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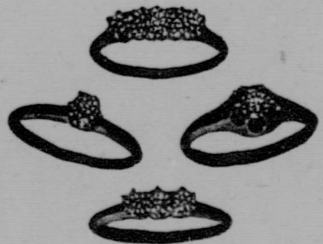
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W. A. Parks, del.

PERIGLYPTOCRINUS PRISCUS *Billings* sp.
Viewed in the direction of the left
postero-lateral ray.

THE OTTAWA NATURALIST

VOL. XXIII. OTTAWA, DECEMBER, 1909 No. 9

NOTE ON THE ORNAMENTATION OF PERIGLYPTO- CRINUS PRISCUS.

BY WILLIAM A. PARKS, PH.D., ASSOCIATE PROFESSOR OF
GEOLOGY, UNIVERSITY OF TORONTO.

WITH ONE PLATE, NO. III.

This beautiful species was described by Billings in Decade IV of Canadian Organic Remains as *Glyptocrinus priscus*. Wachsmuth and Springer in their classical work "The Crinoidea Camerata of North America," establish a new genus, *Periglyptocrinus*, for the reception of those forms, otherwise like *Glyptocrinus*, but in which the arms are biserial instead of uniserial as in all members of the latter genus: the present species evidently belongs to the new genus.

Billings' description, while quite accurate except for the statement that the plates of the cup are smooth, does not enter into the detail necessary for the identification of species of *Glyptocrinus* and its allies. The original figures also are small, indistinct and destitute of the beautiful ornamentation characteristic of the species.

The description given by Wachsmuth and Springer* is couched in the terminology adopted by those authors and is quite adequate for the identification of the species: the profuse ornamentation is however not mentioned nor does it appear in the single figure which accompanies the text. The reason for this omission lies in the fact that the type specimen from which both Billings and Wachsmuth and Springer derived their figures is a young and undeveloped example. The fortunate discovery of two larger and more mature forms, which I cannot but believe belong to this species, justifies some further remarks, particularly with regard to the ornamentation of the plates of the cup.

Judging from the figures of both authors, the size of the type specimen is about 13 mm. from the base to the point of

*The Crinoidea Camerata of North America p. 278

contact of the first pinnules of adjoining arms, and about the same distance measured transversely at the point of origin* of these pinnules. The larger of my specimens measures 30 mm. and 15 mm. in these two directions respectively. It is therefore apparent that the mature cup is more elongate than the undeveloped form.

In these specimens, the arrangement of the plates, the character of the posterior interray, the peculiar manner of origin of the first and second pinnulæ and the biserial arms with their three-jointed plumes conform exactly to the description given by the authors cited. A further account of the anatomy of the form is therefore quite unnecessary.

With regard to the ornamentation, Billings states that "A strong, rounded carina, or ridge, runs up each of the primary rays, and, dividing into two on the centre of the third plate, sends a branch up each of the secondary rays to the base of the fingers; the carinæ are also divided on each of the basal plates, and coalesce into one on the centres of the first primary radial plates; in the azygos interradius a sixth rib ascends to the top of the cup, dividing the space into two parts about equal; it bifurcates below on the centre of the large azygos, one branch proceeding to the centre of the two contiguous first primary radial plates." Billings further states that, with the exception of these carinæ, the plates are smooth. The description given of the ornamentation by Wachsmuth and Springer is as follows: "A small species. Dorsal cup obconical with slightly convex sides; section across the costals sharply pentagonal, owing to the conspicuous radial ridges, which pass from the arms down to the centre of the radials, where they divide and are continued to the basals. The ridges, which are rounded, grow narrower towards the middle of the plates, widening at their margins. Surface, except along the ridges, covered with numerous small pustules without definite arrangement."

