



University of Delaware

ACADIA NATIONAL PARK
RESOURCE MANAGEMENT DIVISION

RECEIVED
ACADIA NATIONAL PARK

AUG 6 '87

DEPARTMENT OF CHEMISTRY
NEWARK, DELAWARE 19716

(302) 451-2908

3 August 1987

Mr. Carroll J. Schell, Chief
Resource Management
Acadia National Park
Bar Harbor, Maine 04609

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Dear Mr Schell:

In 1983 and 1986 you have issued Class A collecting permits to me to collect dragonflies within Acadia National Park. The understanding was that I would attempt in as much as possible to collect away from Park visitors. I will be returning to the Bar Harbor area again this August and would like to be able to continue my research on the dragonflies of Mt. Desert Island. It is my intent to publish an article on this subject in the next year or two. I expect to arrive about August 8 and would plan to come to your office sometime during the following week to obtain a permit if it is acceptable with you. I will call first to determine a convenient time.

In recent years I have done less collecting and more photography; however, some of my photography requires that I net a specimen. As a consequence I would be carrying a net even though I would be taking few, if any, specimens for preservation. In the case that I observe new species for the area I would like to be able to take specimens to document their occurrence. For these reasons I request a collecting permit for the period August 9-24, 1987.

Enclosed is a list of specimens which I am donating this year to the museum at the College of the Atlantic. If there is any interest or need to have a similar collection in the Park, I would be happy to prepare one. Also enclosed is an article I published on the dragonflies of Delaware in the summer issue of the Delaware Conservationist.

I look forward to meeting with you sometime next week.

Sincerely yours,

Harold B. White

Harold B. White
Professor of Biochemistry

ACADIA NATIONAL PARK
RESOURCE MANAGEMENT DIVISION

ODONATA SPECIMENS DONATED TO THE MUSEUM AT THE COLLEGE OF THE ATLANTIC
HBW

Species	coll. No.	Location	Date
<i>Calopteryx maculata</i> m	76-28	Ripple Pond	8/4/76
<i>Lestes congener</i> m	70-49	Witch Hole Pond	8/27/70
<i>L. d. disjunctus</i> pr	76-27	Round Pond	8/4/76
<i>L. rectangularis</i> m	68-38	Great Meadow	8/31/68
<i>L. vigilax</i> m,f	73-36	Ripple Pond	8/23/73
<i>Enallagma aspersum</i> m	73-36	Ripple Pond	8/23/73
<i>E. boreale</i> m	73-28	Big Heath	8/10/73
<i>E. civile</i> pr	73-26	Eagle Lake	8/8/73
<i>E. ebrium</i> 2m	81-26	Witch Hole Pond	8/11/81
<i>E. exsulans</i> 2m	73-26	Eagle Lake	8/8/73
<i>E. hageni</i> m	76-27	Round Pond	8/4/76
<i>E. minusculum</i> m	76-27	Round Pond	8/4/76
<i>Argia fumipennis violacea</i>	82-21	Long Pond Outlet	8/10/82
<i>A. moesta</i> m	73-26	Eagle Lake	8/8/73
<i>Nehalennia irene</i> pr	82-19	Penobscot Mountain	8/7/82
<i>Ischnura verticalis</i> m	76-26	Lake Wood	8/4/76
<i>Dromogomphus spinosus</i> m	76-29	N. Br. Union River	8/5/76
<i>Gomphus exilis</i> m	76-27	Round Pond	8/4/76
<i>G. spicatus</i> m	71-17	Witch Hole Pond	5/31/71
<i>Hagenius brevistylus</i> m	82-22	Seal Cove Pond	8/11/82
<i>Anax junius</i> m	81-26	Witch Hole Pond	8/11/81
<i>Basiaeschna janata</i> m	76-28	Ripple Pond Outlet	8/4/76
<i>Boyeria vinosa</i> m	76-28	Ripple Pond Outlet	8/4/76
<i>Aeshna canadensis</i> m	81-27	Heath Brook	8/12/81
<i>A. eremita</i> m	76-24	Blunts Pd. Lamoine	8/3/76
<i>A. i. interrupta</i> m	73-30	Featherbed, Cadillac	8/13/73
<i>A. sitchensis</i> m	76-31	Big Heath	8/11/76
<i>A. subarctica</i> m	70-48	Big Heath	8/25/70
<i>A. tuberculifera</i> m	83-16	Witch Hole Pond	8/17/83
" f	80-09	Big Heath	8/15/80
<i>A. umbrosa</i> m	76-32	Breakneck Brook	8/12/76
<i>A. verticalis</i> m	83-15	Sunken Heath	8/17/83
<i>Somatochlora elongata</i> m	81-27	Heath Brook	8/12/81
<i>S. incurvata</i> m	80-23	Big Heath	8/12/80
<i>S. walshi</i> m	80-23	Big Heath	8/12/80
<i>Dorocordulia lepida</i> m	76-24	Blunts Pd. Lamoine	8/4/76
<i>Libellula (Ladona) exusta</i>	79-04	New Jersey	6/10/79
<i>L.(L.) julia</i> m	60-	Pennsylvania	6/26/60
<i>L. incesta</i> m	70-32	Massachusetts	7/19/70
<i>L. luctuosa</i> m	70-33	Massachusetts	7/25/70
<i>L. pulchella</i> m	76-32	Eagle Lake Dam	8/12/76
<i>L. quadrimaculata</i> m	68-	Massachusetts	5/22/68
<i>Sympetrum costiferum</i> m	70-49	Witch Hole Pond	8/27/70
<i>S. internum</i> m	82-27	Heath Brook	8/12/82
<i>S. semicinctum</i> f	82-21	Long Pond Outlet	8/10/82
<i>S. vicinum</i> pr	70-49	Witch Hole Pond	8/27/70
<i>Leucorrhinia frigida</i> m	67-	Massachusetts	7/2/67
<i>L. glacialis</i> m	73-32	Big Heath	8/21/73
<i>Celithemis martha</i> m	73-36	Ripple Pond	8/23/73
<i>Pantala flavescens</i> m	82-24	Gorham Mountain	8/15/82

