragonfly mounted in a cellophane envelope; 21. Damselfly (Agriidae) pinned and labelled, specimen lying on side; 22. Dragonfly (Libellulidae) pinned with wings spread.

styrafoam bottoms for supporting the pin. Add a sprinkle of moth ball crystals to keep away dermestid beetles — which love to eat insect collections and can reduce prized specimens to a pile of dust in a few weeks. It is very important that every specimen be accompanied by the standard data — locality, date and name of collector (Figs. 20-22). Materials for pinning and collecting can be obtained from biological supply houses or often at a university bookstore.

While Edmund Walker (now deceased), the most prolific student of Canadian Odonata, concluded that Saskatchewan has a "poor" odonate fauna, it is still possible to find nearly 50 species in the province, about 30 of which are dragonflies and the remainder are damselflies (Table 1). By way of contrast, Walker lists 147 species from Ontario and 69 from Manitoba.

There are no good guidebooks to the *species* of Odonata of western Canada but anyone who is persistent and has a 10X hand lens should be able to identify to species any odonates collected in our area by referring to the volumes by Walker (1955, 1958), Needham and

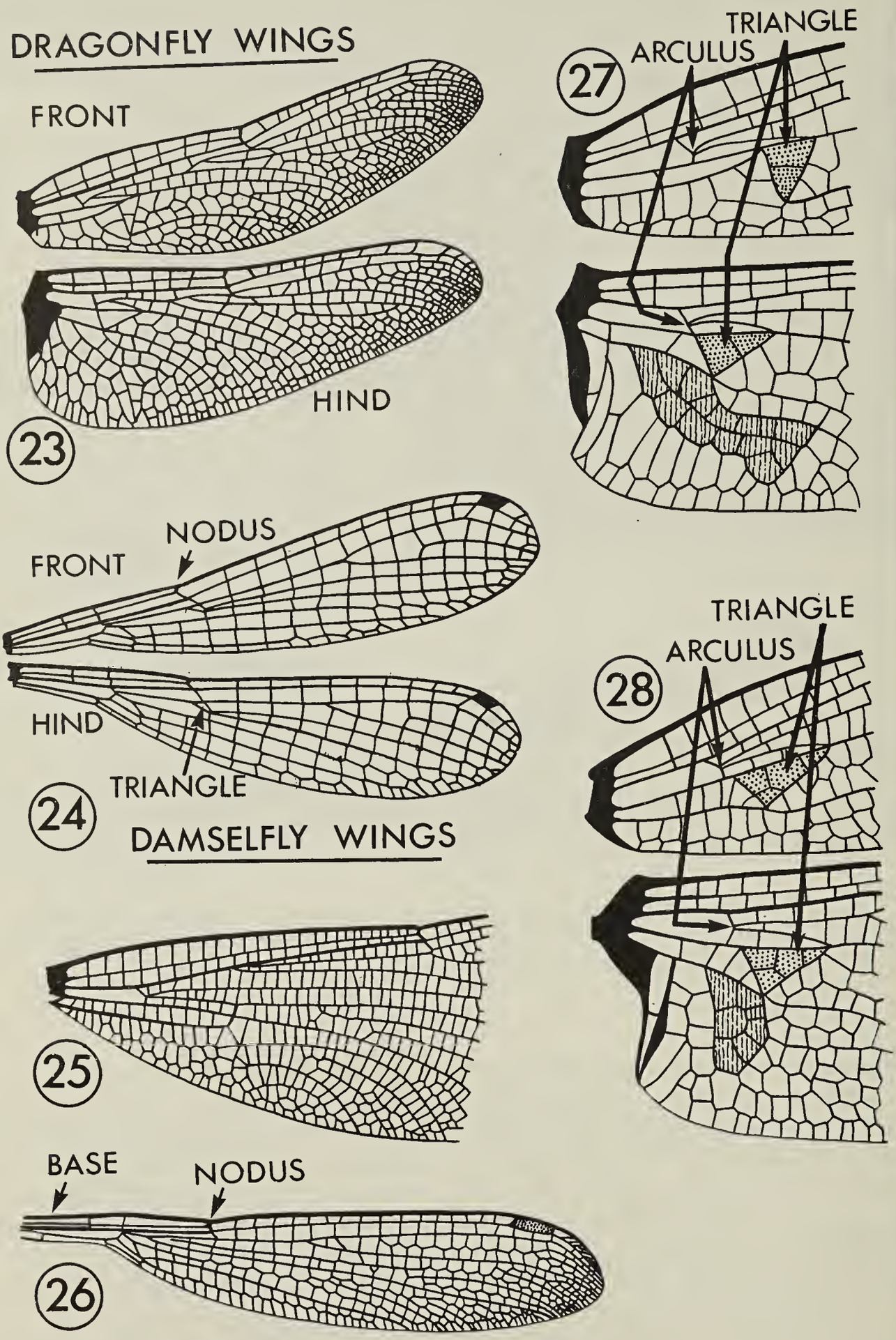

Fig. 23-28. Structures of adults for use with key to families. 23. Wings of dragonfl showing lobe at base of hind wing which is absent on front wing; 24. Wings of damselfl (Narrow-winged) showing similar shape of front and hind wings; 25. Wing base of Broad-winged Damselfly; 26. Wing of a Spread-winged Damselfly; 27. Wing bases of Common Skimmer; 28. Position of triangles in wings of Darners and Clubtails.

Westfall (1955) or Borer and White (1970). (Walker does not cover the Common Skimmers but these are included in Needham and Westfall). The following keys should facilitate the identification of specimens to family. To use this or any other key, read 1a and then 1b, select the true statement, follow the dotted line to the next choice and once again determine whether a or b is appropriate for your specimen; follow the dotted line, and so on until a name is reached.

Anyone who catches a specimen far from the range indicated in Table 1 is asked to send it to the author for confirmation. It will then be added to the University collection.

Phylum Arthropoda, Class Insecta, Order Odonata

ADULTS

Key to Suborders

1a. Front and hind wings similar in shape at the base (Figs. 24, 25, 26) ..... **Damselflies** *(Zygoptera)* 2

