

AUGUST, 1908  
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# THE OTTAWA NATURALIST

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# THE OTTAWA NATURALIST

VOL. XXII.

OTTAWA, AUGUST, 1908

No 5.

## LYMNÆA UMBILICATA C. B. ADAMS IN CANADA.

BY BRYANT WALKER.

The history of this species has been an unfortunate one. It was originally described in 1840 from specimens collected at New Bedford, Mass. Gould in 1841 (Invert. Mass. p. 218) recognized it as a valid species. But Haldeman in 1842 (Monograph, p. 34) referred it to *L. caperata* Say. In this he was followed by W. G. Binney (L. & F. W. Shells Pt. II, p. 56, 1865) and all subsequent writers with one exception. Dr. Pilsbry in 1891 (Proc. A.N.S.P. 1891, p. 320) stated that *umblicata* was synonymous with *L. cubensis* Pfr., and "perfectly distinct" from both *L. caperata* Say and *L. humilis* Say. That this opinion is correct, I have recently had the opportunity of verifying from an inspection of one of Adams' original specimens now in the Museum of Middlebury College, Vt. (Naut. XXII, p. 7, 1908). The only Canadian citation for this species that I know of, and for this I am indebted to Dr. J. F. Whiteaves, is by D'Urban in 1860 (Can. Nat. VI, p. 97), who quotes it from near the village of Grenville in the County of Ottawa. "D'Urban was more of an entomologist than a conchologist and he expressly states that Dr. Isaac Lea named most of his fresh water gastropods" (Whiteaves). As he does not cite *L. caperata* in his list, in the absence of his actual specimens it is impossible to say whether the identification was correct or not. Dr. Dall in his recent report on Alaskan Mollusks (Harr. Exp. XIII p. 79) includes *umblicata* in the synonymy of *caperata* but expresses "strong doubts as to the validity of this species (*caperata*) which may prove entirely heterogeneous." But he does not attempt to differentiate the two forms. Nor does he state whether the local references cited from the literature refer wholly to *caperata* or not. Apparently no Canadian specimens of either form had been examined by him. In 1880, Mr. G. C. Heron (Trans. Ott. Field-Nat. Club No. 1, p. 39)

published a "List of the Shells found about Ottawa" in which he cited *L. humilis* Say and *L. caperata* Say but not *L. umbilicata*. Shortly after this he sent to me a set of the Ottawa "*humilis*."

In revising my *Lymnaeidae* recently, I found that these shells were not *humilis* but were *umbilicata*. A similar discovery in regard to several lots of "*humilis*" from Maine and its recognition from one locality in Michigan, would indicate a probable range for this form from New England westward to Michigan and northward into the St. Lawrence Valley. Its occurrence in Canada is definitely determined by Mr. Heron's specimens.

In view of the confusion which has existed in regard to these three species *L. umbilicata*, *caperata* and *humilis*, it would seem worth while to call attention to their differences, so that Canadian collectors may more readily distinguish them.

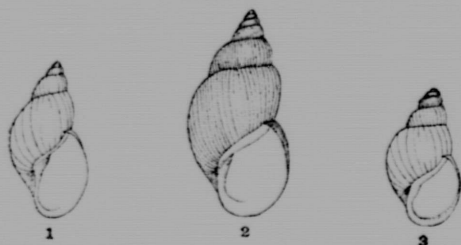


Fig. 1. *L. humilis* Say. Clinton River, Macomb Co., Mich.,  
Alt. 10, diam. 5½ mm.

Fig. 2. *L. caperata* Say. Hammond, Ind.  
Alt. 12¼, diam. 6 mm.

Fig. 3. *L. umbilicata* C. B. Ads. Ottawa, Ontario.  
Alt. 9, diam. 5 mm.

As shown by the figures, the three species differ radically in shape and considerably in size. The surface sculpture is also quite different.

*Caperata* is uniformly larger than the others and is well characterized by the elevated and revolving lines which are very conspicuous in young shells and more or less persistent in maturity and, when present, give the surface a velvety appearance.

*Humilis* is so different in shape from the others that it seems strange that any confusion should have occurred. It never has the thickened lip so common in both of the other species and its

sculpture of rather fine, but irregular growth lines, with no trace of either raised or incised spiral lines is also characteristic. The specimen figured is the usual northern form which is apparently not typical and barely, if at all, distinguishable from the *L. modicella* of Say.