Harold B. White 2 August 1987
103 Radcliffe Dr.
Newark, DE. 19711

Dragons, Damsels and Darning Needles

Small, winged wonders bring life, color to ponds and marshes

Text and photography by Dr. Harold B. White

They've been called snake doctors, mule killers and horse stingers. Dragonflies get no respect.

Even an old wives' tale holds that "if you tell a lie, a darning needle will come along and sew your mouth shut." In Mexico, dragonflies are called "caballito del diablo" or little horses of the devil.

Actually, dragonflies don't deserve the derogatory folk names they have acquired. While some of the insects are large and appear fearsome, they are totally harmless to humans.

In contrast to our culture, where insects are often not appreciated, the Japanese admire dragonflies. They are popular subjects of art and poetry. Regard for these insects, however, is not limited to artists and entomologists.

One can derive a great deal of enjoyment from their beauty and watching their graceful flight or impressive speed over a pond without ever identifying them by common or scientific names. This aesthetic appreciation is available to everyone. The persistent naturalist may want to pursue this appreciation further and try to identify what he sees. Because there are no popular field guides available for dragonflies like there are for birds, butterflies, wild flowers, and shells, the serious dragonfly student will find it a bit more difficult to decipher information on the insects. And because few dragonflies have truly common names, he or she will have to learn the scientific

names in the pursuit of identification. But a unique appreciation can reward anyone who takes a serious interest in dragonflies and their more delicate close relatives, the damselflies.

Dragonflies and damselflies are subgroups of the insect order Odonata, a name that refers to the sharp teeth on their mandibles. Odonata as a group are often called dragonflies which leads to confusion because damselflies then are also called dragonflies.

In Delaware there are about 70 species of dragonflies and 40 species of damselflies. Of the two, dragonflies are larger and more robust. They have round heads covered almost entirely by their compound eyes. When perching, their wings are spread wide. In contrast, damselflies are smaller and more delicate. Their heads are dumbbell-shaped. They are weaker fliers and when perched their wings are held together or slightly spread apart. Once one becomes familiar with the distinctive markings, preferred habitats, and seasonal occurrence, most of the dragonflies and damselflies of Delaware can be identified with little difficulty and without disturbing them.