All the above features are exhibited by the present specimens, but in addition, each plate of the cup, with the exception of a few of the higher brachials and interbrachials, is provided with prominent ridges radiating from the centre to the sides of the plate, where each is continuous with the corresponding ridge of the adjoining plate. In the case of the basals, the radials, the first brachials and the first interbrachials, these ridges coalesce at the centres of the plates, are remarkably lineal in character and are continuous across the sutures: higher up they become more and more petaloid in character. On the outer sides of the main carinæ, where they pass from the radials to the basals after bifurcation, lie secondary parallel ridges, which do not, however, reach the centres of the plates. Somewhat irregularly similar

secondary ridges appear across the sutures between adjacent radials and also between the radials and the first interbranchials. The parts of the plates, not occupied by the radial carinæ or the above-mentioned ridges, are covered by a delicate granulation. The prominence of these ornamental elevations and their unusually lineal character give the impression of a polygon surrounding each radial, with its angles connected to the centre of that plate like the spokes of a wheel. Less pronounced polygons also appear around each plate of the third cirlet, but higher up the cup, this impression is lost on account of the increasing irregularity of the plates and the more pronounced petaloid character of the ridges.

The beauty of the organism is further increased by the peculiar manner of origin of the first and second pinnulæ. The radial plates bifurcate on the second primibrach (primaxil, second costal) and a row of non-stellate but granulated plates lies between the two divisions of the ray. The prominent carinæ are continued up the secundibrachs (distichals) into the arms. From each of the second secundibrachs, lateral branches of the carinæ pass outwards and upwards into the notch between the arms of contiguous rays. Wachsmuth and Springer interpret these lateral extensions of the carinæ as pinnulæ: they appear however to be an integral part of the plates over which they pass and may be considered as the carinæ of tertibrachs (palmars), the continuation of which into arms has not been completed. This explanation seems reasonable in view of the fact that twenty is the normal number of arms in the *Glyptocrinidæ*. Following Wachsmuth and Springer, however, the third secundibrach (distichal) is without a plume, but from the fourth, a strong pinnule passes inwards and upwards to become confluent with its mate in the depression between the two arms of the same ray. It is this peculiar arrangement of the lower pinnulæ which induces me to believe that my specimens belong to Billings' species. Were it not for this agreement in a unique feature, the difference in ornamentation and in the general shape of the cup might be considered sufficient ground for the establishment of a new species.

Periglyptocrinus priscus, as emended above, is a fairly large and unmistakable species and is the most beautiful form among the many Crinoids from the Trenton Formation in Ontario.

Horizon—Trenton.

Location—Balsam Lake, Ontario.

Collector—Mr. Joseph Townsend.

Specimen Number—649 T. University of Toronto Museum.

THE SHARP-SHINNED HAWK MIGRATION.

BY W. E. SAUNDERS, LONDON, ONT.

Point Pelee is a place of surprises. One never knows what to expect, but can always feel sure that there will be something doing in the bird line, and frequently that something is of unexpected and absorbing interest.

My visit of September 18th, 19th and 20th happened to be just the very time to see the celebrated Sharp-shinned Hawk migration from its inception, and thereby to realize more easily the effect it has on other bird life. When we arrived on the 17th, we were told that the hawk flight was not "on" and on the next morning, we found that this was quite true. There were, of course, a few hawks drifting down from the north and crossing the lake, as there always are in fall but there were not a very great many, while on the other hand there were large numbers of small birds. We recorded, that day, 68 species of birds, of which four were hawks, and among these were 100 Sharp-shins, which always comprise the bulk of the early flight. Other birds were there in numbers; for instance, we recorded 300 Waxwings, 150 White-throated Sparrows, 100 Ruby-crowned Kinglets, 80 Flickers and 50 Olive-backed Thrushes.

The wind, that night, was strong from the west and the temperature rather high. The next morning, we found the hawks very much augmented in numbers, recording six species, in the following numbers, 250 Sharp-shins, 10 Marsh, 10 Cooper's, 2 Pigeon, 1 Duck, and 1 Osprey. The results of the presence of so many Sharp-shins was strikingly visible among the small birds, reminding us forcibly of the old automobile joke, which stated that the quick were those that got out of the way of the automobile, and the dead were those that did not. Some of the birds were apparently wise and got out of the way.