*Umblicata* is about the size of *humilis* but in shape is nearer to *caperata*. It is more ventricose than that species and has one less whorl. In full matured specimens, the lip is thickened by a callous deposit, which is more or less tinged with pink. The columella is without a fold and is broadly reflected over the conspicuous umbilicus. The surface is apparently smooth and polished, but under the glass shows usually on the body-whorl some traces of the revolving, incised spiral lines mentioned by Adams and, on the apical whorls, a light, but characteristic longitudinal sculpture.

As stated elsewhere (Naut. 1. c.) *L. umblicata* seems to be a northern variety of *L. cubensis* Pfr. characterised by its more globose shape, more obtuse apex and usually shorter spire and the thickened lip. The additional material that has come under observation since that view was expressed has served to confirm the opinion and therefore, this form should be properly designated as *L. cubensis umblicata* C. B. Ads.

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#### COUNCIL MEETING.

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A meeting of the Council of the Ottawa Field-Naturalists' Club was held on June 2nd in the Carnegie Library. The following members were in attendance: The President, Mr. A. E. Attwood; Messrs. A. Halkett, A. Gibson, C. H. Young, J. M. Macoun, E. E. Lemieux, A. McNeil, L. H. Newman and T. E. Clarke; Miss Q. Jackson and Miss E. E. Currie.

The following were elected ordinary members: Dr. E. M. Walker, B.A., M.B., 99 St. George St., Toronto; Mr. T. A. Brown, Normal School, Ottawa; Mr. A. E. Meldrum, Percy St. School, Ottawa; Mr. E. C. Wight, 34 Gilmour St., Ottawa.

Some changes were made in the programme of excursions, and a discussion took place on Dr. White's proposed combined lecture course, in order that the Club's representatives might present the views of the Council at the meeting of the joint committee to be composed of representatives from different societies in Ottawa giving courses of lectures throughout the winter.

T. E. C.

## EXCURSIONS.

The sub-excursion of the Club to Beaver Meadow on May 16th, under the direction of Vice-President Halkett, proved a decided success and although the attendance was not as large as might have been expected, this did not affect the enthusiasm of those present. With the object of seeing and learning about nature everyone was keenly on the alert for any natural object from the tiniest insect to the largest fossilized rock.

After a delightful walk through the woods on the banks of the west side of the meadow, the different groups with their leaders assembled on a beautiful piece of turf near the Aylmer Road where short addresses were given about the different objects seen or collected during the afternoon.

Mr. N. Criddle being first called upon, expressed his pleasure at having the opportunity of meeting the members in the field, and in the absence of the leaders of the Ornithological Branch undertook to make a few remarks upon some of the birds observed. Special mention was made of the Baltimore Oriole, White-crowned Sparrow, Rose-breasted Grosbeak, Oven-bird, Cat-bird, Brown Creeper, and Wilson's Thrush.

Mr. T. E. Clark followed and described in general terms the characteristic flora of the places visited, and identified with brief running comments the different species collected.

The plants in full flower were, *Hepatica tribola* and *H. acutiloba*, *Trillium erectum* and *T. grandiflorum*, Dog's-tooth Violet, Bishop's Cap, Wild Ginger, Blue Gohosh, Indian Turnip and a few others. Some plants collected in bud only, were the Smaller Bellwort, Twisted Stalk, Small Solomon's Seal and Wild Columbine.

Dr. Blackader drew attention to some of the features that made Beaver Meadow the most beautiful locality from a Naturalist's point of view in the Ottawa district. He also gave a practical talk on the typical trees of the locality, many species of which could be seen from the place where the excursionists had assembled.

Across the road in the little cemetery Dr. Blackader pointed out all the local species of elm—the American, or White, the Cork, or Rock, and the Red, or Slippery.

Mr. Lemieux described in an interesting manner the things he had met with and exhibited a little red Salamander. Speaking to the younger people present he advocated the advantage of making notes on the different things discussed, thereby gaining valuable information and interesting reading for the winter months.



Mr. Halkett followed, speaking of the food of the Salamander, caught by Mr. Lemieux, and showed some land shells which it eats. He also spoke of some spiders' capsules, remarking that at the excursion held at Beechwood two weeks previously, such capsules held the eggs of spiders, but that now the young spiders had hatched out. One capsule was found to contain hymenopterous parasites.

