The Odonata of East-central South Dakota

Michael K. Fresvik

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THE ODONATA OF EAST-CENTRAL
SOUTH DAKOTA

BY

MICHAEL K. FRESVIK

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Major in
Entomology, South Dakota State
University

1969

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Thesis Advisor

Date

Head, Entomology-Zoology

Department

Date
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MKF
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INTRODUCTION

Many studies have been conducted throughout the world to determine the identity of Odonata found in a certain locality. In the United States individual workers have, in their own states, conducted surveys to determine what species were present. South Dakota was one of the few states in which such a survey had never been carried out. Thus South Dakota represented a "missing link" in the formal complex of the United States Odonatan fauna.

The present study was undertaken to determine what species, in the adult stage, were present and the abundance of each in east-central South Dakota.

General Background on Odonata

According to Byers (1930), Fabricius in 1793 was the first to use the term Odonata as a family-group name to apply to dragonflies and damselflies. Imms (1957) states that more than 4,500 species of Odonata have been described and that they attain their greatest abundance in the Neotropical region. Except for Japan, no part of the Palearctic zone contains an abundant or striking dragonfly fauna. Dragonflies and damselflies are large predacious insects, of ancient lineage, and of unique form and habits. Their beauty and wonderful powers of flight are almost beyond comparison.
Smith and Pritchard (1963) distinguished the order Odonata from other insects by its members having two subequal pairs of net-veined wings, three-segmented tarsi, short setiform antennae, strong chewing mouth parts and large compound eyes.

The large size and activities of some dragonflies have given rise to a number of superstitions. Some of the names in common use testify to this: "devil's darning needles," "horse stinger," "snake feeder," and "snake doctors." Actually they are quite harmless and as a whole they are an attractive and beneficial group of insects.

According to Borror and DeLong (1964), the present day Odonata vary in length from 3/4 inch to over 5 inches; the largest dragonflies known, through fossils, lived about 250 million years ago during the Upper Carboniferous and had a wing spread of about 27 inches! Although no existing members of the order compare in size with this Upper Carboniferous Meganeura, Richards and Davies (1957), states that females of Megaloprepus coerulatus measure 7½ inches across the wings.

Some of the dragonflies are among the fleetest of living creatures on wings. They depend on their wings for meeting the needs of life. Members of this order capture their prey on the wing, and feed on almost all small flying insects. According to Howard (1902), flies seem to be their most common food, but large dragonflies will eat smaller ones. Many depend on their wings during oviposition in that they lay their eggs while flying by dropping them to the surface of the water.
The coloration of living dragonflies is varied and quite beautiful. Some of the color fades badly in preserved specimens. Needham and Westfall (1955) state that the surface colors keep very well, as does the irridescence of the clear wing membrane, but the deeper pigment colors suffer from drying. Greens fade to yellow, purple to black, and bright blues darken with internal postmortem changes.

All dragonflies normally develop in fresh water. Walker (1953) states that only some of the more primitive are subaquatic, e.g. Petalura gigantea of Australia, which forms burrows or canals in the peat or mud of small mountain swamps.

A peculiar characteristic of the order is the method of mating. Ross (1965) states that before mating, the male bends the tip of the abdomen forward and transfers the spermatozoa to a receptacle on the second abdominal sternite. In mating, the male, using its terminal claspers, grasps the female either by the head (Anisoptera) or the prothorax (Zygoptera). The female then curls her abdomen forward to reach the second sternite of the male, at which place the actual transfer of spermatozoa is effected.

The eggs are laid in water and after two weeks or more they hatch into pale little nymphs. Dragonfly and damselfly nymphs are exclusively carnivorous and according to Odum (1966) they use the hinged labium to good advantage in capturing prey. The nymphs are not too choosy in what they eat; they only require that the prey be living and moving and not too large. Kendeigh (1962) implies that
the number of larvae found will increase with the age of a pond from the time the pond is formed until attached vegetation becomes excessive. After a number of instars and a period from less than one to five years the naiad is fully grown. The naiad then finds a reed or the strong stem of some other plant and clings to this support. For some days before the time of transformation the nymph takes no food but remains quietly clinging to its support until some impulse causes it to crawl up the stem and leave the water (Needham and Heywood (1929). When it has established itself firmly, it remains motionless; the adult then emerges through a slit on the dorsum of the head and thorax. The newly emerged adults are pale (teneral) and within a few hours the color pattern appears, but full color does not develop until later. This is the period in life when the individual is most susceptible to natural enemies.
REVIEW OF LITERATURE

In attempts to evaluate the diversity of the South Dakota Odonata fauna as it compares with that of other areas, a search of the literature was made for diversity studies from other states.

**Eastern States**

According to Borror (1944), the first records of Odonata from Maine were by Hagen in 1861 who mentioned five species. Borror (1940), himself, spent the summers of 1938 and 1939 collecting in the region of Muscongus Bay, Maine. In these two summers 29 localities were visited with collections being made on 62 different days. A total of 70 species were taken, bringing the state total to 112 species. Since that time Borror (1951) recorded four additional summers of collecting in south-central Maine which yielded a number of new records bringing the most recent total to 119 species.

In New Jersey Montgomery (1933) mentioned that during the summer of 1930 he collected 1186 specimens, representing 46 species. He recognized that this is an incomplete list but it does give an idea as to the fauna present.

In the vicinity of Washington D. C. Donnelly (1961) reports that prior to World War I Rolla and Bertha Currie collected quite extensively and listed 114 species. Since 1949 Donnelly has collected and reports that 32 species of the total 114 have not been taken in recent years, and eleven species have been collected that were not previously recorded by the Curries and their contemporaries. Donnelly believes
that in spite of the recent creation of new lentic habitats there can be no doubt that the Odonata fauna in the area has been significantly impoverished since World War I.

Fisher (1940) collected in Maryland finding new distribution records and raised the state total to 89 species.

In Tennessee, Williamson (1903) collected in the area around Nashville. He stated that the environments around this city were not especially good for taking Odonata. There are no natural lakes or ponds of any size. Most species were collected along the Cumberland River and in surrounding marshes. Nevertheless, he was still able to collect 61 species. Trogdon (1962) also collected in Tennessee, spending five summers collecting in 34 well distributed counties. He collected 1776 specimens, representing 68 species. A total of 16 new state records were recorded bringing the most recent total to 120 species.

For Kentucky, Garman (1924) reported on a study based on collections accumulated incidentally over the last 30 years. He indicated that Kentucky is too hilly and its streams too rapid to afford good collecting for Odonata. Nevertheless there are regions along the Ohio and Mississippi Rivers where dragonflies are abundant. Garman collected 68 species, and reported that this too is merely a nucleus for future workers to build around. Cook (1951) in following up Garman's study collected for ten years in Kentucky and took a total of 94 different species of which 35 had not previously been reported from the state.

The only records discovered for Louisiana was a report by Montgomery (1927) who listed 28 species which were identified from a total of 596 specimens.
In North Carolina, Westfall (1942) collected during the summers of 1938-1942 but found no new additions to the list of 135 species published by Brimley in 1938.

According to Cruden (1962), Needham and Westfall in 1955 listed 20 species of Anisoptera from West Virginia and Kormondy in 1960 added 8 species to this list. Cruden, who collected in the summer of 1961, made the first West Virginia records of Zygoptera, listing 74 species for both the suborders.

Alrutz (1959) reports that publications concerning the distribution of Odonata in Ohio have appeared with regularity over the past 65 years. The earliest of these were included by Borror (1937) in his comprehensive summation of the collections and records for Ohio. Since that date other papers have expanded the known distribution. Alrutz (1961) took part in a field research program on the distribution and ecology of the Odonata of Ohio. Collections were made in 68 of the state's 88 counties. With the addition of Alrutz's records the Ohio Odonatan faunal list attained 145 species. Cruden and Currie (1961) extended this list to 147 species.