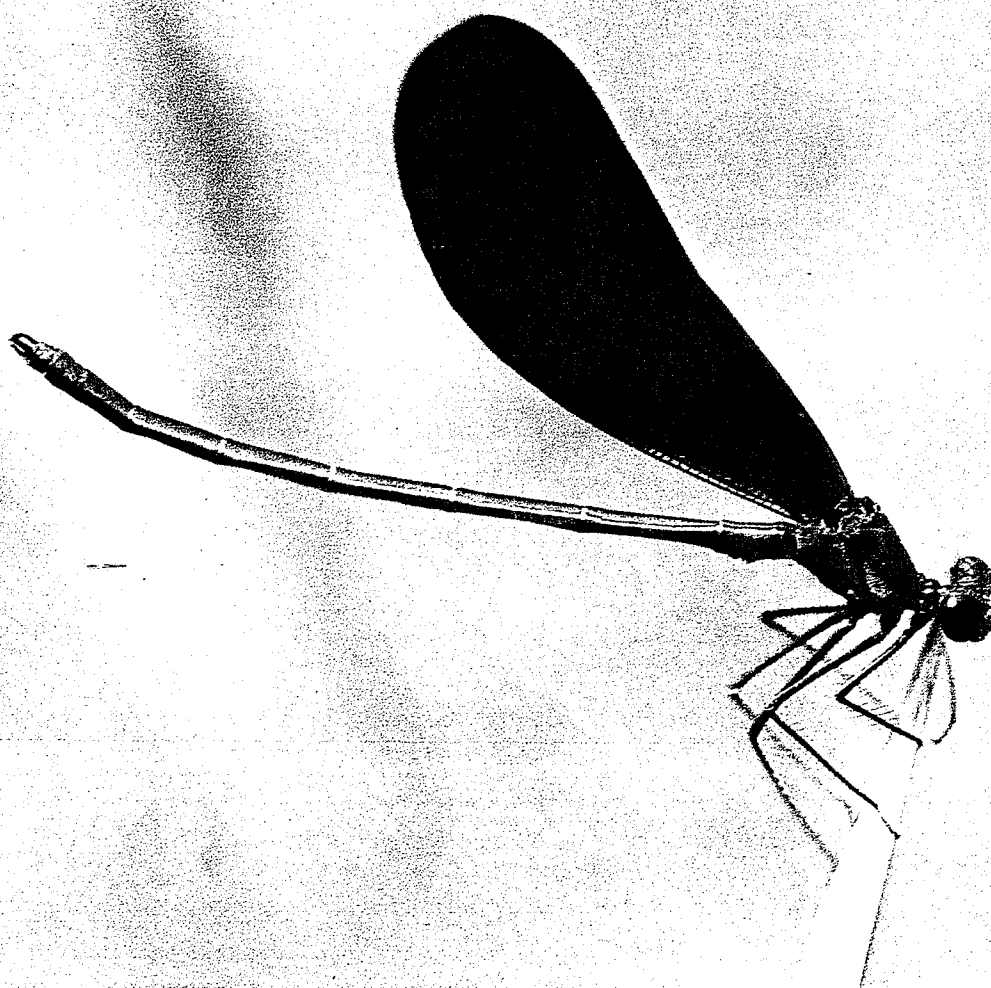
For the less than avid bird-watcher who does not like to rise early, cover great distances on foot, or confront inclement weather, dragonflies are a wonderful alternative. They are most active on sunny, warm, calm days from May through October. They usually arrive at freshwater habitats after midmorning and depart by early evening.

The Odonata actually have

some similarities with birds. Like birds the males are brightly colored and establish territories. They drive off other males of their species and are quick to pursue females that enter their territory.

"Mosquito hawk" is an apt folk name for dragonflies in that they are winged predators with excellent eyesight that feed on other flying insects. With an evolutionary history of several hundred million years, the Odonata have had plenty of time to refine their ability to seek and capture. In addition to keen eyesight and aerial maneuverability, dragonflies and damselflies have evolved an insect net. In flight their legs, often lined with spines, are suspended like a basket beneath their thorax, ready to scoop up the small insects they pursue. So specialized are these legs that they are not used for walking, but only perching or hanging. While some dragonflies feed around their territories, others feed away from water, over fields or near woodland borders. In these cases territorial behavior is not observed and occasionally large swarms of males and females of several species will congregate to feed on gnats and mosquitoes. To the extent they feed on harmful insects, the Odonata are beneficial.