Although the Ruby-crowned migration was just beginning, we saw none after the first day. The White-throated Sparrows dropped from 150 to 20, and the Olive-backed Thrush, which divides with the Cuckoo the doubtful honor of being the favorite food of the Sharp-shinned Hawk, also dropped to 20, and there was a similar diminution in the numbers of almost every species, while the total number of species observed, which was 68 on the first day, was 31 on the second day.

On the third day the conditions became extreme. I was in the observatory from 6 until nearly 10. The Hawk flight began about 6.15 and was unabated when I left. The rate of flight can be imagined by the fact, that when I undertook to count 100 passing me, the task occupied only eleven minutes. A few of

these were returning, probably one dozen out of 100, this would leave 75 which crossed the lake in 11 minutes, which is at the rate of about 400 per hour. They did not fly in these numbers at all times of the morning, but so far as we were able to judge, the flight continued all day and we recorded 900 Sharp-shinned Hawks, 50 Marsh Hawks, 10 Cooper's Hawks, 3 Duck Hawks, and 1 Fish Hawk. The total number of species seen besides these 6 Hawks was only 13, and of small birds that might be considered legitimate prey for the hawk, we saw only 50 specimens divided among eight species, so it will be seen that almost every species vanished completely. The supposition is that birds which lived in the upper branches were all eaten, but the fact that we kicked out of the bushes occasional White-throat, etc., goes to show that ground-loving and shrub-loving birds concealed themselves with tolerable efficacy. A pair of wrens scolded me from a clump of juniper, but would not leave their shelter, although I was within 5 or 6 feet of them. Two or three White-throats, which flew out of another juniper clump at my approach, immediately concealed themselves elsewhere and when, after watching them for a little while, I moved again, another one jumped out of the clump within 5 feet of me.

It is hard to say just where these hawks passed the night, but certainly as they went down in the morning, they looked hungry: all of them apparently were hunting for breakfast, and it was not until nearly 10, that a few of them appeared with a visible crop, showing that they had fed. They stooped at one another often and occasionally one would be seen in hot pursuit of some small bird, but in every case the latter escaped. Many of the hawks came through the woods and down the trail at a distance of only a few feet from the ground, hoping no doubt to surprise their prey.

In the few hawks taken, we identified the remains of the Wood Pewee, White-throated Sparrow and Olive-backed Thrush. Nearly all of the feathered clusters seen on the ground, where the meal had taken place, consisted of the remains of the Thrush.

Even mid-winter showed no such lack of birds, as these two hawk-ridden days. The flight had been delayed beyond its usual time and doubtless this contributed to a congestion of hawks, and the fact that such a large percentage of them crossed the water at once, leads one to suppose that their domination will be short this year. Certainly they will not stay where food is not reasonably plentiful, when by crossing the lake and spreading over the country they will be able to get their meals with much greater regularity than by staying on Point Pelee.

At one time I chanced to be watching a hawk, which was about 200 yards away, when, apparently sighting a small bird in

a bush within 25 feet of where I stood, he set his wings and dived with great rapidity almost straight for me. When he came within 50 yards, his feet, which had been kept close up, were brought forward and extended all ready for business, but just before he reached the bush they were partially withdrawn and the little bird, which had moved, escaped.

It seemed strange to move around through the cedars and deciduous woods at Point Pelee and have no birds within sight, except hawks. Some species had apparently learned their lesson especially well, as for instance, the Carolina Wren and the Cardinal, both of which are common throughout the year at Point Pelee. Of the former, two of us recorded four specimens on the first day, but the latter was not observed at all, although it must have been there in considerable numbers.