Montgomery (1950) states that Williamson in 1917 published a list of the Odonata of Indiana; this paper listed 125 species. Through the years 1941-1950 Montgomery collected or received from other collectors 6590 specimens of Odonata taken in Indiana. Additions from these specimens brought the state list to 144 species. From 1951-1952 Montgomery (1953) collected 834 more specimens, representing 68 species, two of which were previously unknown from Indiana. These two additions
brought the state list to 146 species. Montgomery (1955) collected 1,960 specimens representing 71 species during the period 1953-1954 increasing the state list of Odonata to the current total of 147 species.

In Michigan, according to Evans (1915), Miss Abigail O'Brien in 1910 prepared a partial list of Odonata of the Douglas Lake Region. In the summer of 1914 Evans collected in this same area and found 43 species, a rather large faunal complex for such a small area in that Kormondy (1962) indicated only a total of 80 species for the entire state.

**Western States**

Williamson (1900) stated that Bank's was the first to mention Odonata from Wyoming. It was his conclusion that Wyoming would be found to be less favorable odonatologically than many other states because of its lack of aquatic areas.

Ries (1963) states that in the years 1872-1875 Joseph Duncan Putnam went on four field trips into Utah. From these explorations he recorded 13 species of Odonata as occurring in that state. Besides the work of Putnam, Musser (1961) indicates that the only published records of the Odonata fauna of Utah are found in the broad general works of Needham and Heywood, and Needham and Westfall.

**Canadian Provinces**

Much work has been conducted in Canada to determine the Odonata fauna. Walker (1906a) reported on the first list of Ontario Odonata. After four seasons of collecting 86 species were encountered. He believed that at least 100 species should occur there. Walker (1924)
collected in the Thunder Bay District of Ontario. A total of 22 species were listed for this area. It was noted that the general character of the faunal complex is boreal. Walker (1940b) reports that in the summer of 1938 the Royal Ontario Museum of Zoology, at Toronto organized an expedition to the Patricia portion of the Kenora District. In 1939 two other parties were sent into the area. These expeditions were part of a general faunal survey of Ontario. In the 1938 expedition 700 specimens representing 28 species were collected and in the 1939 expedition 159 specimens representing 19 species were taken. Together 30 species were collected.

Walker (1912b) states that collections of Odonata from the Prairie Provinces of Canada are apt to show a large preponderance of individuals of the genera Lestes, Sympetrum, Enallagma, and Aeshna. Walker (1940a) pointed out that preliminary lists have been published for most of the provinces but very little has appeared on the Odonata fauna of Saskatchewan. In 1912 he published a list of 19 species. In 1937 Dr. D. S. Rawson of the University of Saskatchewan employed 7 student assistants to collect specimens during the summer vacation. In all 47 species were taken.

Another study was conducted by Walker (1923) and Mr. T. B. Kurata in the Godbout area of Quebec. Odonata were collected at large and small lakes, creeks and large rivers, small ponds, and a small stagnant puddle. Poor numbers were attributed to the cool climate, absence of certain types of environments, and the shortness of the visit. In all, 24 species were recorded.
Northern North America

Walker (1943) explains that very little has appeared regarding the species which inhabit the northern parts of North America, New foundland, Labrador, and the Northwest and Yukon Territories of Canada. He examined the collections of Dr. F. A. Urquhart which consisted of 223 specimens representing 20 species. In Alaska Ahrens (1938) collected during the summer of 1937, which was the coldest and wettest summer in 20 years. He was able to collect 426 specimens representing 20 species. Gloyd (1939) states that a hundred years of incidental collecting has yielded a total of 24 species.

Studies of the types listed above and the present study are valuable in ascertaining faunal affinities and evolutionary patterns of the Odonata.
METHODS AND MATERIALS

Collecting and Preservation of Specimens

The author began collecting specimens in the spring of 1968 and continued throughout the summer. During this time collections were made in the following east-central counties of South Dakota: Beadle, Brookings, Buffalo, Davison, Faulk, Hand, Hanson, Hughes, Hyde, Jerauld, Lake, McCook, Minnehaha, Miner, Moody, Potter, Sanford, Spink, Sully and Turner. Collecting areas included: large permanent lakes, permanent ponds, temporary ponds, rivers, creeks, intermittent streams, and road ditches.

The most important piece of equipment for collecting dragonflies is the insect net. It should be large, light in weight, and strong. The net found by the author to be most useful had a four foot long handle with a nylon net, 18 inches in diameter.

It was soon discovered that some of the larger dragonflies were especially hard to capture. The author then found it necessary to study their habits and flying patterns and adapted his collecting methods to them. Some of the larger dragonflies follow a certain flight path. The author then stationed himself along the path and waited until they would fly past. Dragonflies dodge best when approached from the front. The best results were obtained by keeping the net well concealed until they were passing and then sweeping at them from the rear. The large dragonflies of the genus *Anax* were
able to avoid capture by use of the net. The author then waited until
they came to rest and shot 22 caliber bird shot at them. If not fired
at too close a range the insects weren't damaged too badly and were
used in the collection. The smaller damselflies were captured by
sweeping the tops of the long grass by the waterside.

When an insect was captured it was immediately placed in a cy­
anide killing bottle. The specimens were removed from the killing
bottle as soon as they were dead. It is to be noted that the killing
bottle can accumulate moisture, and if the insects are allowed to be­
come saturated they spoil. After each use, the killing bottle should
be aired out completely.

After being removed from the killing bottle the specimens were
placed in paper envelopes. When dried they were removed and pinned
transversely through the thorax at the base of the wings.

Identification of Specimens

The South Dakota State University collection contained only a few
identified specimens. These were identified by B. E. Montgomery Depart­
ment of Entomology, Purdue University. This enabled the author to com­
pare specimens collected with those previously identified by Montgomery.

The vast majority of specimens were identified by the use of var­
ious insect keys. The following keys were used in the identification
of specimens collected: Needham and Heywood (1929), Walker (1953, 1958),
Needham and Westfall (1955), Byers (1930), Garman (1927), Borrór and
DeLong (1964), Byers (1927a), and Borrór (1945).
Photomicrographs of many specimens were taken with a Wild, single lens reflex, 35 mm. camera and Kodak Plus X, PX-135 film. The camera was mounted on a Wild compound dissecting microscope.
SYSTEMATIC TREATMENT

KEY TO ODONATA OF EAST-CENTRAL SOUTH DAKOTA

KEY TO SUBORDERS

1. Wings similar in shape, both narrowed at the base; anal appendages four in number, two superior and two inferior

............................(damselflies, suborder Zygoptera)

Wings dissimilar in shape, the hind wing wider than front wing; anal appendages of male three in number, two superior and one inferior..(dragonflies, suborder Anisoptera)

Suborder ANISOPTERA Selys
"Dragonflies"

The suborder Anisoptera includes the greater percentage of Odonata. They are, on the whole, larger and more robust than the damselflies. The wings are held horizontally when at rest and not folded over the back. The hind wing is broader at the base than the fore wing. Males have but a single inferior appendage at the end of the abdomen.
KEY TO THE FAMILIES OF ANISOPTERA OF EAST-CENTRAL SOUTH DAKOTA

1. Triangles in the fore and hind wing similar in shape and about equal distance from the arculus; two antenodal crossveins thickened, usually a brace vein behind proximal end of stigma

2. Triangles in the fore and hind wing dissimilar in shape, triangle in hind wing nearer arculus than triangle in fore wing; no brace vein behind proximal end of stigma. LIBELLULIDAE

2. Eyes contiguous, meeting along the mid-dorsal line for a considerable distance. ABSCHNIDAE

Family GOSPHIDAE Rambur
"Club-tails"

The club-tails are dragonflies of wide distribution and are quite distinct from others in both adult and nymphal stages. The eyes are widely separated on the top of the head. Adults are clear winged and the stigma is broad with a brace vein at its proximal end. Gomphidae species have the terminal abdominal segments swollen like a club, thus their common name.

