

- M. Stem leaves flat; basal leaves wanting at flower time; bushy plants of fallow fields, roadsides, fencerows and along railroad rights-of-way
(Fig. 13).....Grass-leaved Goldenrod
(*Solidago graminifolia* (L.) Salisb.)
- MM. Leaves slightly folded; basal leaves with long narrowed bases present at flowering time; slender plants of alkaline sedge meadows, wet prairies and edges of marshes
(Fig. 14).....Riddell's Goldenrod
(*Solidago Riddellii* Frank)
- LL. Leaves broad and flat, not grass-like,
- N. Coarse plants with grayish hairs on the stems and leaves; stem leaves mostly erect; in dry to mesic prairies.
(Fig. 15).....Rigid Goldenrod
(*Solidago rigida* L.)
- NN. Slender plants without hairs or essentially so; all leaves more or less spreading; plants of alkaline sedge meadows, low prairies and moist depressions between beach ridges.
(Fig. 16).....Ohio Goldenrod
(*Solidago ohioensis* Riddell)

Peter J. Salamun
UWM Department of Botany

Literature Cited

- Blum, J.L. Vascular development in three common goldenrod galls.
Mich. Acad. Sci. 38:23-34. 1952
- Cooley, George R. Solidago. The *Asa Gray Bulletin* II(3): 309-313. 1953.
- Medler, J. Goldenrod galls. *Arboretum News*. October, 1965.
- Salamun, P.J. Preliminary Reports on the flora of Wisconsin, No. 50.
Compositae III—Composite Family. The Genus *Solidago*—
Goldenrod. *Trans. Wis. Acad.* 52:353-382. 1963.
- Zedler, Paul. Arboretum Goldenrods. *Arboretum News*. Spring, 1967.

BIRD HYBRIDS IN THE KETTLE MORaine

SINCE HYBRIDIZATION in birds is so rare in nature, it is unusual to have the opportunity to study what happens when two species interbreed. Blue-winged Warblers (*Vermivora pinus*) and Golden-winged Warblers (*V. chrysoptera*) produce hybrids wherever they occur together. Furthermore, such hybrids are fertile and there is pairing between these hybrids and both parental species. When my husband and I learned that both species breed in the northern Kettle Moraine State Forest, we decided to see what sorts of interactions between the two species were occurring there. Our objective initially was to determine if pairing was random between the species, e.g. were Blue-wings pairing with Golden-wings as frequently as they were with members of their own species. Also, what was the frequency of hybrids in this area? In addition, we had some



1.



2.



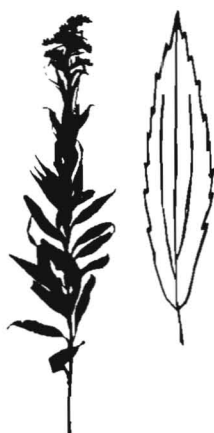
3. Zig-zag Goldenrod



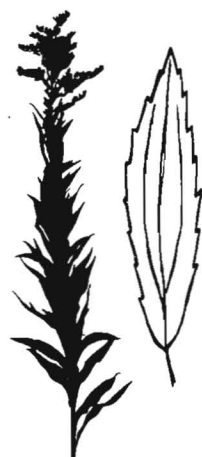
4. Showy Goldenrod



5. Swamp Goldenrod



6. Late Goldenrod

7. Canada Goldenrod
Tall Goldenrod



8. Old Field Goldenrod 9. Missouri Goldenrod 10. Roughleaved Goldenrod



11. Early Goldenrod

12. Elm-leaved Goldenrod



13. Grass-leaved Goldenrod



14. Riddell's Goldenrod



15. Rigid Goldenrod



16. Ohio Goldenrod

long-range goals which could only be attained by studying the birds over a period of several years.

In early May we began watching males on their territories and observing what type of females they were associating with. We found four Blue-wing males paired with Blue-wing females and two Golden-wing males paired with Golden-wing females. Another Golden-wing male was paired with a hybrid female. It appears pairing with respect to the two species is not random, but most pairs are composed of a male and a female of the same species.