It was decidedly interesting to watch the few Pigeon Hawks which were noted, their graceful swallow-like flight contrasting strongly with the alternate flapping and sailing of the Sharp-shinned. One of the former which we saw flying along with the others, surpassed them considerably in speed and was apparently playing with them as he came, darting first at one and then another, but only in play, as his food consisted of smaller species, which are doubtless more pleasing to his palate. On several occasions I, as well as others, have seen this bird chase its prey over the water, and on this trip Mr. Norman Wood, of Ann Arbor, noted the same thing occurring at the end of the Point. Later in the day I saw a Pigeon Hawk come in from the lake on the east side. I watched him as he crossed the field and lit on one of the upper dead limbs of a big tree, which was fully one-quarter of a mile away. After marking the spot carefully I made a circuit and on arriving, found him eating a bird, which doubtless he had caught over the water. He paid little attention to me and I was readily able to come within range behind some trees and secure him. Soon after I had located his perch and started to hunt him, I saw another specimen returning from the lake, but was unable to see where it went to. These occurrences lend colour to the idea that it is customary with this species to take its prey over the water when opportunity favours this course.

The following is the full list of birds noted on the three days of the trip:—

September.....	18th	19th	20th
Olive-backed Thrush.....	50	20	4
Wilson's Thrush.....	2	1	....
Ruby-crowned Kinglet.....	100	....	....
Red-breasted Nuthatch.....	6	....	....

White-breasted Nuthatch.....	2	1	....
Winter Wren.....	8	4	....
House Wren.....	20	12	2
Carolina Wren.....	4	....	....
Thrasher.....	15	5	....
Catbird.....	5	1	....
Pipit.....	1	....	....
Redstart.....	35	....	....
Oven-bird.....	4	....	....
Black-throated Blue Warbler...	2	....	....
Black-poll Warbler.....	10	....	....
Chestnut-sided Warbler.....	3	....	....
Magnolia Warbler.....	5	....	....
Cape May Warbler.....	2	....	....
Nashville Warbler.....	1	....	....
Black and White Warbler.....	1	....	....
Blue-headed Vireo.....	1	....	....
Red-eyed Vireo.....	1	....	....
Migrant Shrike.....	2	....	....
Cedar Bird.....	300	3	4
Eave Swallow.....	1	....	....
Red-breasted Grosbeak.....	1	....	....
Towhee.....	1	....	....
Lincoln's Sparrow.....	1	....	....
Song Sparrow.....	5	3	....
Junco.....	5	....	....
Chipping Sparrow.....	10	10	....
White-throated Sparrow.....	150	20	4
Vesper Sparrow.....	2	1	....
Gold Finch.....	8	30	30
Bronzed Grackle.....	20	....	....
Red-winged Blackbird.....	300	....	2,000
Cow-bird.....	300	....	....
Bobolink.....	200	....	....
Crow.....	20	15	25
Least Flycatcher.....	2	....	....
Wood Pewee.....	4	1	....
Humming Bird.....	20	5	....
Swift.....	4	....	2
Whip-poor-will.....	3	....	....
Flicker.....	80	10	3
Downy Woodpecker.....	1	1	....
King Fisher.....	2	2	1
Sharp-shinned Hawk.....	100	250	900
Sparrow Hawk.....	1	....	....
Pigeon Hawk.....	....	2	4

Marsh Hawk.....	8	10	50
Duck Hawk.....	1	3	
Fish Hawk.....	1		
Red-tailed Hawk.....	1		
Cooper's Hawk.....	8	10	10
Dove.....		1	1
Bald Eagle.....			1
Semipalmated Plover.....	1	1	1
Spotted Sandpiper.....	1		
Sanderling.....	2	1	
Semipalmated Sandpiper.....	1		
Least Sandpiper.....	1		
Snipe.....	1		
King Rail.....	1	1	
Bittern.....			1
Least Bittern.....	1		
Great Blue Heron.....	2	2	3
Wood Duck.....	30		
Blue-winged Teal.....	35		
Green-winged Teal.....	5		
Black Duck.....		15	
Herring Gull.....	100	100	50
Ring-billed Gull.....	400	100	50
Bonaparte's Gull.....	1		
Coot.....	1		
Florida Gallinule.....	8		

RARE BIRDS AT POINT PELEE.

