

## ORDER COPEPODA

*Diaptomus oregonensis* Lilleborg. A very common species of lakes in Ontario and New Brunswick.

*D. birgei* Marsh. Common in pond in limestone rock, Barriefield, Ont., and in a pond at St. Andrews, N.B.

*Cyclops ater*, Herrick. Scarce in a spring-fed pool near Chamcook, N.B.

*C. bicuspidatus* Claus. A common species of lakes in Ontario.

*C. americanus* Marsh. Common in pools at Barriefield, Ont.

*C. brevispinosus* Herrick. Common in open water of Lake Missanag, Ont.

*C. fuscus* Jurine. Scarce in marshy pools and common in a pond at St. Andrews, N.B.

*C. serrulatus* Fischer. A common species in pools in Ontario and New Brunswick.

*C. phaleratus* Koch. In temporary pools at Aylmer, Ont.

*C. fimbriatus* Fischer. Scarce in shallow water at edge of Cataraqui River.

*Canthocamptus minutus* Claus. Common in ponds, lakes and pools in Ontario and New Brunswick.

## AGRICULTURAL DEVELOPMENT AS A FACTOR IN WILD LIFE REDUCTION

By NORMAN CRIDDLE

A paper presented to the Provincial-Dominion Game Conference, April, 1926.

**I**N THEIR anxiety to preserve our wild life, conservationists have advocated numerous measures of reform, they have also advanced many reasons to account for the gradual decrease of the creatures involved. It seems to me, however, that undue emphasis has been placed upon the importance of predatory birds and mammals and not enough upon the innumerable changes brought about through agricultural development. The destruction of our forests, while seriously affecting fur-bearing and the larger game animals, has, on the whole, had less effect on the feathered tribes than has the steady encroachment upon the virgin vegetation by settlers and in the clearing away of shrubs and trees to make room for the planting of crops. By these means vast numbers of breeding birds have been deprived of the necessary cover to shelter their nests from enemies. Pasturing where cultivation is not profitable has probably been a still greater factor in restricting ground birds; areas that once supported a numerous bird population being now so denuded of vegetation as to be useless for that purpose.

Referring particularly to the prairie provinces, we have only to consider that territory forty years ago and compare the conditions then with those of to-day to realize how great has been the change in that time. The country, as I remember it then, was literally a sportsman's paradise; ducks, geese, cranes and other waterfowl inhabited the marshes in thousands, while the prairies were teeming with a great variety of species, including Sharp-tailed Grouse, Upland Plover, Golden Plover and many more. Hawks and owls were relatively as numerous as the game birds and even

in those days large flocks of crows might be noted that stretched right across the sky.

Many of the species then so plentiful have now been reduced to the vanishing point; of others, but a remnant survives. The sportsman, the game-hog and the law-breaker have all contributed to this lamentable state of affairs but the agriculturalist has probably assisted still more. The millions of acres of cultivated land were originally breeding places for birds which have been forced to move elsewhere. More important still has been the grazing by livestock. The numerous prairie ponds and small lakes which once harboured birds now support the farmer's herds; the water providing convenient drinking places and the shores, usually embracing a more luxuriant growth of grass than is procurable elsewhere, are cropped so closely that no bird can obtain nesting quarters in the vicinity. Furthermore, the lack of cover leads to the detection of both eggs and young by predators on the lookout for them.

These conditions now prevail over practically all the more thickly settled districts and they are steadily being extended with the arrival of new settlers. It may be said in extenuation for the breaking up of the virgin sod that much food is being made available that was formerly absent and this is true, but the effects are of minor importance in comparison to the harm done.

Having recognized the conditions outlined above, the problem for us to solve is. "How are we to prevent them becoming worse with continued agricultural development?" Should we boldly step in before it is too late and set aside bird sanctuaries despite their agricultural possibilities or should we confine our efforts to protecting areas that have

comparatively small farming value, but which nevertheless support numerous breeding birds? Probably the latter course would be wisest. In any case the first thing to do is to preserve what we have and this means that all our present bird sanctuaries must be defended against both cattle and hay-makers. Lakes and marshes should have a protected shore-line extending outward for at least half a mile, because it is on the land rather than amid the reeds that many ducks nest. Our upland sanctuaries should also be protected from livestock.

Road-side shrubs, hedge-rows and farm plantations should be encouraged as much as possible, because it is among these that many grouse and song birds nest or seek protection from their enemies.