1b. Front and hind wings dissimilar in shape at the base (Figs. 23, 27, 28) ..... **Dragonflies** *(Anisoptera)* 4

Key to Saskatchewan Families of Damselflies (Zygoptera)

2a. Wings narrow at the base but suddenly become wider (petiolate) (Figs. 24, 26) 3

2b. Wings rounded evenly at the base (not petiolate) (Fig. 25) ..... **Broad-winged Damselflies** (*Agriidae* or *Agrionidae*)

3a. A small triangle in mid wing behind the nodus (Fig. 24) ..... **Narrow-winged Damselflies** *(Coenagrionidae)*

3b. No small triangle in mid wing behind nodus (Fig. 26) ..... **Spread-winged Damselflies** *(Lestidae)*

Key to Saskatchewan Families of Dragonflies (Anisoptera)

4a. Triangle (T) of fore and hind wings about equally distant from arculus and similarly shaped (Fig. 28) ..... **Common Skimmers** *(Libellulidae)*

4b. Triangle more distant from arculus in fore wing than hind wing (Fig. 27) 5

5a. Eyes meet or nearly meet at top of head (Fig. 15) ..... **Darners** *(Aeshnidae)*

5b. Eyes widely separated at top of head ..... **Clubtails** *(Gomphidae)*

NYMPHS

Keys to Suborders

1a. Abdomen terminates in sharp spines (Figs. 1-3) ..... **Dragonflies** *(Anisoptera)* 4

1b. Abdomen terminates in 3 flat pointed platelike gills (Figs. 5, 6, 8) ..... **Damselflies** *(Zygoptera)* 2

Key to Saskatchewan Families of Damselflies (Zygoptera)

2a. Individual segments of antenna about equal in length (Figs. 7, 9) 3

2b. First segment of antenna as long as following

6 segments combined
(Figs. 5, 6) ..... **Broad-winged Damselflies** *(Agriidae* or *Agrionidae)*

3a. Basal part of labium (Fig. 7) narrowed like a stalk when viewed from below.
(Fig. 10) ..... **Spread-winged Damselflies** *(Lestidae)*

3b. Basal part of labium (Fig. 7) not narrowed like a stalk but as in Fig. 11 . **Narrow-winged Damselflies** *(Coenagrionidae)*

Key to Saskatchewan Families of Dragonflies (Anisoptera)

4a. Antennae with 4 segments, segment 3 greatly enlarged and the last segment minute (Fig. 1) ..... **Clubtails** *(Gomphidae)*

4b. Antenna threadlike and with 6 or 7 segments (Figs. 2, 3) 5

5a. Labium flat or nearly so in side view as in Figure 7 ..... **Darners** *(Aeshnidae)*

5b. Labium spoon shaped as in Figure 4 and covering the front of the face up to the base of the antennae ..... **Common Skimmers** *(Libelullidae)*

Table 1. A preliminary list of the Odonata of Saskatchewan, from Walker (1940). Nomenclature follows Walker (1953)