By W. E. SAUNDERS, LONDON, ONT.

The visit of the enthusiasts to Point Pelee, beginning October 1st, proved no exception to the rule that the Point always has something of extraordinary interest for the bird man.

This time we discovered Henslow's Sparrow in migration and it certainly gave one a feeling of satisfaction to go to a certain field selected because of its fitness, for this sparrow at this time, and then after a short time, to find and secure it. We got altogether three, and those who are acquainted with this bird in its autumn plumage, will realize its beauty. The species of the genus *Ammodramus*, perhaps without exception, make it a rule to spend the winter in their highest plumage, and when they reach the breeding grounds in spring, not having molted since the previous autumn, they are in worn plumage, so that the autumn and mid-winter specimens which I have taken of

Henslow's, Sharp-tailed and Grasshopper, are the highest plumaged specimens that I have.

I would not like to injure the reputation of the members of the camp as wing shots by stating that we fired many times to get these three Henslow's, but certainly we used more than three cartridges. I think they are the most difficult shooting that I know. Getting up at one's feet with an exceptionally jerky flight, they travel, perhaps 20, perhaps 100 yards, before dropping into the grass, but there is no moment of that exposure that they are not difficult to hit. The novice in wing shooting got two in two shots, the rest of us got one in all the rest of the shots, which were a good many.

One of the rarest hawks in our collections is the Duck Hawk. Sometimes at the Point we have the pleasure of seeing one of these perhaps the best flyers of all the North American Falconidae, but we have never taken one at the Point. On Sunday morning I was early at the observatory tower and was delighted to see within 100 yards, on top of the life saving building, a Duck Hawk in young plumage. There he sat and waited. Within 30 yards of me came a bright plumaged Cape May Warbler, into a red cedar, so when the next man arrived I had the pleasure of offering him, for choice of seeing, first the Cape May Warbler and then the Duck Hawk; he naturally chose the Hawk, and I promptly produced it and then followed the Warbler. When Taverner arrived, he announced that he was going to photograph the Hawk, and left for that purpose. We arranged a code of signals by which we could inform him if the Hawk was becoming nervous and likely to fly, but we had no opportunity of using them, and on the photographer's return, his remark was, "Well, some hawks are the limit." It turned out that he had been able to walk in full view, as close to the hawk as the slope of the roof would allow, perhaps 20 yards, and there set up his camera, but in order to get a good photograph he wanted the hawk to look at him and it was necessary to throw his handkerchief in the air to attract its attention. Later on we were informed that one of the boys nearby had been throwing stones at a hawk on top of this same building and had not been able to scare it away. Duck Hawks are certainly not given to this kind of behaviour.

The Cardinals had not recovered from their hawk scare, and only two were heard and none seen by the members of the party. Bird feathers were numerous and varied. At one place we found the fresh remains of two Thrashers, and besides numerous Thrushes we saw feathers of the Phoebe, Whip-poor-will, White-throated Sparrow, Sora Rail and others

For a long time we had been observing flocks of Bonaparte's

Gulls. Occasionally these would fly past us, within close range, but it remained for this trip to disclose to us, that, sometimes at least, these flocks consist in quite large proportions of Caspian Tern, and I selected one from the flock in which this was first noted, but it dropped too far out in the cold water and the wind drifted it beyond my swimming powers. These birds will be looked for later on, as they have been observed in only small numbers before. On this trip there was only the one occasion when they came near shore and at all other times the beautiful evolutions of the gulls were carried on at considerable distances. Nearly every person has seen flocks of Blackbirds and perhaps Waders, which when passing within view, are apt to dart down at an abrupt angle and then shoot up again, but the Bonaparte's Gull not only does this, but reverses the process as well. While watching a flock skimming over the surface of the water, there could be seen, one, at a time, of these beautiful birds, leaving the flock and shooting upwards for perhaps 20 yards, at an incredibly rapid rate and then dropping down to join the others. The effect of these gyrations is very beautiful indeed; and only a few times have I seen anything resembling the beautiful curving flight which this bird used when a high flying flock desires to come to the surface of the water. They always make me think of falling leaves. Swallows are the only other birds that I have often seen performing in this way.