Mr. Wilson described how the party under he and Mr. E. Wilson had examined the rocks as exposed along the west side of Beaver Meadow. The party went into a quarry where many interesting geological facts were noted. Attention was called to the dip of the beds which is clearly shown at the quarry, and the use made of the dip and strike in working out the geology of a country was also explained. The quarry is in the lower Trenton and probably near the junction of that formation with the Black River.

The following fossils collected during the afternoon have since been determined by Dr. Ami. *Pachydictya acuta*, *Orthis plicatella*, *Strophomena incurvata*, *Rhynchotrema inaequalis*, *Asaphus* sp., *Illenus* sp., several *Monticuliporidae*, *Prasopora Selwyni*, *Batostoma* sp., and other branching forms.

After a few concluding words from Mr. Halkett, the party broke up, all well pleased with their outing.

N. C.

The sub-excursion on the afternoon of Saturday the 23rd of May was held at Ironsides, and those who attended spent an enjoyable time roaming the woods in search of insects and flowers, or in observing the general phenomena of nature, and the geological character of the locality.

The following interesting notes, bearing on the geological features of the district, are by Mr. W. J. Wilson:

"Ironsides is situated on a clay terrace about 182 feet above sea level. Chelsea Station is on a similar terrace or old sea beach and is 365 feet above the same datum, so that in less than three miles there is a rise of 183 feet. Nearly forty years ago this slope was fire swept and the forest completely destroyed; then the soil, bare and unprotected, suffered most severe and rapid denudation. Wherever there were watercourses, however small, deep gullies were cut into the clays and much material was carried to lower levels. In a short time after the fire deciduous trees began to spring up and a fierce battle raged for some years between the forest and the eroding agencies. Gradually the young trees forced their roots deeper into the soil and steadily gained a firm hold till now they have the complete mastery

Erosion has largely stopped, the trees are becoming large and shady, and the decaying leaves and plants are forming humus which is constantly enriching the soil.

Good exposures of Leda clay and Saxicava sand are seen in the railway cuttings, and along the banks of the Gatineau river. Only one exposure of solid rock was noted near Ironsides. This occurs on the west bank of the Gatineau river just below Wright's Bridge, and is a rather fine grained Potsdam sandstone. On account of the clay covering, only a small surface is exposed. The part seen is evidently some distance above the base of the formation which is usually a conglomerate. This sandstone is the same as that used in the construction of the Parliament buildings, and also in the new Victoria Museum. The sandstone used in these buildings came from a quarry on lot 6, Concession II, Nepean Broken Front, where there is a considerable area of this rock. Blocks from the same quarry are used for paving parts of the streets of Ottawa."

At the addresses, which were delivered from a beautiful inclined slope, Dr. E. H. Blackader spoke of the plants, Mr. Norman Criddle on the birds, and Mr. Arthur Gibson on the insects.

The following description of the plants observed or collected is supplied in manuscript by Dr. Blackader, and in effect embodies what he said about them:—

"There is a tiny plant with very beautiful purple coloured flowers which was known to grow in this locality many years ago. It is a plant which has a fairly wide distribution, but yet rather limited to special localities. One may scour all the other localities in the neighborhood of Ottawa, that we are in the habit of visiting in our Saturday afternoon outings, and yet not find this plant. It was feared that it had become exterminated from this locality also, but this afternoon we have found that it is fairly abundant. It belongs to the Milkwort family and is known botanically as *Polygala paucifolia*. The Flowering Wintergreen seems to me to describe it very well in popular language; the other name, Fringed Polygala, is considered more scientifically appropriate.

The Lily family is well represented in this neighborhood. We have found the large Bellwort, *Uvularia grandiflora*, and its poor neighbor, the little pale-coloured Smaller Bellwort, *Oakesia sessilifolia*. Besides these we have seen the Rosy Twisted-Stalk, the Clintonia, the Indian Cucumber-root and several other representatives of this family, some of which are going to seed, and some scarcely opened into flower.

Two specimens of the Orchis family have been gathered: the Showy Orchis and the Early Coral-Root, which is rather inconspicuous and retiring in its habits.

Among the ferns gathered are the Christmas fern which is just opening out its pale green bristly fronds; the Marginal shield-fern; the delicate Beech-fern, and the graceful three-divided Oak-fern.