The larvae of dragonflies and damselflies are also predatory. They live in the water and can be found with a dip net along the borders of ponds or in the leaf litter in streams. These larvae, called nymphs, stalk their prey like chameleons. When they are in striking distance, their double-



A black-winged damselfly, *Calopteryx maculata*, perches on a blade of grass.

hinged lower jaw rapidly extends to catch their victim, usually other insects including other nymphs. They also feed on salamanders, worms, and small fish.

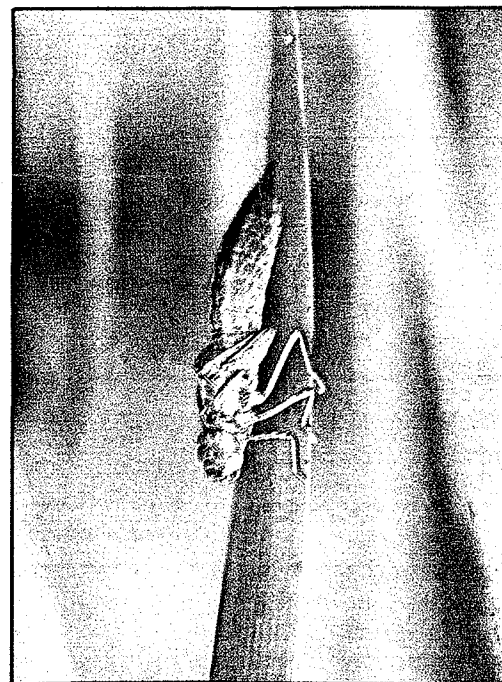
Unlike the adult, the nymph can use its legs for walking. However, for rapid escapes, dragonfly nymphs use a form of jet propulsion. Water is taken into the abdomen and forcefully expelled propelling the nymph rapidly forward. Damselfly nymphs cannot do this. Instead, they have three paddle-shaped gills at the end of their abdomen which are used like a fish tail when they need to move quickly.

Nymphs molt many times before they are full grown. At the appropriate time, determined by temperature and day length, the nymph climbs out of the water and transforms into a fragile adult known as a teneral, leaving behind its nymphal shell, the