The Carolina Wrens which were observed on only one day on our last trip, were again in evidence, and several were heard singing each day. Tree Swallows were seen in considerable numbers on the 1st and 2nd of October. They were living out over the marsh where probably they roosted as well. A very few Barn Swallows were also noted, but the date was very late for them.

The nights were warm until that of the 5th, when the thermometer dropped to 42. The effect was instantaneous, and the next morning a large number of Blackbirds were added to the daily bill, but their flight finished early in the morning and it happened that this particular morning was the only one, on which we made a late arrival at the end of the Point, owing to dissipation on the previous evening. The said dissipation consisting of cartridge loading and bird skinning, which are perhaps different from the ordinary method of burning midnight oil.

Short-eared Owls were a feature of the trip, and were seen in moderate numbers almost every day near the end of the Point. Two notable Waders were seen, 3 Golden Plovers and one White-rumped Sandpiper. A single Connecticut Warbler was taken on October 2nd, but warblers in general were in small numbers and their flight had evidently passed.

BOTANICAL EXCURSIONS.

GERMAN FIELD METHODS.

BY JOHN CRAIG, CORNELL UNIVERSITY, ITHACA, N.Y.

There are few places in central Europe where the student can spend a more agreeable summer than in the pleasant city of Freiburg, in the famous Black Forest region of southwestern Germany. In this city is located the University of Freiburg, noted for its strong medical staff, and to the average American naturalist remembered as the institution with which Weismann, the eminent zoologist and student of evolution, has long been connected.

It was my privilege a year ago to attend several of Dr. Weismann's lectures, and it may interest readers of THE NATURALIST to hear some of the personal features of these events. It is quite the custom in Germany for the chief or head of a department to give an elementary course, and this is the case with Professor Weismann. The number of advanced students seemed to be comparatively small. The course which attracted the mass of students was an elementary and general course in zoology, differing in no special respect from such outlines as are available in the best text books of the present day; but it was exceedingly popular and the great attraction was the man, the lecturer, and many students with whom I talked told me that their main reason for coming to Freiburg was the fact that they would have the privilege of studying under Weismann. Another reason possibly for the head of a department giving elementary courses may be due to the fact that the German professor's salary derived from the university itself is not large, but each full professor has the privilege of charging a fee to all students taking his lectures and these fees constitute the large share of his revenue, therefore it is not surprising that the elementary courses should be elected by the full professor who is permitted to charge a fee.

It is interesting to note the manner in which the work is given and lectures conducted. Weismann is now well advanced in years a man between seventy-five and eighty, tall, of dignified, cultured presence white hair and beard. He wears very heavy lens glasses, owing to weakened and waning vision. The lecture period is forty-five minutes in length and begins fifteen minutes after the hour, at which time the professor enters the class, and in the case of Weismann was always greeted with applause by his waiting students who had previously secured seats in the large auditorium. The lecturer immediately advanced to a

comfortable arm chair in front of a small desk, seated himself, and began a hasty review of the ground covered by the previous lecture. The review occupied about five minutes, when he plunged into new matter and continued talking with a fair degree of rapidity to the close of the hour. Professor Weismann is always accompanied by an intelligent attendant, who brought forward such charts and models as were necessary to illustrate the lecture. Many of these are employed. In fact the wall behind the lecturer was always covered with charts which could be drawn down or rolled up at will, in addition to coloured diagrams on the blackboard. One of the features of Weismann's lectures was the facility with which he could use coloured chalks in sketching organs and special features to be illustrated. He in common with other lecturers in this school always employed chalk of a definite colour to illustrate given tissues or organs. A system of this kind adds very considerably to the clarity of the lecture. Dr. Weismann used no notes in lecturing. At the close of the hour he immediately retired to his private room. It is considered a very special privilege on the part of the student to be able to approach the professor and discuss any point covered in the hour's lecture. Although long past the seventy-year mile post Weismann is still lecturing daily at twelve, including Saturday.