The Maples are represented by two species which never become trees, and are not seen in the city. They prefer the moist shady hillsides near streams. These are the Moosewood, *Acer pennsylvanicum*, which has a very large leaf for our woods, and drooping greenish racemes; and the Mountain Maple, *A. spicatum*, which has upright racemes while in flower, but they become drooping in fruit."

Following, Mr. Criddle spoke on the birds observed, which included the Black-billed Cuckoo, pointing out that this species is chiefly distinguishable from the Yellow-billed Cuckoo, both of which are found in Eastern Canada, by the colour of the bill, as their names imply; and that both build nests and rear their young, thus differing from the Old World species which lay their eggs in the nests of other birds\*; the Ruby-throated Hummingbird; the Phoebe, whose plaintive cry was heard; the Rose-breasted Grosbeak, mentioning that the male bird is of a brilliant black and white with a rose coloured breast, whilst the female is dull coloured and is therefore protected as she sits on her nest unseen by enemies; the Red-eyed Vireo; the Black-and-White Warbler; the Yellow Warbler; the Oven-bird, commenting on

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\*Whilst it is true, as Mr. Criddle says, that our two species of Cuckoo build nests and rear their young, still there are cases on record where they have followed the habit of their congener, the European Cuckoo, *Cuculus canorus*, and our own Cow-bird, *Molothrus ater*, by laying their eggs in the nests of other birds; such as in those of the robin, cat-bird, mourning-dove, and others. Furthermore, the black-billed cuckoo sometimes lays eggs in the nest of the yellow-billed cuckoo and *vice versa*. There seems indeed to be an erratic trait in the whole group of the cuckoos which number some two hundred species of wide distribution, in the manner of their domestic proclivities. The nests of some are rudely built, whilst others are of slender structure; and a nest may contain at the same time eggs in various stages of incubation and hatched out young ones. Owing to such irregular oviposition, it may not be wondered at that the instinct of the bird might lead her sometimes to drop an egg in the nest of some other bird, as by so doing a purpose may be served to the young bird in being reared in a nest where the depositing of the full complement of eggs is attended by the regularity usual among birds. An interesting instance of the domestic deviations of the cuckoo is that of the Ani, *Crotophaga ani*, a bird of South America and the West Indies. It is said that a number of those birds form a community among themselves and construct a huge nest in which the females in common lay their eggs, which number as many as fourteen or more. Altogether the cuckoos as a group appear to be very erratic and eccentric in their manners of nest-building or non-nest-building, as well as in their habits of depositing their eggs, or in attending to the wants of their young.

its curious mouse-like shaped nest, and mentioning that although this nest is difficult to find yet it was often discovered by the female cow-bird, and used as a means for the rearing of her young at the expense of the rightful tenants; the Redstart; the Wood Thrush, and Wilson's Thrush.

In speaking of the insects, Mr. Gibson mentioned the interest now taken in Mosquitoes owing to the important part they play in the spread of malaria, yellow fever, and other diseases. He spoke of some of the early butterflies, which had been noticed for the first time, namely, the Large Yellow Tiger Swallow-Tail; the Clouded Sulphur; the Northern Dusky-Wing, and the Spring-blue. Bumble-bees, he also said, were particularly abundant, remarking that in the spring of 1907 there were very few specimens, on account of the severe open winter of 1906-7, which killed them. Bumble-bees are very valuable insects on account of the good work they do in fertilizing red clover. He showed specimens of the cocoons of the Hickory Halisidota Tussock-Moth. These insects were enormously abundant in August and September of last year, and much anxiety was caused in Eastern Canada by the caterpillars attacking fruit and other trees. Other insects collected during the afternoon were exhibited by Mr. Gibson, and questions were answered in regard to them.

An interesting find of the afternoon was a specimen of the Grass Snake, a species which is not over common in the vicinity of Ottawa.

A. H.

### BIRD MIGRATION, 1907.

OBSERVATIONS MADE ON SABLE ISLAND, NOVA SCOTIA.  
BY JAMES BOUTEILLER.