Also, we color banded as many individuals as possible. We found that a good way to catch the birds for banding was to set up mist nets and then play the species' song with a tape recorder. Then the territory holding warbler in making a flying attack at the tape recorder as he would a strange male on his territory often flew into the net. We took colored pictures of as many birds as possible so we could see if the plumage showed traces of gene flow from the other species. This proves to be a good way to study hybridization without necessitating collecting the bird and consequently destroying the very process you are trying to study.

The two species look very different. Golden-wings have a black face and throat patch (gray in females), gray back, white breast, and a large golden wing bar. Blue-wings have a black line through the eye, olive back, yellow breast, and two single white wing bars. The hybrid that was observed paired with a Golden-wing was an interesting combination of these characters; she had a black line through the eye like a Blue-wing and intermediate wing bars, breast and back color. Such hybrids are easy to distinguish in the field. However, Dr. Lester Short of the American Museum of Natural History, studying museum specimens of these birds, showed that there are some hybrid features that cannot be readily observed in the field. Some of these hybrids at a distance look like an ordinary Blue-wing or Golden-wing. This comes about because when a Blue-wing and Golden-wing pair their offspring are of intermediate condition such as the female we observed. However, after a number of backcrossings of hybrids with parental species and their offspring doing the same, birds are produced that show only some subtle hybrid features. In a study of nine captured birds in the Kettle Moraine, we found that seven had some hybrid characters. For example, one male Golden-wing had some wing bar feathers that were partly white instead of totally yellow.

Both species occur together in the Kettle Moraine, often in boggy areas with shrubs and small trees, usually near a stand of taller trees. Blue-wing males defend a territory of about an acre against other Blue-wing males, Golden-wing males against other Golden-wing males, but a Blue-wing pair and a Golden-wing pair often share the same territory. Thus in the Kettle Moraine the two species nest in the same types of places, which brings the two species into contact and allows the opportunity for interbreeding.

Interbreeding might be more extensive if the two species returned in the spring to the Kettle Moraine from their wintering grounds at the same time.

However most resident Blue-wing males arrived about a week earlier than Golden-wing males and were already paired with Blue-wing females before Golden-wing females returned.

The Blue-winged Warbler has been relatively rare in Wisconsin until the last few decades. The Blue-winged Warbler in the course of its northward range expansion has increasingly come into contact with the Golden-winged Warbler. Although we found no interspecific pairing between Blue-wings and Golden-wings in our study this spring, interbreeding probably occurred to a limited extent when the two species first came into contact in the Kettle Moraine. The natural processes that normally keep different species from interbreeding are imperfect in the case of Blue-wings and Golden-wings. These species are at a critical point; if pairing of the parental species with hybrids does not cease soon, there will no longer be two species but one more variable species. In fact, since more than 75% of the birds we studied showed some hybrid traits, it appears the species' borders have already blurred in the Kettle Moraine.

Although we learned something about the relationships of Blue-wings and Golden-wings this spring, many interesting problems will take a long time to solve. Will the degree of gene flow decrease, increase or remain stable over the next ten years? The study of banded birds should provide some insight into this question. Will Blue-wings eventually outnumber Golden-wings in the Kettle Moraine as has happened in some areas in the East? Presently the two species are present in approximately equal numbers.

It would be helpful to our study to know something about the history of the Kettle Moraine populations of Blue-wings and Golden-wings. How long have both species been breeding there? Any information that readers of this Bulletin might have concerning this problem would be much appreciated.

I wish to thank John Meyer and Bernard Brouchoud for their help with this study.

Millicent S. Ficken
UWM Department of Zoology

IN QUEST OF THE ELUSIVE OVENBIRD

THE OVENBIRD *Seiurus aurocapillus* is a common and familiar bird. During migration it is abundant and easily observed in thickets, woods, parks and gardens, and is one of the most numerous casualties in the autumn kills at TV transmitter towers. During the breeding season it is closely restricted to upland deciduous or mixed forests, and by virtue of its loud conspicuous song, can easily be perceived as one of the most numerous and characteristic birds of those communities. On the other hand, as every birdwatcher knows, the Ovenbird on its breeding grounds is notoriously wary and secretive. To actually see an Ovenbird at this season, or to find its nest, or to observe and study its behavior, is something that requires considerable time, persistence, patience and even hardship. Harry Hann who studied this bird in detail in the 1930's, (*Wilson Bulletin* 49:145-237, 1937) described one of the hardships: "The absence of intruders (in the woods) was due in no small degree to the mosqui-