I was asked a short time ago, "Why have Chestnut-collared Longspurs and Lark Buntings ceased to breed in a certain section of Manitoba?" In reply I inquired, "Have you any protected sod land left?" The answer was, "No, it is all utilized for grazing." The obvious explanation is applicable to nearly all the settled parts of Canada to-day.

## THE GRAPTOLITES OF THE GLENOGLE FORMATION

By T. H. CLARK

**T**HE Glenogle formation consists of a series of black shales of Ordovician age containing beds rich in graptolites typically exposed at Glenogle, B.C., and locally developed in the vicinity of that place. The earliest mention of graptolites in the rocks of the formation is in a report by McConnell in 1887\*. Besides describing the geological relations of the shales he also included a report upon the graptolites by Lapworth, who submitted the following list of species:—

*Didymograptus* cf. *euodus* Lapworth;  
*Glossograptus ciliatus* Emmons;  
*G. ciliatus* Emmons [= *G. spinulosus* (Hall)];  
*Cryptograptus tricornis* (Carruthers);  
*Diplograptus angustifolius* Hall;  
*D. rugosus* Emmons;  
*Climacograptus caelatus* Lapworth;

*Doubtful forms:* *Lasiograptus* and *Phyllograptus*. Lapworth was of the opinion that this assemblage belonged to the Trenton-Utica fauna, but suggested that it might be somewhat older than the typical Normanskill fauna. Lapworth's report was also printed independently elsewhere.†

Allan, in his report on the geology of the Field area‡, B.C., adds little to what McConnell had reported, and repeats Lapworth's list. Gurley in his study of North American Graptolites§ changed the name *Diplograptus rugosus* to *D. foliaceus*, and in a foot-note inclined toward the view that the beds were of Chazy age. Still later, Ruedemann, in his invaluable monograph on the Graptolites of New York\*, considered the

assemblage to be more properly correlated with the Lowville and Black River, and slightly older than the typical Normanskill fauna, and gave further reasons for his disbelief in assigning the beds to the Chazy. Unimportant references to the Glenogle shales occur in the International Geological Congress Guide Books†. More recently, Walcott has suggested the name Glenogle Formation for these graptoliteiferous beds, which had hitherto been referred to as the Graptolite Beds.‡

Lapworth's list of fossils from Glenogle remained unchanged except for refinements of nomenclature until 1924, when Walcott published a new list of fossils from this locality, collected by L. D. Burling, and identified by Ruedemann§. The list is as follows:—

*Loganograptus logani* mut. *tardus* Ruedemann;  
*Didymograptus serratulus* Hall;  
*D. sagitticaulis* Gurley;  
*D. sp. nov. aff. D. forcipiformis* Ruedemann;  
*D. spinosus* aff. *D. filiformis* Tullberg;  
*D. spinosus* Ruedemann;  
*Cryptograptus tricornis* (Carruthers);  
*Climacograptus antiquus* Lapworth [= *C. caelatus* Lapworth];  
*Diplograptus* cf. *teretiusculus* Hisinger [Probably, instead of *D. rugosus*];  
*Lasiograptus sp. nov.*  
*Glossograptus horridus* Ruedemann [*G. ciliatus* of Lapworth].

Ruedemann's comments include the following words: "This fauna is a new association of forms indicating a horizon between the Deep Kill and Normanskill shales."

\*McConnell, R. G., Geol. & Nat. Hist. Surv. Canada, Ann. Rept. 1886, vol. 2, p. 22D, 1887.

†Lapworth, Charles, Sci., 9, p. 320, 1887.

‡Allan, J. A., Geol. Surv. Canada, Mem. 55, geol. ser. 46, p. 100, 1914. In Allan's paper *Glossograptus tricornis* Emmons should read *Glossograptus ciliatus* Emmons.

§Gurley, R. R., Journ. Geology, vol. 4, p. 298, 1896.

\*Ruedemann, R., N.Y. State Mus., Mem. 11, pt. 2, p. 9-25 1908.

†Geol. Surv. Canada, Guide Book No. 8, pt. 2, pp. 142, 181, 200, 1913.

‡Walcott, C. D., Smithsonian, Misc. Coll., 67, no. 8, p. 463, 1923.

§Walcott, C. D., Smithsonian, Misc. Coll., 75, no. 1, p. 33, 1924.



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