NAME OF SPECIES.	WHEN FIRST		NUMBER
	SEEN	SEEN	
Redpoll.....	Jan.	20.....	One.
Nuthatch.....	"	20.....	"
Saw-whet Owl.....	Feb.	21.....	"
American Robin.....	March	1.....	"
American Crow.....	"	24.....	"
Slate-coloured Junco.....	April	1.....	Several.
White-throated Sparrow.....	"	1.....	"
Canada Goose.....	"	8.....	Two.
American Robins.....	"	11.....	Several.
Belted Kingfisher.....	"	14.....	One.
Fox Sparrow.....	"	14.....	Several.
Terns.....	"	26.....	A few.
Greater Yellowlegs.....	"	28.....	One.

Night-hawk.....	May	1.....	One
Piping Plover.....	"	7.....	"
Crow.....	"	12.....	Three
Swallow.....	"	12.....	One.
Red Phalarope.....	"	13.....	In flocks.
Northern Phalarope.....	"	13.....	One.
Least Bittern.....	"	13.....	"
Roseate Tern.....	"	16.....	"
White Crowned Sparrow.....	"	13.....	"
Pine Warbler.....	"	16.....	"
Least Semipalmated Sandpiper.....	"	19.....	Three.
Curlew.....	June	10.....	One.
Kingbird.....	July	9.....	"
Squa Gulls.....	"	18.....	Several.
White Rumped Sandpiper.....	"	28.....	About 50
Yellowleg.....	"	30.....	One.
Black-bellied Plover.....	Aug.	12.....	Two.
Rail.....	"	14.....	One.
Pectoral Sandpiper.....	Sept.	7.....	"
Connecticut Warbler.....	"	15.....	"
American Pipit.....	"	18.....	About 2 dz.
Canada Goose.....	"	18.....	About 1 dz.
American Osprey.....	"	26.....	One.
White Throated Sparrow.....	"	26.....	"
Mourning Dove.....	"	26.....	"
Black Throated Blue Warbler.....	"	28.....	"
Black and White Warbler.....	"	28.....	"
Bronze Grackle.....	"	29.....	Two.
Yellow Palm Warbler.....	Oct.	3.....	In numbers
House Sparrow.....	"	6.....	One.
Fox Sparrow.....	"	15.....	Two.
House Wren.....	"	17.....	One.
Slate Coloured Junco.....	"	17.....	"
Golden Crested Wren.....	"	18.....	Two.
Red Throated Loon.....	"	19.....	One.
Vesper Sparrow.....	"	21.....	"
American Robin.....	"	24.....	In numbrs.
White Throated Sparrow.....	"	24.....	In numbrs.
Hermit Thrush.....	"	24.....	A few.
Yellow-billed Cuckoo.....	"	26.....	One.
American Bittern.....	"	27.....	"
Snow Bunting.....	"	27.....	In numbrs.
Hermit Thrush.....	Nov.	1.....	Several.
Nuthatch.....	"	1.....	Several.
Scaup Duck.....	"	1.....	Several.
Long-tailed Duck.....	"	1.....	About 50.
Northern Shrike.....	"	16.....	One.

ENTOMOLOGICAL NOTES FROM CENTRAL NEW  
BRUNSWICK.

BY WM. H. MOORE, SCOTCH LAKE, N.B.

The following notes were jotted down during the seasons of 1901 and 1907.

April 4th, a species of *Grapta*, probably *faunus*, was observed on the house.

April 11th, two *Vanessa antiopa*, one *V. milbertii*.

April 12th, *Grapta j.-album*: Graptas were common.

April 18th, one *V. milbertii*. Very few examples of this species are seen here.

May 6th, *Lycæna marginata*, common by 9th.

May 14th, *Pieris napi*, rather rare here now.

May 21st, *Thecla augustus*; very scarce here.

May 23rd, *Papilio turnus*; last seen July 19th.

May 24th, *P. asterias*. Full grown larvæ were found on carraway July 12th. Very small larvæ were noticed on carrots July 26th. A full grown larva taken July 26th was sluggish the next day and pupated on 28th. The chrysalis was a beautiful shade of light green with the protuberances on the back yellow. On August 8th the colour was decidedly darker and before noon a male butterfly emerged.

August 6th, a caterpillar of *P. asterias* was found hung up in a crevice of a barn; the following day it had changed to a chrysalis, which was much darker in colour than the first one mentioned.

Many imagoes of *P. asterias* were seen from August 4th to 8th, changing to chrysalis form. A period of thirteen days elapsed from full grown larva to imago; but some individuals winter in the chrysalis stage. A female when laying her eggs hovers over a leaf and with curved abdomen places the egg upon the under side of the leaf.