	Known Distribution
Zygoptera	
Family Agriidae or Agrionidae	
1. *Agrion aequabile* (Say)	Prince Albert Park
Family Lestidae	
2. *Lestes congener* Hagen	P.A. to Jackfish Lake
3. *Lestes unguiculatus* Hagen	Regina-Maple Cr.-P.A.
4. *Lestes dryas* Kirby	Regina-Maple Cr.-P.A.
5. *Lestes disjunctus* Selys	Regina-Swift Current-P.A.
6. *Lestes forcipatus* Rambur	Prince Albert Park
Family Coenagriidae or Coenagrionidae	
7. *Enallagma clausum* Morse	Big Manitou-Lac La Ronge
8. *Enallagma boreale* Selys	Regina-Maple Cr.-P.A.
9. *Enallagma cyathigerum* (Charpentier)	Regina-Maple Cr.-Pa.
10. *Enallagma hageni* (Walsh)	Regina-Maple Creek
11. *Enallagma ebrium* (Hagen)	Regina-Maple Cr.-P.A. Park
12. *Enallagma carunculatum* Morse	Echo, Last Mt. Lakes
13. *Enallagma civile* (Hagen)	Regina-Swift Current
14. *Coenagrion resolutum* (Hagen)	Regina-Prince Albert
15. *Coenagrion interrogatum* (Hagen)	Muskegs
16. *Coenagrion angulatum* Walker	Regina-Swift Current-P.A.
17. *Nehalennia irene* (Hagen)	Rosetown-Prince Albert
18. *Amphiagrion abbreviatum* (Selys)	Maple Creek-Cypress Hills
Anisoptera (Dragonflies)	
Family Aeshnidae	
19. *Aeshna eremita* Scudder	Prince Albert-La Ronge
20. *Aeshna interrupta* Walker	Regina-Maple Cr.-La Ronge
21. *Aeshna canadensis* Walker	Prince Albert
22. *Aeshna sitchensis* Hagen	P.A.-P.A. Park
23. *Aeshna umbrosa* Walker	Maple Cr.-P.A.-Reindeer L.
24. *Aeshna constricta* Say	Diefenbaker Lake area (Snipe Lake)
25. *Anax junius* Drury	Regina, Southern Sask.

Family Gomphidae

26. *Ophiogomphus severus* *Ophiogomphus colubrinus*	N. Sask. River at P.A. Reindeer Lake region (Walker 1958)
27. *Ophiogomphus rupinsulensis* (Walsh)	S. Sask. River at Saskatoon
28. *Gomphus intricatus* Hagen	Sask. River., P.A. & Saskatoon

Family Libellulidae

29. *Cordulia shurtleffi* Scudder	P.A., P.A. Park
30. *Somatochlora minor* Calvert	Prince Albert
31. *Somatochlora ensigera* Martin	Maple Creek
32. *Somatochlora franklini* (Selys)	Saskatoon-P.A. Park
33. *Somatochlora whitehousei* Walker	Prince Albert
34. *Tetragoneuria spinigera* Selys	P.A. Park
35. *Libellula quadrimaculata* L.	Regina-Maple Cr.-P.A.
36. *Libellula exusta julia* Uhler	P.A. Park (species not listed in Needham, Westphall, 1955)
37. *Sympetrum corruptum* (Hagen)	Swift Current-Maple Cr.-P.A. (not in Needham, Westphall 1955)
38. *Sympetrum madidum* (Hagen)	Regina-Maple Cr.-P.A.
39. *Sympetrum obstrusum*	Lac Vert-P.A. Park
40. *Sympetrum decisum* (= *internum* Montgomery)	Regina-Maple Cr.-P.A.
41. *Sympetrum costiferum* (Hagen)	Swift Current-Prince Albert
42. *Sympetrum danae* (Sulzer)	Yorkton-Saskatoon-P.A.
43. *Leucorrhinia hudsonica* (Selys)	Lac Vert-P.A. Park
44. *Leucorrhinia borealis* Hagen	Indian Head-P.A. Park
45. *Leucorrhinia glacialis* Hagen	Prince Albert Park
46. *Leucorrhinia proxima* Calvert	Prince Albert Park
47. *Leucorrhinia intacta* Hagen	Prince Albert (City)

Further reading:

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———, 1955. *The Odonata of Canada and Alaska. Vol. 1.* U. of Toronto Press. 292 p. Covers general biology, life histories, and taxonomy (to species) of damselflies.

———, 1958. *The Odonata of Canada and Alaska. Vol. 2.* U. of Toronto Press. 318 p. Covers taxonomy (to speeies) of Aeshnidae, Gomphidae and several families not found in Saskatchewan. This series unfortunately does not cover the Libellulidae.