Club-tails, or gomphids, are mainly stream inhabitants; they do not soar or hover in the open like the more familiar Anisoptera, but spend most of their time at rest, squatting on some bare surface.
KEY TO THE GENERA OF GOMPHIDAE OF EAST-CENTRAL SOUTH DAKOTA

1. Hind femur with long spines interspersed with short ones
   
   Dromogomphus

   Hind femur with no conspicuous long spines

   Gomphus

Genus DROMOGOMPHUS Selys
"Spiny-Legged Clubtails"

Members of this genus are large dragonflies and are yellowish green in coloration. The genus is easily recognized by the long hind femora which are armed with four to eight strong spines. The wings are hyaline with a trace of yellow along the costal veins.

Only one species was collected by the author in east-central South Dakota.

Dromogomphus spinosus Selys
"Spiny-Legged Clubtails"

Slender yellowish species with conspicuous brown shoulder stripes. Sides of thorax yellow. Mid-dorsal yellow stripe of abdomen almost continuous, interrupted only on segments 8 and 9. Legs black, yellowish at the base. Hind femur with long spines interspersed with short ones.

Habitat: Clear streams and lakes.

South Dakota distribution: Hughes County, along the Missouri River.
Specimens examined: 2

Remarks: Dromogomphus spinosus is extremely rare in east-central South Dakota. It was collected at the Oahe Dam site near Pierre.

Genus GOMPHUS Leach
"Common Clubtails"

Gomphus is a large Holarctic group whose members breed in a variety of aquatic habitats. The thorax is pale yellow-green, conspicuously striped with dark brown or black. The abdomen is dark in color. There are no crossveins in the supertriangle, triangle, or subtriangle and the stigma has a brace vein.

This genus has been divided into a number of subgenera of which only the subgenus Gomphus was collected in east-central South Dakota. Of this complex only one species was found.

Gomphus graslinellus Walsh
"Common Clubtail"

Slender, greenish species, striped with brown. The blackish abdomen is marked with bright yellow. Wings hyaline with brown veins. Legs brown, with outer face of tibiae yellow.

Habitat: Slow moving streams.

South Dakota distribution: Minnehaha County, along the Split Rock River.

Specimens examined: 2
Remarks: Gomphus graslinellus was collected along a muddy, slow-moving stream near Garretson.

Family AESCHNIDAE Selys
"Darners"

This group includes the largest and strongest fliers of the dragonflies. These dragonflies have long spear-shaped bodies and are common late in the summer when most of the other large Anisoptera have disappeared.

All darners are above average size for dragonflies, and are of brilliant coloration: blues, greens, and brown. The head is large and nearly hemispherical. The eyes meet for some distance on the top of the head.

KEY TO THE GENERA OF AESCHNIDAE OF EAST-CENTRAL SOUTH DAKOTA

1. Sectors of arculus arising from the arculus at or below its middle; thorax not uniform green ............... Aeschna

Sectors of arculus arising from above the middle of the arculus; thorax uniform green ...................... Anax

Genus ANAX Leach
"Green darners"

Green darners are large robust dragonflies with an unmarked green thorax. The males are different from other aeschnines in
lacking auricles on abdominal segment 2. Abdominal segments 7 to 10 bear supplementary lateral carinae. The inferior abdominal appendage of the male is entire.

*Anax junius* was the only species collected by the author.

*Anax junius* Druzy

Large, strong flying dragonflies with green thorax and bluish abdomen. Face greenish yellow. Frons with rounded black spot on the above surface, spot surrounded by yellow and then blue semicircle. Femora reddish, but legs blackish apically. Wings hyaline, often tinged with amber yellow, costa yellow, stigma slightly darker. Abdominal segments 1 and 2 bulbous, diameter of following segments reduced to one-half or one-third that of the first two segments. Inferior abdominal appendages of the males less than a fourth as long as the superior appendages; superior appendages brown, with a sharp pointed tooth at outer apical angle.

Habitat: Found in a variety of aquatic habitats.

South Dakota distribution: Beadle, Brookings, Hanson, Hughes Jerauld, Lake, Miner, Minnehaha and Sully Counties.

Specimens examined: 15

Remarks: *Anax junius* is common through-out east-central South Dakota.
Genus AESCHNA Fabricius
"Blue Darners"

This is the dominant genus of the family in the Holarctic region. The thorax is brown, striped with blue and yellow. The abdomen is brown and patterned with yellow, blue, or green. The wings are broad with a well developed anal loop.

KEY TO SPECIES OF AESCHNA OF EAST-CENTRAL SOUTH DAKOTA

1. Anal triangle of male three-celled; dorsum of abdominal segment 10 smooth, without tubercles or spines; female thoracic stripes well developed .......... _constricta_ 

Anal triangle of male two-celled; dorsum of abdominal segment 10 with a median tooth between one or two pairs of spines; female with thoracic stripes narrow or represented by narrow spots ................. _lineata_

_Aeschna constricta_ Say
"Eastern Paddletail"

Face greenish, black T spot on frons with cross-arms wider than the upright. Thorax reddish brown, with pair of pale stripes on dorsum that widen upward, ending just under crest. Two lateral yellowish stripes also present and widening upward to end under wing bases. Anterior stripe with sinuate anterior margin and posterior spur. Second stripe much wider than first. Abdomen brown, spotted with blue.
Habitat: *Aeschna consicta* is found in a variety of lake and pond environments throughout the collecting area.

South Dakota distribution: Brookings, Hand, Lake, Potter and Sully Counties.

Specimens examined: 57

Remarks: Most specimens were captured as they clung to the underside of trees or bushes, usually some distance from water.

*Aeschna lineata* Walker

Wide-ranging northern species, with dorsal thoracic stripes much reduced. Face olive green with narrow black frontoclypeal stripe; black T. spot on frons heavy, sides of stem nearly straight but widened at junction with vertex band. Thorax thinly hairy, with pale side stripes continuous but very narrow. Abdomen brown, darkening towards apex, with bands of blue spots.

Habitat: *Aeschna lineata* was found at scattered locations throughout the collecting area.

South Dakota distribution: Brookings, Hand, Lake Potter and Sully Counties.

Specimens examined: 18

Remarks: This species seemed to be more abundant in the eastern part of the collecting area.
Family LIBELLULIDAE Rambur
"Skimmers"

According to Needham and Heywood (1929), the skimmers are the commonest and best known of all dragonflies. These are the most showy dragonflies and on warm days they can be seen hovering over most aquatic areas. Many have their wings marked with spots or bands. Their flight is usually somewhat erratic. They are seen quite readily resting on roads and sidewalks. The most characteristic venational feature is the foot-shaped anal loop in the hind wing.

Of the three subfamilies only Libellulinae was collected from the state.