May 26th, *Pieris napi* and *P. rapæ* and *Papilio turnus* seen.

June 4th, *Thanaos icelus*.

June 5th, *Brenthis myrina* first seen. *P. turnus* and *Pieris rapæ* very plentiful.

June 11th, *Lycæna lucia*, *Phyciodes tharos*, *Eudamus pylades* and *Thorybes hobomok*.

June 15th, *Chrysophanus hypophlæas*, *Basilarchia disippus*.

June 13th, *Anosia plexippus* taken on choke-cherry bloom, another seen the next day. One secured August 8th was newly hatched. August 16th, a chrysalis of this species was found

hanging in grass near some milkweeds. August 28th, a full-grown larva was secured.

June 16th, *Basilarchia arthemis* first seen, became plentiful but by July 16th was about over. On September 10th, a remarkably late date, the last one of the season was seen.

June 26th, *Argynnis atlantis*, abundant.

June 27th, *Pyrameis cardui*, a very rare butterfly here. *Phyciodes marcia*, *Thanaos icelus*, *Eudamus pylades*, and *Colias interior*, and some unidentified skippers are noticed.

July 10th, *Satyrodes canthus* and *Satyrus alope* are added to the list.

July 18th, a very rare species is added, it being *Thecla acadica*. Only two examples of this species have been seen here before.

August 7th, *Feniseca tarquinius*, first found, but in May and June, 1907, they were abundant.

August 22nd, *Basilarchia hultii* was taken. This is the only example of this species ever seen here. It differs from *disippus* in having white spots on the hind wings.

Two specimens of *Debis portlandia* have been caught in this section. *Grapta progne* and *G. gracilis* have also been taken. *Melitæa harrisii* was secured July 16th, 1907.

July 24th, 1906, while watching skaters on a brook, one was observed to leap upon a small green bug commonly known as a spit grass-hopper or frog-hopper. The bug was drawn beneath the body of the skater, which evidently began to suck its juices. The current was carrying the skater down stream so it began moving toward a tuft of grass, upon a blade of which it obtained a resting place. In the meantime other skaters had scented the bug and were circling about the captor evidently in search of some slight repast. A couple of weeks later Mrs. Moore was near the brook at this same place and heard a buzzing among some grass and brush. Investigation proved the sound to be produced by a very large dragon-fly that was engaged in mortal combat with a large hornet. The hornet was frightened away from its antagonist yet it did not go far away, and within a minute returned to the fray. All the while the dragon-fly kept up its buzzing, evidently to frighten its enemy. The hornet was not to be cowed by a noise, and again attacked the dragon-fly, worrying it from the under side, apparently trying to cut off its legs. It had succeeded in amputating one leg when the fight was stopped and the dragon-fly secured as it was of a species not in our collection. Had the hornet succeeded in its endeavors it would have been master of the situation, as it is with its legs the dragon-fly embraces its prey, while it bites it.

While taking a half-mile walk, one Sunday afternoon in August, along a road bordered with alders, and leading through a swamp, numbers of reddish dragon-flies were seen. Two pairs were secured, the males were cardinal, with chocolate coloured heads and black side markings upon each segment of the body. The females had greenish faces. One was light-brown with blackish markings, while the other was red and black, yet not so bright red as the males. When caught both females voided eggs which were transparent, round, and of a yellowish shade.

Several species of damsel and dragon-flies are found along the afore-mentioned brook and road. They are coloured in different shades of grey, blue, green, yellow, red, white and black.

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#### BOTANICAL BRANCH.

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On the evening of May 7th, a regular meeting of the Botanical Branch was held at the home of Mr. Geo. H. Clark, Seed Commissioner, Ottawa. There was a large attendance and a most interesting discussion took place upon the following topics:—

(1) Process of making water colour drawings—by Norman Criddle.

(2) Group and family characteristics of seeds and their import in the identification of plants—by W. Bond, Seed Branch, Ottawa.

(3) Conditions unfavorable to the resumption of growth by the dormant embryo—by G. H. Clark, B.S.A., Seed Commissioner, Ottawa.