Among the pleasant experiences during my stay at Freiburg were attendance and participation in several botanical excursions, of which there are a number every week, there being one every Saturday and usually one on Sunday. The number of students attending these excursions varied from twenty-five to forty. Usually several women were members of the party. A fee is charged for the privilege of attending them, in the same way that a fee is charged for laboratory facilities.

The ordinary plan was to take a certain train out of town for a given distance into the country, the details and a map of the route having been previously posted in the laboratory and lecture rooms of the botanical department. One of the assistants usually acted as business manager of the party, purchasing tickets and apportioning the expenses among those attending. On arriving at the starting point for field work the party immediately struck out into the country at a smart pace. It must be borne in mind that botanical students (or field-naturalists) are not given the freedom of the countryside in the same generous way in Germany that obtains in Canada and the United States. Parties are not allowed to tramp at will over meadow or even through pasture lands. If such liberties are attempted they are likely to come into sharp conflict with the owner of the land. There are certain crown properties, however, in which

they may roam for purposes of study. The line of march then is usually confined to the country roads, choosing the byways more than the highways. The party tramps along, looking here and there for interesting plants in bloom, when suddenly a whistle is blown which is the signal for a halt. The professor is seen standing a little in advance of the party, holding up a plant for general inspection. The students cluster around and the professor asks questions. First, what is the plant; second, where does it belong, what are its peculiarities of structure, what are its uses, adaptations, etc. Sometimes the answers come in chorus, and again there is silence or a solo! Usually at the close of the study of the individual plant some additional remarks are offered by the professor and the march is then resumed. These stops occur at frequent intervals. At each time students are expected to note the names of plants discovered and supplement the information given by other information to be secured from the manuals. Frequently plants are brought in from the side lines by students themselves.

The situation of Freiburg, lying as it does near the Rhine Valley on the one hand and at the gateway of the most attractive and interesting part of the Black Forest Mountains on the other, makes it possible to vary the character of the flora to be studied from day to day by simply changing the route. Thus the mountain flora may be studied on one excursion and the lowland area with a different flora explored the next time, or it is even possible in an extended walk to include both upland and lowland.

Germans, like Englishmen, are good walkers. The "week end" tramps with rucksack on back are very much in vogue in Germany, and the mountain paths in this particular region are freely patronized during the summer by cheerful pedestrians. This kind of exercise makes for the development of an essential quality in a naturalist, namely the ability to walk. In these field excursions I discovered that the leader usually set a lively pace. One of the last excursions I had the privilege of attending occurred on the 12th of July, 1908, and I found on returning home and comparing the route with the map that we covered about ten miles in a little over three hours. I found also the following list of plants were collected and many of them discussed. The list is uninteresting in itself, but simply shows the flowering plants which happened to attract our attention in this short ramble among the hills of the Schwarzwald in the first half of July.

Achillea multiflorum, *Alnus glutinosa*, *Asplenium rigida*,
Andromeda polifolia, *Betula verrucosa*, *Blitum capitatum*,
Calluna vulgaris, *Campanula lata*, *Campanula patula*, *Cardamine*