Subfamily LIBELLULINAE Selys

The Libellulinae are dragonflies of moderate to large size and have world-wide distribution. This group, according to Needham and Westfall (1955), makes up nearly half of our North American genera. The eyes are large and always in contact at the top of the head. The anal loop is well developed and foot-shaped with a distinct bisector. These dragonflies mainly have perching habits, utilizing their long thin legs for this purpose.
KEY TO THE GENERA OF LIBELLULINAE OF
EAST-CENTRAL SOUTH DAKOTA

1. Vein M₂ waved .............................................. 2
   Vein M₂ smoothly curved .................................. 3

2. Arculus near midpoint between first and second antenodal
crossveins; male with a pair of ventral hooks on abdom-
inal segment 1 .............................................. Plathemis
   Arculus at or close to second antenodal crossvein;
   male with no ventral hooks on abdominal segment . Libellula

3. Midrib of anal loop nearly straight or very
   slightly bent at ankle .................................... Perithemis
   Midrib of anal loop more angulated ......................... 4

4. Wings with one or no crossveins under the stigma ........... 5
   Wings with two or more crossveins under the stigma ....... 6

5. Radial planate subtends two rows of cells ................ Tarnetrum
   Radial planate subtends a single row of cells .......... Sympetrum

6. Stigma short and thick; face whitish ....................... Leucorrhinia
   Stigma longer; face not white ............................ Tramea

Genus PLATHEMIS Hagen
"White Tails"

The dorsal surface of the abdomen densely prunose white in color.
The males have two, females three, brown patches on the wings. Females
resemble Libellula females but are a bit smaller. The males have a
large, forked, midventral process on abdominal segment 1.
Of the two species of Plathemis only one, Plathemis lydia, was collected in eastern South Dakota.

**Plathemis lydia Drury**
"Common White-tailed Skimmer"

Face and vertex yellowish brown, thickly beset with short stiff hairs. Thorax brown, blackish below, sides marked with two indistinct longitudinal whitish stripes. Abdomen of male short and thick, becoming densely pruinose white with age. Female abdomen with a row of yellow spots on each side of segments 3 to 8.

**Habitat:** This is a common species around ponds and small streams throughout east-central South Dakota.

**South Dakota distribution:** Beadle, Hand, Hyde, Jerauld, Minnehaha, and Turner Counties.

**Specimens examined:** 23

**Remarks:** Plathemis lydia was usually found in association with Libellula pulchella. The two species often fly the same beat about the borders of ponds.

**Genus LIBELLULA Linnaeus**

Dragonflies of the genus Libellula are the best known of our larger dragonflies. They can be seen coursing through the air above almost every pond in the summer. Their bodies are stout with the abdomen tapering to the rear from a swollen base. The thorax is robust, and densely set with hair. The stripings of the thorax are
distinct, becoming darker with age. Members of this genus collected by the author have their wings marked with brown.

KEY TO SPECIES OF LIBELLULA OF EAST-CENTRAL SOUTH DAKOTA

1. Broad blackish band covering basal third of wings ... luctuosa
   Wings patterned with brown on three separate areas ... pulchella

Libellula luctuosa Burmeister
"The Widow"

Dark brown, of moderate size, easily recognized by the broad basal black band across the basal third of both fore and hind wings. Face blackish. Thorax brown and quite hairy. No stripes on the side of the thorax. Abdomen black, becoming prunose in male with age.

Habitat: Libellula luctuosa was collected around larger ponds.

South Dakota distribution: Hanson and Hughes Counties.

Specimens examined: 3

Remarks: Libellula luctuosa was not very abundant throughout the collecting area. It flies steadily over water and is extremely hard to capture.
Libellula pulchella Drury
"Ten Spot"

Large, strong-flying species, with wings conspicuously spotted. Face brownish, yellowish on top of frons. Thorax brown, clothed with thin white pubescence. Sides with two yellowish stripes. Abdomen brown, with two interrupted yellowish stripes running the entire length.

Habitat: Libellula pulchella was collected around ponds of all sizes.

South Dakota distribution: Beadle, Hand, Hanson, Hyde, Jerauld, Lake, McCook, Miner, Minnehaha and Turner Counties.

Specimens examined: 42

Remarks: Libellula pulchella is a common wide ranging species found throughout the collecting area. It flies throughout the period of sunlight and is hard to catch.

Genus PERITHEMIS Hagen
"Amber Wings"

Small dragonflies with tints of amber and gold in their wings; wings of females patterned in brown. Eyes large and contiguous for some distance on the top of the head. Wings longer than the short, broad abdomen.

Only one species was collected by the author in east-central South Dakota.
**Perithemis tenera** Say
"Common Amber-Wing"

Small, brownish, dragonfly; face yellowish; brownish at the sides and on top of frons. Thorax brown, densely clothed with soft brown hairs. Wings tinted with amber yellow, stigma of male reddish. Legs yellowish with black spines. Abdomen short, stout, males depressed toward the middle and tapered toward the end.

**Habitat:** *Perithemis tenera* seems to prefer small artificial ponds.

**South Dakota distribution:** Hand and Hyde Counties.

**Specimens examined:** 6

**Remarks:** This species was collected from two stock dam sites in the western part of the collecting area. *Perithemis tenera* doesn't seem to be too abundant in eastern South Dakota.

**Genus Tarnetrum** Needham and Fisher

The head of this group is broad with a well-developed frontal furrow. The triangular interspace of the forewing is narrowed toward the posterior wing margin. It has a brown thorax with two yellow spots. Abdominal segment 4 has an extra encircling carina on the dorsal side in addition to the regular apical carina.

Of the four or five species only *T. corruptum* was taken by the author.
Tarnetrum corruptum Hagen
"Corrupt Skimmer"

Face yellowish, becoming bright red in mature adults. Thorax stout, grayish brown, and clothed with white hair. Sides of thorax with 2 white stripes. Lower ends of stripes overlaid by yellow spots, half encircled by black at lower end. Abdomen olivaceous, with the spots on the sides of segments 3-9 forming a diffuse black line. Legs black, marked with yellow on the outer surface.

Habitat: Tarnetrum corruptum was collected around ponds, and small shallow lakes throughout the collecting area.

South Dakota distribution: Beadle, Brookings, Buffalo, Davidson, Faulk, Hand, Hanson, Hughes, Lake, Miner and Sully Counties.

Specimens examined: 85

Remarks: Tarnetrum corruptum is a long and late season dragonfly. It is found throughout the collecting area but seems to be more abundant in the western areas.

Genus SYMPETRUM Newman
"Topers"

This is the largest genus of anisopterans taken by the author in east-central South Dakota. They are small, autumnal dragonflies of red coloration. The teneral coloration is yellow. The head is of moderate size with the face red in mature specimens. The thorax is yellow in coloration becoming reddish brown in mature specimens. The sides of abdominal segments 3-9 has a line of black triangles. Segment 4 has no extra cross carina.
KEY TO SPECIES OF SYMPETRUM OF EAST-CENTRAL SOUTH DAKOTA

1. Superior abdominal appendages of male with a prominent inferior tooth ........................................... internum

Superior abdominal appendages of male with no prominent inferior tooth ............................................... 2

2. Wings with yellow extending beyond the nodus, becoming brown in a crossband at its outer margin ........... fasciatum

Wings slightly yellow along costal strip and at extreme base ............................................................... costiferum

Sympetrum internum Montgomery
"Northern Red Skimmer"

Reddish species, face becoming red in mature individuals. Teneral coloration is yellow on face and thorax. Thorax reddish brown with no stripes on dorsum or sides. Wings hyaline, with a variable amount of gold at the base. Legs black except for under side of front femur. Abdomen red, with black triangles on sides of segments 4 to 9.

Habitat: Sympetrum internum is primarily a pond species.


Specimens examined: 264

Remarks: This was the most common anisopteran collected by the author. It was found throughout the collecting area.
**Sympetrum fasciatum Walker**  
"Banded Red Skimmer"

Small yellowish brown species. Thorax with black stripes on lateral sutures. Abdomen reddish in mature specimens with black side stripes. Species distinguished by a brown band on outer margin of yellow in both fore and hind wings.

**Habitat:** *Sympetrum fasciatum* was collected around cold water ponds.

**South Dakota distribution:** Hand and Hughes Counties.

**Specimens examined:** 26

**Remarks:** *Sympetrum fasciatum* was found by the author at two collecting sites. Specimens were most abundant around a cold water pond below Oahe Dam on the Missouri River.