Mr. Norman Criddle, Aweme, Man., who has done such excellent work in preparing the illustrations for the book on "Farm Weeds" recently published by the Seed Branch of the Department of Agriculture, outlined his methods of procedure in the production of his paintings. Mr. Criddle explained that whatever measure of success he had enjoyed was due to the early encouragement he had received. This explanation, however, was not considered sufficient in itself to account for the marked ability shown by the artist. It was discovered later that Mr. Criddle showed special talents in this direction when a mere child. The ability to reproduce exactly what one sees in the minutest detail, is a rare gift and one possessed by Mr. Criddle to a high degree.

Mr. Bond, Assistant in the Seed Laboratory, described the methods followed by the Seed Branch in identifying weed seeds. The speaker explained the difficulty that was met



with owing to the absence of any definite method of classification similar to that relied upon when the flower is available for identification purposes. While this fact necessitated the use of a large reference collection of correctly named seeds taken from authentic samples, yet many families of plants were found to produce seeds of a certain type common to the family to which they belong and which were therefore easily placed in the proper family. As instances of this, the characteristics of the seeds of the following families were submitted:—

RANUNCULACEAE. (Crowfoot Family).

Genera having achenes. Achenes flat, irregularly oval in shape with pointed base. Persistent style of varying length, attached.

PAPAVERACEAE. (Poppy Family).

Seeds kidney shaped with raised reticulated surfaces. Seeds of several genera crested.

CRUCIFERAE. (Mustard Family).

Seeds generally with depression along each side of the radicle causing it to project prominently. Hilum white. Acrid taste. Pericarp often finely pitted.

CARYOPHYLLACEAE. (Pink Family).

Seeds kidney shaped with characteristic tubercles or warts generally arranged in parallel rows or concentric rings.

MALVACEAE. (Mallow Family).

Seeds kidney shaped, resting sides flattened or compressed.

LEGUMINOSAE. (Pulse Family).

Seeds with hard pericarp. In many genera the radicle projects prominently; others are globular with a long characteristic hilum.

UMBELLIFERAE. (Parsley Family).

Carpels usually with five prominent ribs, ventral surface flattened. Many produce aromatic odour from essential oil.

COMPOSITAE. (Composite Family).

Achenes oblong and stick-like, often having ribs running longitudinally. When the pappus is detached a conspicuous crown or impression remains.

LABIATAE. (Mint Family).

Achenes mostly attached at the base, leaving characteristic depressions. Many genera show two flattened sides through pressure in ovary. Somewhat resemble small insects.

PLANTAGINACEAE. (Plantain Family).

Seeds boat-shaped with rounded ends. Dorsal surface convex, ventral showing a deep groove with an oblong spot resembling an eye.

POLYGONACEAE. (Buckwheat Family).

Achenes usually sharply triangular, an occasional genus

lenticular with pointed end. Generally highly glazed.

GRAMINEAE. (Grass Family).

Grain or caryopsis has small embryo placed at the base of the grain. Wheat grain is typical of the grain of many genera with palets removed. Some genera have highly glazed palets closely adhering to the caryopsis.

From the above it will be seen that the seeds of some families at least have certain characters peculiar to them which aid materially in their identification.

The identification of the species is a much more difficult matter and generally speaking requires long experience in order to become at all proficient in this connection. In the species of the genus Brassica for instance, it was pointed out that it is necessary to plant the seed of doubtful samples and produce the first foliage leaves at least in order to be sure of their identity. Within recent years that part of the study of botany which has to do with the seed has been largely overlooked although a most interesting field of work is offered in this connection.

Mr. G. H. Clark next presented the following paper:—

CONDITIONS UNFAVORABLE TO THE RESUMPTION OF GROWTH  
BY THE DORMANT EMBRYO IN SEEDS.

True germination in seed producing plants takes place when the oospore germinates after fertilization within the ovule has been secured, which process of fertilization produces the oospore. The succeeding generation then commences in the development of the embryo, which, when ready to separate itself from the mother plant, is surrounded by, attached to, or contains within its cells a supply of nutriment necessary to its further growth. The seed is then said to be ripe, and the embryo plant may then be said to be ready to enter upon a period of rest. It is well known that with many kinds of seeds a rest period is enforced, which may be taken as one of nature's methods of providing for the perpetration of the species. Experiments conducted in the seed laboratory with many kinds of cultivated plants and with weed seeds make clear that this preservation of life, or delayed germination, varies considerably, even with fully ripened seeds taken from the same plant.