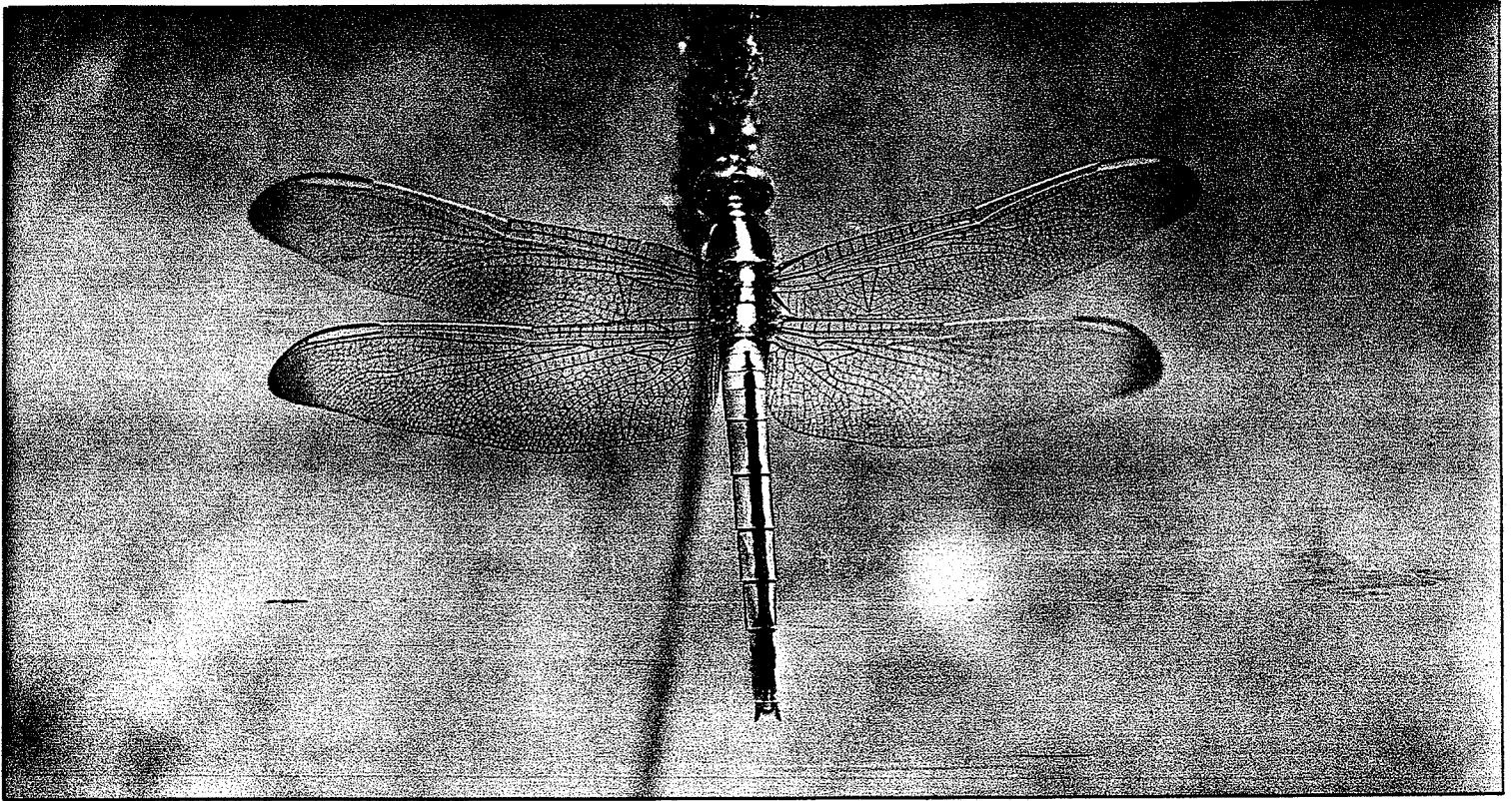
exuvia. This is a marvelous metamorphosis, fully as spectacular as the emergence of a butterfly. The teneral flutters away from the water to harden and feed before returning to the water as a mature adult. Tenerals are weak fliers and are a favorite food of kingbirds and Cedar waxwings. Perhaps they are a delicacy in the avian world akin to the softshelled crab.

A greater threat to dragonflies and damselflies than birds is habitat destruction by human activities. This is particularly true in a state like Delaware where many tracts of original wetlands have been drained for agriculture and development has consumed whole stream valleys.

Industrial and agricultural pollution also poses a problem for the insects. Within New Castle County the only known habitat in Delaware for two species was



This exuvia of an *Anax Junius* was photographed near Sandtown in Sussex County.



The *Libellula needhami* is common to salt water marshes. This specimen was found near Milford.

drained and developed during the past decade. Care must continue to be taken in spraying for gypsy moths in Blackbird State Forest so that the only known Delaware population of the rare *Gomphus rogersi* is not threatened.

While some habitats of dragonflies have been destroyed, others have been created. For example, the formation of mill ponds and farm ponds has provided habitats for many cosmopolitan species. As a consequence, the species common in Delaware tend to be hardy pond species. The rare species are those restricted to pristine, unaltered habitats.

While dragonflies and damselflies are usually associated with fresh water, there are two North American species, *Erythrodiplox berenice* and *Libellula needhami*, that actually prefer salt marshes. Both are common along the Delaware Bay and around Indian River, only occasionally straying from those areas. This type of habitat specialization is not uncommon. The northern part of the state is

home to a large dragonfly with green eyes and yellow stripes, *Cordulegaster erronea*, that is only found in midsummer over small, shaded, spring-fed streams.