**Sympetrum costiferum Hagen**  
"Yellow-Bordered Red Skimmer"

Reddish species, with a costal stripe of yellow on wing membrane. Face of male red, female light yellow. Thorax brown to red, yellow in female, without pattern, clothed in pale short pubescence. Legs with the outer side of tibiae and femora yellow; all else black. Wings hyaline, with a faint tinge of gold at the extreme base and a stripe of yellow along the costal margin. Stigma reddish. Abdomen reddish with a lateral strip of black along the segments. Caudal appendages of male red.

**Habitat:** *Sympetrum costiferum* is mainly a pond species.
South Dakota distribution: Beadle, Brookings, and Potter Counties.

Specimens examined: 26

Remarks: *Sympetrum costiferum* was collected mainly in the eastern portion of the collection area.

Genus **LEUCORRHINIA** Brittinger
"White-faces"

These are small dragonflies with blackish bodies. The wings are clear save for some small brown cells at the extreme bases. They have white faces, ivory colored labra and are black on the dorsum of the head.

Only one species, *Leucorrhinja intacta*, was collected by the author in east-central South Dakota.

**Leucorrhinja intacta** Hagen
"Common White-Faced Skimmer"


Habitat: *Leucorrhinja intacta* was collected around ponds and shallow weed choked lakes.

South Dakota distribution: Beadle, Hanson, and Jerauld Counties.

Specimens examined: 26
Remarks: *Leucorrhinia intacta* is a common pond species collected throughout east-central South Dakota.

Genus *Tramea* Hagen
"Saddle Bags"

Members of the genus are large dragonflies with irregular bands of brown across the base of the hind wing. The head is large. The thorax is uniform brown in color, and the abdomen is dark brown with the basal segments greatly swollen. The wings are long, strong, and pointed; the hind ones very wide across the base. The stigma of fore wing is longer than that of hind wing.

Only one species was collected by the author in east-central South Dakota.

*Tramea lacerata* Hagen
"Common Raggedy Skimmer"

Large dragonflies with black bodies. Face pale, labrum black. Thorax walnut brown under a coat of pale hair. Legs mostly black. Abdomen shining black at maturity, with large yellow mid-dorsal spots on segments 6 and 7. In the older specimens yellow spots indistinct. Hind wing with blackish brown spot covering the basal third.

Habitat: *Tramea lacerata* was collected near shallow weed choked lakes.

South Dakota distribution: Hanson and Lake Counties.

Specimens examined: 3

Remarks: *Tramea lacerata* was rarely seen and extremely hard to capture.
Suborder ZYGOPTERA Selys
"Damselflies"

These are insects of slender stature. Their heads are transversely elongate and their eyes separated by more than their own width. The fore and hind wings are similar in shape. The male has four abdominal appendages; two superiors and two inferiors. Whereas the female has a fully developed ovipositor, which is usually small. Flight is slow and uncertain because of the lack of rigidity in their wings.

KEY TO FAMILIES OF ZYGOPTERA OF EAST-CENTRAL SOUTH DAKOTA

1. Wings not stalked, antenodal cross veins numerous; red patch at base of wings
   \[ Agrionidae \]

Wings stalked, two antenodal crossveins; no red at base of wings

2. M₃ arising nearer arculus than nodus
   \[ Lestidae \]

M₃ arising nearer nodus than arculus
   \[ Coenagrionidae \]

Family AGRIONIDAE Leach
"Broad-Winged Damselflies"

These are large damselflies with broad wings and metallic bodies. There are numerous antenodal cross veins and no brace vein to the stigma in the wings.

Only one genus was collected by the author in east-central South Dakota.
Genus HETAERINA Hagen
"Ruby Spots"

These are beautiful, bronzy red damselflies, males conspicuously marked with a red spot at the wing base. The legs are slender and black in color. The wings are long with the stigma well developed. The females differ from the males in that they are pale in color.

One species, Hetaerina americana, was collected by the author in east-central South Dakota.

Hetaerina americana Fabricius
"American Ruby-Spot"

Plate 1, Fig. 1

Males beautiful reddish bronze with brilliant spots of ruby red at the wing bases. Females metallic green with amber yellow coloration at wing bases. Legs black, femora beneath and tibiae externally pale. Abdominal segments bronzy green, darkening toward the apex.

Habitat: Hetaerina americana haunts the riffles in small, clear flowing streams.

South Dakota distribution: Hetaerina americana was collected in Turner County.

Specimens examined: 36

Remarks: Hetaerina americana was taken at only one location in east-central South Dakota. It was collected from a stretch of rapids on a small clear flowing stream. It was quite abundant at this location but was not encountered at any other collecting site.
Family LESTIDAE Needham
"Spread-Winged Damselflies"

The members of this family are large, clear winged damselflies of elongate form. The nodus is placed one-third the distance from the wing base; the arculus is about halfway between the base and nodus. The stigma is large, well braced and surmounts more than one cell.

Their flight is not swift, and they are easy to capture.

There was only one genus, Lestes, collected by the author in east-central South Dakota.

Genus LESTES Leach
"Marsh Spread-Wings"

Lestes are elongate damselflies of large size. The wings are held obliquely upward and backward when at rest, and are hyaline. The legs are slender with the femoral and tibial spines longer than the spaces that separate them. Dorsally the thorax is metallic green, bronze, or brown, usually pale yellowish or greenish below. Adults rarely fly out over open water but frequent the margins of ponds.

KEY TO SPECIES OF LESTES OF EAST-CENTRAL SOUTH DAKOTA

1. Inferior appendages less than one-half the length of the superiors ........................................... congener

Inferior appendages more than one-half the length of the superiors ........................................... 2
2. Inferior appendages sigmoid, roughly S-shaped; their apices curved in an opposite direction to that of the superiors

\[ \text{unguiculatus} \]

Inferior appendages not sigmoid; if curved, curved in same direction as the superiors

\[ \text{dryas} \]

3. Dorsum of thorax metallic green

\[ \text{disjunctus} \]

Dorsum not metallic green

\[ \text{forcipatus} \]

4. Thorax blackish, becoming prunose with age; inferior appendages tapering towards its apex

\[ \text{forcipatus} \]

Thorax dark brown, with dull greenish or yellowish stripe on mesoperal suture; inferior appendages with distal fourth clubed

\[ \text{forcipatus} \]

\[ \text{Lestes congenere Hagen} \]

"Little Spread-Wing"

Plate 1; Fig. 2

Small blackish brown damselflies, with a dull bronze lustre.

Venter of thorax yellow to whitish. Metepimeron with elongate black spot near the ventro-lateral carina. Abdomen blackish with pale yellow basal annuli on segments 3 - 7. Legs yellow; femora and tibiae with lateral black line. Wings hyaline; stigma brown, surmounting more than one cell.

Habitat: Lestes congenere was collected around permanent ponds.

South Dakota distribution: Brookings, Davison, Hand, Hughes, Hyde, Jerauld, Lake, Miner, and Minnehaha Counties.

Specimens examined: 73
Remarks: *Lestes congener* was collected throughout the collecting area.

*Lestes unguiculatus* Hagen
"Common Spread-Wing"

Plate 1; Fig. 3

Robust species of average size. Dorsum of thorax bronze brown to gray. Sides of thorax with black spot above mesothoracic coxae. Legs black, lined with yellow externally on femora and tibiae. Abdomen yellow in teneral, dark metallic green or brown in mature specimens. Yellow side margins on all the middle segments. Appendages black at tip, inferior S-shaped.

Habitat: *Lestes unguiculatus* was collected around temporary or permanent ponds.

South Dakota distribution: Beadle, Brookings, Buffalo, Hand, Hanson, Hughes, Hyde, Jerauld, Lake, McCook, Miner, Minnehaha, Moody, and Turner Counties.