*Conditions that are unfavorable to germination.*

(a). Maturity of embryo. Although the seed may be said to be ripe when it has naturally separated itself from the mother plant, the embryo is not necessarily fully matured in the apparently ripe seed until such time as it may be able to commence with the process of secreting enzymes, which are necessary to the digestion of the food stored by it for the purpose of its nutri-

ment when growth is resumed. It is stated or suggested by some botanists of repute that this so-called non-maturity of the embryo in sound and apparently ripe seeds is the cause of delayed germination of most seeds that seem to require a rest period. Some recent work by Crocker, however, would seem to disprove this theory with many, but not all, kinds of seeds. The hawthorn, for instance, will germinate very sparingly during the first two years, even though ideal conditions for growth be provided, by artificial or other means.

(b). Water content. The ideal condition for preserving life and vital energy within the embryo of most seeds is storage in a relatively cool, dry place. Even under the best conditions of storage, seeds gradually part with their moisture content. The rapidity with which this takes place is believed to be due largely to the condition of the seed coat. If the seed coat be such as to hermetically seal the embryo with its food supply, then life is preserved, under proper conditions of storage, for a longer period.

Germination of the seed or resumption of growth on the part of the embryo can not take place unless the embryo is able to secure a sufficient supply of water, even though the embryo may be fully matured and ready to commence growth. Crocker found that in most kinds of seeds, such as are to be found among the cruciferae, borraginaceae, the plantains, the iris, and many species of water plants, that the embryo and its store of food was so completely sealed in a seed coat, impervious to water, that germination could not take place. He conducted extensive experiments with seeds of various kinds of plants by germinating them at different temperatures, with some of which seeds he artificially striated, or clipped the seed-coat, in a way not to injure the embryo, and compared the germination with seeds of the same kind on which the seed coat remained intact. With very few exceptions he found that the artificial clipping of freshly-ripened seeds (by which process of clipping he enabled the water to reach the embryo) induced prompt growth, whereas those with seed coats not clipped failed to germinate or germinated very sparingly; further, that the various kinds of seeds differ in respect to the temperature best suited to the resumption of rapid growth on the part of the embryo. It was found that with some of the seeds that were not entirely impervious to water but in which inhibition took place slowly, that the embryo swelled and filled the cavity occupied by it, and yet growth did not commence. As soon, however, as the "plug", or that small portion of the seed coat of some species of seeds (iris) which is contiguous to the embryo, was removed, artificial growth at once commenced. Crocker's work entirely

bears out the result of tests conducted in our seed laboratory with fresh seeds of cucurbits, radish and other cruciferous seeds and such kinds as are known to have a relatively hard seed coat, as clover seeds and others. Samples of red clover and alsike seeds that are sent in for test in the fall of the year, directly after they are harvested, are expected as a rule to give a low percentage of germination and a high percentage of seeds that remain sound and hard. Ordinary storage for a period of six months apparently breaks down the natural condition of the seedcoat of clover seeds which renders them difficultly pervious to water. One sample of red clover seed, produced in the province of Manitoba, when submitted to the usual germination test, showed only 17% of growth during the first month and less than 50% at the end of three months. From the original sample 50 grains were taken and artificially clipped (without injuring the embryo,) in order to secure the admission of water. From these 50 seeds made pervious to water by artificial means, 50 plants were promptly produced, when submitted to the ordinary methods of germination.

The question of how this difficulty may be overcome with commercial seeds has apparently occupied the attention of expert seedsmen and brewers. It is well known that these freshly ripened seeds are entirely satisfactory in respect to their germination after they have had a rest period of six months or a year. Radish seeds, for instance, are known to be more satisfactory, from the seedsman's standpoint, when they are fully one year old. It is known that some skilled seedsmen are able, within a few hours, by treating their supplies of cruciferous seeds (and other seeds which, when fresh, show delayed germination) to secure as satisfactory results as by keeping them over in storage for a year; and it is believed to be a quite common practice on the part of some seedsmen to kiln dry their fresh stocks of such seeds for a few hours, at a temperature that is not dangerous to their vitality. That is done also by brewers with some lots of barley of mixed varieties, for the purpose of reducing the barley to a uniform rapidity of germination."

---

L. H. N.

Mr. Norman Criddle, who has been in Ottawa for the last three months, left on the 5th August for his home at Aweme, Man. Mr. Criddle has been a member of the Club for many years, and during his stay he attended most of the spring excursions and did much to make them a success.

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