There are no real geographical or climatological barriers in Delaware and thus the species that are found here are also found in neighboring states. Only four species, two dragonflies and two damselflies, reach their northernmost distribution in Delaware. Three of these are associated with the cypress swamps and ponds near Laurel and Seaford. There are some species that are quite common nearby but have not been found in Delaware. In particular the Pine Barrens of New Jersey harbor a number of species that are rare or unknown in Delaware.

Part of the fun of getting to know dragonflies and damselflies is recognizing that many of the species one sees along the Brandywine River are not going to be found at Lums Pond or along the tributaries of the Pocomoke River. Furthermore, the dominant species change as the year progresses. The familiar

small red dragonflies of late summer and fall will not be seen in May or June. This is appreciated in a Japanese haiku by Shirao which says:

*The beginning of
autumn,
Decided*

By the red dragon-fly.

Perhaps the best known dragonfly in North America is the green darner, *Anax junius*. It is about three inches long with a green thorax and a bright blue abdomen. Almost every pond has a few resident males that course back and forth over open water, occasionally confronting each other in high speed chases and never seeming to land. They are also frequently seen along the coast in the fall migrating south along with the monarch butterfly. How far they go and the nature of their return in the early spring are still mysteries.

At the other end of the scale is the Amber Wing, *Perithemis tenera*, which is not much more than an inch long. It has an orange-brown body and wings and flies just above the water

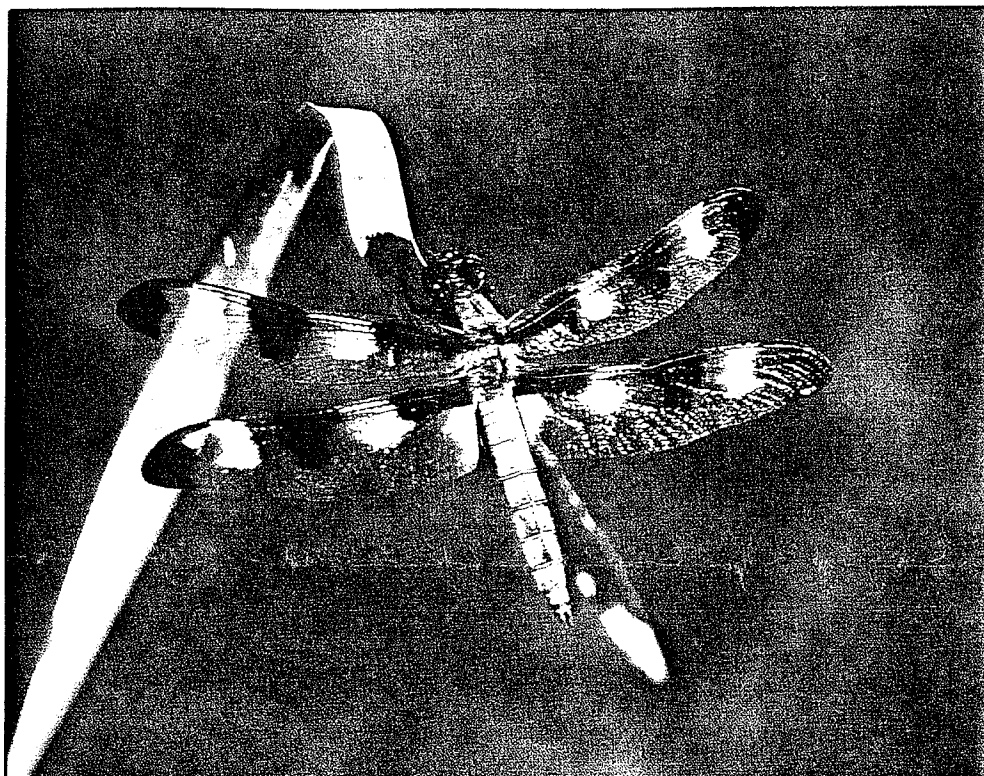
surface. The amber wing belongs to a large group of perching dragonflies that are common around ponds. Among these are the ten spot, *Libellula pulchella*, that has alternating black and white spots on its wings. The widow, *Libellula luctuosa*, has clear wing tips, white in the middle, and dark at the wing base. The black-faced skimmer, *Libellula cyanea*, has small, but quite noticeable, white dots near each wing tip. Most familiar is the white tail, *Plathemis lydia*, which has a broad chalk-white abdomen and seems fond of muddy ponds.