Specimens examined: 363

Remarks: *Lestes unguiculatus* was the most common *Lestes* collected by the author. This species was collected throughout east-central South Dakota.

*Lestes dryas* Kirby
"Green Spread-Wing"

Plate 1; Fig. 4

Medium size metallic green species with the sides of the thorax yellow. Legs black, lined with yellow externally; tarsi black.
Abdomen metallic green dorsally, yellowish on the sides. Anal appendages black; inferiors broad, expanded at their apices, flattened and nearly in a horizontal plane.

Habitat: *Lestes dryas* was collected in the area of temporary ponds and pond-like expansions of slow streams.

South Dakota distribution: Hand, Minnehaha, and Spink Counties.

Specimens examined: 4

Remarks: Four specimens of *Lestes dryas* were collected from widely scattered areas in east-central South Dakota.

*Lestes disjunctus* Selys
"Disjunct Spread-Wing"

Plate 2; Fig. 1

Blackish brown species with a greenish face. Thorax with bronzy lustre that disappears when prunosity develops. Abdomen dark brown with a greenish tinge. Apical segments black, prunose with age. Abdominal appendages black tipped with whitish hairs. Legs yellow with black stripes.

Habitat: *Lestes disjunctus* was collected in the area of permanent ponds, rich in vegetation.

South Dakota distribution: *Lestes disjunctus* was collected from Jerauld County.

Specimens examined: 2

Remarks: *Lestes disjunctus* was collected on only one location and seems to be quite rare in east-central South Dakota.
Lestes forcipatus Rambur
"Forcipate Spread-Wing"

Plate 2; Fig. 2

Dark brown species of above average size. Medium line of thorax and humeral stripes are dull yellowish or greenish gray. Sterna, lower pleura, and coxae greenish or dull yellow. Legs greenish yellow, striped with black. Abdomen blackish above, yellowish on sides. Abdominal appendages black.

Habitat: Lestes forcipatus was collected around temporary ponds.

South Dakota distribution: Buffalo, Hanson, Jerauld, Lake, McCook, and Minnehaha Counties.

Specimens examined: 56

Remarks: Lestes forcipatus was the largest of the genus Lestes, collected by the author. It was found throughout the collecting area.
Family COENAGRIONIDAE
"Narrow-Winged Damselflies"

Coenagrionidae is a large family with many genera and species. These are small brightly colored damselflies with clear wings. The colors run from black to blue, but red, orange, brown, green, and yellow occur.

These damselflies occur in a variety of habitats throughout east-central South Dakota: streams, ponds, and lakes. Most are feeble fliers, and when at rest hold their body horizontal and their wings together over the body.

<table>
<thead>
<tr>
<th>KEY TO THE GENERA OF COENAGRIONIDAE OF EAST-CENTRAL SOUTH DAKOTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tibiae with spines longer than the interval between them</td>
</tr>
<tr>
<td>Argia</td>
</tr>
<tr>
<td>Tibiae with spines about as long as interval between them</td>
</tr>
<tr>
<td>2. No pale postocular spots on head</td>
</tr>
<tr>
<td>With pale postocular spots on head</td>
</tr>
<tr>
<td>3. Body red and black; short and stout</td>
</tr>
<tr>
<td>Amphiagron</td>
</tr>
<tr>
<td>Body metallic green, slender</td>
</tr>
<tr>
<td>Nehalennia</td>
</tr>
<tr>
<td>4. Stigma in fore and hind wing dissimilar; stigma</td>
</tr>
<tr>
<td>in fore wing dark, in hind wing yellowish in color</td>
</tr>
<tr>
<td>Ischnura</td>
</tr>
<tr>
<td>Stigma in fore and hind wing similar</td>
</tr>
<tr>
<td>5.</td>
</tr>
</tbody>
</table>
5. Sternum of segment 8 of female without a vulvar spine;
   penis of male with long membranous process . . . . \textit{Coenagrion}

Sternum of segment 8 of female with a vulvar spine;
penis of male without long membranous process . . . \textit{Enallagma}

Genus \textit{ARGIA} Rambur
"Dancers"

\textit{Argia} is a complex genus, found chiefly in the American tropics. Males are blue or violet and black, and the females are tan. Unlike other damselflies, they have a pronounced distaste for vegetation. Adults prefer to alight in open spaces, on logs, stones, and bare banks rather than on vegetation.

\textit{Argia apicalis} was the only species of this genus collected by the author.

\textit{Argia apicalis} Say
"Narrow-Lined Dancer"

Plate 2; Fig. 3

Slender species, thorax clear blue. Prothorax black except for the sides. Anterior mesemiperon covered by a black band, remainder of humeral stripe reduced to a fine brown line on humeral suture. Third lateral suture with fine brown line. Dorsal abdominal segments 1 – 7 dark brown, interrupted by basal rings of yellow on segments 3 – 7.

Habitat: \textit{Argia apicalis} was collected around a small, clear-flowing stream.

South Dakota distribution: \textit{Argia apicalis} was collected from Turner County.
Specimens examined: 1

Remarks: Only one specimen of Argia apicalis was collected by the author in east-central South Dakota.

Genus AMPHIAGRION Selys

These are small, stout-bodied damselflies, males are red and black in color and the females are tan. They have short legs and a ventral thoracic tubercle on the intersternum. The thorax is bronzy black and the abdomen is short, thick and red in coloration.

One species was collected by the author.

Amphiagrion saucium Burmeister
"Bicolored Bog Damsel"

Plate 2; Fig. 4

Small red and black damselflies with trapezoid stigma on clear wings. Thorax bronzy black without stripes. Abdomen reddish brown, becoming black on segments 7 - 10. Legs pale reddish, femora and tibiae with dark streak along outer surface. Abdominal appendages reddish.

Habitat: Amphiagrion saucium was collected in the area of small slow-flowing springs.

South Dakota distribution: Beadle, McCook, Spink and Turner Counties.

Specimens examined: 16

Remarks: Amphiagrion saucium was collected at four sites. Each site had a spring running into a pond or forming a small creek. These
sites were scattered throughout the collecting area, indicating that it occurs over a wide area.

Genus NEHALENNIA Selys
"Green Damsels"

Members of this genus are small delicate bronzey green damselflies, the entire dorsum of head and body is a rich bronzey green. The legs are slender, moderately long, with black stripes and black spines. The wings are hyaline with a pale stigma covering a single cell.

Only one species, Nehalennia irene, was collected by the author.

Nehalennia irene Hagen
"Common Green Damselfly"

Plate 3; Fig. 1

Slender bronzey green species with a blue tipped abdomen. Face pale, basal segment of antennae ringed with black and white. Top of head metallic green. Thorax metallic green with narrow black lines on carinae. Legs yellow with black stripe on femora and tibiae. Abdomen bronzey green above, yellowish beneath, with segments 8-10 blue. Anal appendages of male black, female brown.

Habitat: Nehalennia irene was collected around still marshy or boggy water.

South Dakota distribution: Buffalo, Jerauld, Lake, McCook, Miner, and Minnehaha Counties.

Specimens examined: 15
Remarks: *Nehalennia irene* was the smallest damselfly collected by the author. It was found at scattered areas throughout the collecting area.

Genus *ISCHNURA* Charpentier

"Fork-tails"

The males are black and green, blue on segment 8 and 9 of the abdomen. The head is black above with the postocular spots of moderate size. On the apical margin of the dorsum of abdominal segment 10 there is an elevated bifid process.

*Ischnura verticalis* was the only species of this genus collected by the author.

*Ischnura verticalis* Say

"Common Fork-Tail"

Plate 3; Fig. 2

Face yellow green with postocular spots bluish-green, round, and isolated. Thorax black dorsally, yellow-green beneath. Dorsum of abdominal segments 1 - 7 and 10 black, with yellow basal rings on segments 3 - 7. Segments 8 and 9 blue with black spots on either side.

Habitat: *Ischnura verticalis* was collected around permanent bodies of water.

South Dakota distribution: Beadle, Brookings, Buffalo, Faulk, Hand, Hanson, Hughes, Lake, McCook, Miner, Minnehaha, Spink, and Turner Counties.

Specimens examined: 49

Remarks: *Ischnura verticalis* is quite common, found throughout the collecting area in a variety of aquatic habitats.
Genus **COENAGRICION** Kirby

The males of this genus are blue and black in coloration, the females are brownish. This genus is separated from the genus *Enallagma*, in that the females lack a ventral spine on segment 8, while the males have the penis prolonged into a pair of membranous appendages.

**KEY TO SPECIES OF COENAGRICION OF EAST-CENTRAL SOUTH DAKOTA**

1. Dorsal black spot on second abdominal segment connected with lateral stripes .................................................. *resolutum*

Dorsal black spot on second abdominal segment isolated .............................................................. *angulatum*

Coenagrion resolutum Hagen
"Resolute Damsel"

Plate 3; Fig. 3


Habitat: Coenagrion resolutum is mainly a small pond species. South Dakota distribution: Beadle, Faulk, Lake, McCook, Minnehaha, and Spink Counties.

Specimens examined: 39
Remarks: Coenagrion resolutum seemed to be more abundant in the eastern part of the collecting area.

**Coenagrion angulatum** Walker  
"Angulate Damselfly"

Plate 3; Fig. 4

Slightly larger than **Coenagrion resolutum**, males darker blue with black areas of abdomen more extensive. Face pale green with no connecting line between the postocular spots. Front of thorax black with blue antehumeral stripes. Abdominal segments 8 and 9 blue, 10 black above, blue on the sides. Abdominal appendages black.

Habitat: **Coenagrion angulatum** was collected in the area of semi-permanent ponds.

South Dakota distribution: Jerauld and Minnehaha Counties.

Specimens examined: 3

Remarks: **Coenagrion angulatum** was collected at 2 widely separated locations.

**Genus ENALLAGMA** Charpentier  
"Bluets"

The genus **Enallagma** is by far the largest genus of South Dakota Odonata, and is the second largest genus in North America. Most of the species found in South Dakota are black and blue in coloration. The adults abound in a variety of aquatic habitats and are seen flying low over water, rarely being found away from water.
KEY TO SPECIES OF *ENALLAGMA* OF

EAST-CENTRAL SOUTH DAKOTA

1. Superior abdominal appendages not bifid, at best giving
   only a slightly bilobed appearance ........................................ 2
   Superior abdominal appendages bifid, maybe a yellowish
   tubercle between the arms ...................................................... 6

2. Superior abdominal appendages longer than 10th segment
   of abdomen; color black with orange or gray
   marking .................................................................................. signatum
   Superior abdominal appendages less than length of
   10th segment of abdomen; mainly blue and black
   in coloration ............................................................................... 3

3. Superior abdominal appendages short and rounded with
   a slight posterolateral notch ..................................................... boreale
   Superior abdominal appendages more elongate with
   extremity upturned slightly ....................................................... 4

4. $M_2$ arising between the 3rd and 4th postnodal cross-
   veins in the hind wing .............................................................. hageni
   $M_2$ arising between the 4th and 5th postnodal
   crossveins in the hind wing ....................................................... 5

5. Abdominal segments 3 - 5 blue with black apical
   spots and rings .......................................................................... cyathigerum
   Abdominal segments 3 - 5 blue with black on the
   apical two-fifths to two-thirds .................................................. clausum
6. Superior abdominal appendage with the superior arm much longer than the inferior arm
Superior abdominal appendage with superior and inferior arms about same length

7. With a yellowish tubercle between the arms of the superior abdominal appendages
Without a yellowish tubercle between the arms of the superior abdominal appendages

8. Superior abdominal appendages with fork shallow, superior and inferior arms about the same length
Superior appendages widely forked with superior arm slightly larger than the inferior arm

9. Superior abdominal appendages with the fork deep but not widely spread, color blue and black
Superior abdominal appendage with a widely separated fork, color greenish yellow

Enallagma signatum Hagen
"Brown-Bodied Bluet"

Plate 4; Fig. 1

Large slender, black and orange damselfly. Face pale, base and first segment of the antennae pale yellow. Orange postocular spots linear and joined by way of the postocellar stripe. Thorax pale orange and marked with black. Abdomen pale yellow, becoming bronzy brown towards the posterior ends of the segments. Dorsal surface segment 9
is pale orange. Superior abdominal appendages orange deepening to black at the apices. Inferior abdominal appendages yellow, tips black.

Habitat: Enallagma signatum was found around small lakes.

South Dakota distribution: Enallagma signatum was found in Turner County.

Specimens examined: 13

Remarks: Enallagma signatum was collected around a small weed-choked lake in Turner County.

Enallagma boreale Selys "Boreal Bluet"

Plate 4; Fig. 2

Blue-black damselfly of average size. Face pale blue, postocular spot blue, large in size; nearly touching the ocular margins.

Thorax pale blue, striped with black. Abdomen bright blue with the following black: basal spot on 1; apical spot and ring on 2; apical spot connected with apical band on 3-5; apical three-fourths of 6; 7 except basal annulus; entire dorsum of 10; 8 and 9 wholly blue.

Superior appendages black; blunt and rounded in profile.

Habitat: Enallagma boreale was collected from a small lake.

South Dakota distribution: Enallagma boreale was collected from Miner County.

Specimens examined: 1

Remarks: One specimen was collected by the author and that was from Lake Carthage in Miner County.
Enallagma hageni Walsh
"Hagen's Bluet"

Plate 4; Fig. 3

Face pale blue, postocular spots large and isolated, entirely surrounded by black. Thorax pale blue, marked with black stripes. Abdomen blue marked with black as follows: basal spot on 1; apical spot and ring on 2; similar markings on segments 3-5 but more extensive; one-half of 6; nearly all of 7 and 10; 8 and 9 blue. Inferior abdominal appendages longer than superiors.

Habitat: Enallagma hageni was collected around lakes, ponds, and streams of all types.

South Dakota distribution: Beadle, Faulk, Hand, Hanson, Hyde, Jerauld, Lake, McCook, Miner, Minnehaha, Moody and Turner Counties.

Specimens examined: 174

Remarks: Enallagma hageni was collected throughout the collecting area.

Enallagma cyathigerum Charpentier
"Cup-Bearing Bluet"

Plate 4; Fig. 4

Face pale blue-brown. Postocular spots large, nearly touching the ocular margin. Thorax pale blue, marked with black stripes. Abdomen blue, marked with black as follows: basal apical spot on 1; apical spot and ring on 2; apical spot connected with apical band on 3-5; apical half of 6; nearly all of 7 except basal ring; dorsum of 10; 8 and 9 blue. Superior abdominal appendage blunt and rounded with an upturned ventral hook.
Habitat: *Enallagma cyathigerum* is mainly a small lake species.

South Dakota distribution: Faulk, Lake, and Miner Counties.

Specimens examined: 3

Remarks: *Enallagma cyathigerum* was collected at 3 separate and widely scattered locations.

*Enallagma clausum* Morse
"Closed Bluet"

Plate 5; Fig. 1

Face pale brown with postocular spots triangular in shape and surrounded by black. Occipital line present but not connecting the postocular spots. Thorax blue, marked with black stripes. Abdomen blue, marked with black as follows: basal spot on 1; apical spot and ring on 2; apical two-fifths to two-thirds of 3-5; apical three-fourths of 6; nearly all of 7; all of 10; 8 and 9 blue. Superior abdominal appendages pointed and recurved at the apices.