Among the common damselflies is the black-winged damselfly, *Calopteryx maculata*. The males have dark wings and iridescent green bodies. They can be seen along streams throughout Delaware from mid-May through August. A closely related species, *Calopteryx dimidiata*, has only the tips of its wings black. It is restricted to areas around the sandy-bottomed streams in the southern part of the state. In the late summer and fall one may get a glimpse of the ruby spot, *Hetaerina americana*, along streams. This damselfly has clear wings except for a brilliant red spot at the wing base.

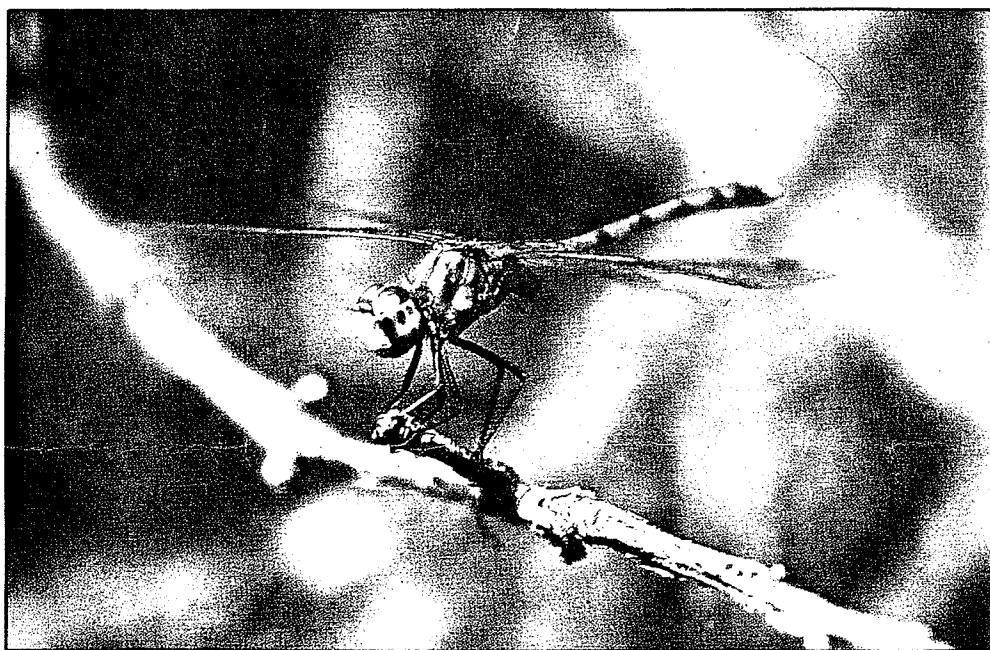
"Spread wings" are a group of fairly large, clear-winged damselflies that are found in fresh water marshes and around mature ponds with lots of emergent vegetation. In contrast to other damselflies, they hold their wings slightly apart rather than together. Delaware's most conspicuous member of this group is *Lestes inaequalis*. It has an iridescent green body with yellowish sides on its thorax.

The little blue damselflies that are common most everywhere are actually a group of species that one learns to differentiate with practice. Not all are blue. Within this group is a beautiful species, *Enallagma vesperum*, in which the males have a bright yellow thorax.

These are just a few of the dragonflies and damselflies one can see in Delaware. Common or rare, each is spectacular in its own right. Whether fishing along White Clay Creek, canoeing on



Libellula pulchella, known commonly as the ten spot.



Sympetrum ambiguum photographed resting on a twig in Lums Pond State Park.

Lums Pond, or swimming at Trap Pond, we share the habitat with these insects. By protecting our freshwater habitats from destruction and pollution, we can preserve these ancient and beautiful insects not only for future poets, artists, and naturalists, but for everyone.

EDITOR'S NOTE: Dr. Harold B. White is a professor of biochemistry with the University of Delaware. A Delaware resident since 1971, Dr. White has made dragonflies his hobby for the past 30 years. He also serves as corresponding secretary for the American Entomological Society.