Habitat: *Enallagma clausum* seems to prefer larger lakes.

South Dakota distribution: *Enallagma clausum* was collected from Davison County.

Specimens examined: 4

Remarks: All the specimens were taken from Lake Mitchell in Davison County.

*Enallagma anna* Williamson
"Anna Bluet"

Plate 5; Fig. 2

Face pale blue with large postocular spots connected by a pale postocollar stripe. Thorax blue, striped with black. Abdomen blue,
marked with black as follows: basal spot on 1; apical spot and ring on 2; apical two-fifths of 3; apical half of 4; apical two-thirds of 5; apical three-fourths of 6; most of 7; all of 10; 8 and 9 blue. Superior abdominal appendage as long as segment 10, bifid, with inferior arm shorter than the superior.

Habitat: Enallagma anna was found along small streams.

South Dakota distribution: McCook and Turner Counties.

Specimens examined: 3

Remarks: The specimens were collected from small, slow moving clear streams.

Enallagma carunculatum Morse
"Carunculate Bluet"

Plate 5; Fig. 3

Face pale blue, tear shaped postocular spots blue, connected by occipital bar. Thorax blue, striped with black. Abdomen blue, marked with black as follows: basal spot on 1; large apical spot on 2; apical half of 3-4; apical three-fourths of 5-6; nearly all of 7; all of 10; 8 and 9 blue. Superior abdominal appendages bifid, with a yellowish tubercle between the arms.

Habitat: Enallagma carunculatum was collected around lakes and larger streams.

South Dakota distribution: Beadle, Buffalo, Davison, Jerauld, and Turner Counties.

Specimens examined: 13
Remarks: *Enallagma carunculatum* was collected at scattered sites in the western regions of the collecting area.

*Enallagma civile* Hagen
"Civile Bluet"

Plate 5: Fig. 4

Face pale blue, postocular spots small and usually separated from postocular stripe. Thorax blue with black stripes. Abdomen blue, with black markings as follows: basal spot on 1; apical spot on 2; apical fourth on 3-5; half of 6; most of 7; all of 10; 8 and 9 blue. Superior abdominal appendages black, widely bifid; large tubercle between the arms.

Habitat: *Enallagma civile* was collected around ponds and larger lakes.

South Dakota distribution: Beadle, Brookings, Davison, Faulk, Hanson, Jerauld, Lake, McCook, Miner, Minnehaha, Moody, Spink and Turner Counties.

Specimens examined: 231

Remarks: *Enallagma civile* was the most abundant Odonata collected by the author. It was collected from sites throughout the collecting area.

*Enallagma ebrium* Hagen
"Drunken Bluet"

Plate 6: Fig. 1

Face blue, postocular spots large and usually isolated. Thorax blue, with black markings as follows: basal spot on 1; apical spot and ring on 2; apical fourth to third of 3-5; apical half of 6; nearly all
of 7; all of 10; 8 and 9 blue. Superior abdominal appendages black, bifid, without yellowish tubercle between the arms.

Habitat: *Enallagma ebrum* was collected around marshy ponds and lakes.

South Dakota distribution: Beadle, Buffalo, Davison, Hand, Hanson, Hyde, Jerauld, Lake, McCook, Miner, Minnehaha, and Turner Counties.

Specimens examined: 73

Remarks: *Enallagma ebrum* was collected from widely scattered ponds throughout the collecting area.

*Enallagma antennatum* Say
"Orange-Faced Bluets"

Plate 6; Fig. 2

Face orange, postocular spots are blue-yellow, narrow and connected by an orange occipital bar. Thorax yellow-green, striped with black and yellow. Dorsum of abdominal segments 1-3 and 10 entirely black sides pale, yellowish beneath. Segment 9 blue. Superior abdominal appendages black, widely bifid; no tubercle between arms.

Habitat: *Enallagma antennatum* was collected from around slow moving creeks and lake margins.

South Dakota distribution: Buffalo, Hanson, McCook, Minnehaha, and Turner Counties.

Specimens examined: 12

Remarks: *Enallagma antennatum* was collected mainly in the eastern portions of the collecting area.
SUMMARY

A total of 1,785 specimens of Odonata were collected and identified by the author during the summer and fall of 1968 and spring of 1969. They were collected from 20 counties in east-central South Dakota. Of this total 601 specimens were of the suborder Anisoptera and 1184 were Zygoptera.

Within these two suborders six families were identified.

All three families, Agrionidae, Lestidae, and Coenagrionidae, of the suborder Zygoptera were collected. Under these three families eight genera were represented; Hetaerina in the family Agrionidae; Lestes in the family Lestidae; and Agria, Amphiagrion, Nehalennia, Ischnura, Coenagrion, and Enallagma in the family Coenagrionidae. In all, a total of 22 species of Zygoptera were collected and identified.

In the suborder Anisoptera, three families were obtained in east-central South Dakota. These were Libellulidae, Aeshnidae, and Gomphidae. Eleven genera were represented in these three families and included the following: Dromogomphus and Gomphus in the family Gomphidae; Aeschna and Anax in the family Aeshnidae; and Plathemis, Libellula, Perithemis, Tarnetrum, Sympetrum, Leucorrhinia, and Tramea in the family Libellulidae. A total of fifteen species of Anisoptera were collected and identified.

South Dakota is unique in the fact that it is geographically located so that its faunal composition includes species which
predominate in either the North, South, East, or West. Thus it appears to be a zoogeographical "melting pot" at least as far as the Odonata are concerned.


This study represents the beginning of research on the Odonata of South Dakota. The author was unable to do any collecting in the western part of the state. It is his opinion that this area differs enough from the eastern counties so as to allow for the discovery of new species not recorded in this study. Thus with future studies a more complete faunal complex may be developed.


Plate 1

Fig. 1. Male abdominal appendages of *Hetaerina americana*, dorsal view.

Fig. 2. Male abdominal appendages of *Lestes congen* er, ventral view.

Fig. 3. Male abdominal appendages of *Lestes unguiculatus*, ventral view.

Fig. 4. Male abdominal appendages of *Lestes dryas*, ventral view.
Fig. 1. Male abdominal appendages of *Lestes disjunctus*, ventral view.

Fig. 2. Male abdominal appendages of *Lestes forcipatus*, ventral view.

Fig. 3. Male abdominal appendages of *Argia apicalis*, lateral view.

Fig. 4. Male abdominal appendages of *Amphiagrion saucium*, lateral view.
Fig. 1. Male abdominal appendages of *Nehalennia irene*, lateral view.

Fig. 2. Male abdominal appendages of *Ischnura verticalis*, lateral view.

Fig. 3. Male abdominal appendages of *Coenagrion resolutum*, lateral view.

Fig. 4. Male abdominal appendages of *Coenagrion angulatum*, lateral view.
Plate 4

Fig. 1. Male abdominal appendages of *Enallagma signatum*, lateral view.

Fig. 2. Male abdominal appendages of *Enallagma borca*, lateral view.

Fig. 3. Male abdominal appendages of *Enallagma hagenii*, lateral view.

Fig. 4. Male abdominal appendages of *Enallagma cyathigerum*, lateral view.
Plate 5

Fig. 1. Male abdominal appendages of *Enallagma clausum*, lateral view.

Fig. 2. Male abdominal appendages of *Enallagma anna*, lateral view.

Fig. 3. Male abdominal appendages of *Enallagma carunculatum*, lateral view.

Fig. 4. Male abdominal appendages of *Enallagma civile*, lateral view.
Plate 6

Fig. 1. Male abdominal appendages of *Enallagma ebrarium*, lateral view.

Fig. 2. Male abdominal appendages of *Enallagma antennatum*, lateral view.
Distribution of Dromogomphus spinosus
Distribution of Libellula pulchella