sylvatica, Carex pauciflora, Centaurea nigra, Centaurea Jacea, Chaerophyllum hirsutum, Chrysanthemum Leucanthemum, Comarum palustre, Cynosurus crispus, Dactylis glomerata, Digitalis ambigua, Drosera rotundifolia, Epilobium angustifolium, Epilobium montana, Equisetum arvense, Galium Mollugo, Genista sagittalis, Geranium columbinum, Geum rivale, Heracleum sp-?, Hieracium murorum, Hieracium viticella, Holcus lanatus, Lathyrus pratensis, Lycopodium Stelago, Lysimachia vulgaris, Mimulus sp-?, Pinus montana, Pinus uncinata, Polygonum perfoliatum, Prenanthes purpurea, Ranunculus Flammula, Ranunculus repens, Sambucus racemosa, Scabiosa arvensis, Scrophularia ambrosia, Senecio Fuchsii, Silene rupestris, Spiraea Aruncus, Spiraea Ulmaria, Stachys sylvatica, Stellaria graminea, Stellaria nemorum, Trifolium aureum, Trifolium sp-?, Valeriana officinalis, Veronica officinalis, Vicia Cracca, Vicia sepium, Viola tricolor.

To many people an agreeable feature of travel in the country places in Europe lies in the fact that the pedestrian is never far away from a source of good beer and rarely distant from an eating house! It is unnecessary to descant upon the quality of the beer which is available in that region, nor would I say anything which would have a tendency to generate a thirst on the part of my readers by extolling the merits of this native beer. The beer is good, it is readily available, and it is drunk in a civilized manner, sitting at tables, and accompanied with pretzels or good rye bread and cheese. In the little German *gasthaus* one does not need to invade a stifling, heavily curtained bar room and range along side the counter as certain of the lower animals place themselves in front of a trough, but one may sit under the shade of a tree in the garden or on the veranda while partaking of refreshment.

This merely leads me to say that the botanical excursion invariably includes a *gasthaus* in its tour. In fact it usually closes the afternoon's program at such a place, with the Herr professor presiding at an impromptu supper surrounded by his group of students, all in excellent good humor. I am not commending this as a desirable innovation, but merely commenting on the eating and drinking habits in Germany as contrasted with our habits in this country. No doubt too much beer is drunk; but it is probable that beer is safer than whiskey. Besides this, there is no treating. Everyone pays for his own drinks.

In general this type of excursion and the stimulation which it brings tends to develop naturalists. It is fair I think to say that our training in this country aims on the other hand to develop a much narrower man, the specialist. We are in need at the present time of a larger number of men who are not narrow specialists, rather naturalists of the so-called older school,

men whose sympathies in the field of natural history are not restricted or confined to a single branch, but who have an interest in the entire range of plant and animal life and who, for this reason, are able to see correlations in a much broader way than the person whose vision is limited to and focused upon a comparatively small group.

I ought to testify to the earnestness of the students who participate in these excursions, and also to the courtesy of the instructing staff. I observed no suggestion of exclusiveness, nothing but generous cordiality. The memory is very pleasant.

THE FLETCHER MEMORIAL FUND.

At the meeting of the Ottawa Field-Naturalists' Club held in the Assembly Hall of the Normal School on November 9th, the Fletcher Memorial Committee reported that they had met with a warm response from members of the Club and friends of the late Dr. Fletcher, when the matter of the proposed memorial had been brought before them. Already between \$1,400 and \$1,500 had been subscribed but the Committee required about \$1,800 for the project in view and asked that those who had not yet subscribed to the fund, but who intended to do so, would immediately communicate with the Treasurer (Mr. Arthur Gibson) or other member of the Committee. There had not been, nor would there be, any personal canvass; it was the desire of the Club that spontaneity should characterize every donation to the fund.

The Committee reported that by far the larger number of subscribers had favored the suggestion put forward at the meeting of the Club in December last, that the memorial should take the form of a fountain erected on the grounds of the Experimental Farm, Ottawa, the scene of Dr. Fletcher's labors during the last twenty years of his life and where he had done so much, officially and unofficially, in assisting the farmer and fruit grower in their efforts to resist the attack of insect and fungous enemies, and in encouraging the study of Natural History throughout the Dominion.

At the conclusion of the report it was moved by Mr. Frank T. Shutt and seconded by Dr. William Saunders, and unanimously carried, "that the tribute about to be made to the memory of the late Dr. Fletcher, take the form of a drinking fountain consisting of a granite shaft with bronze medallion, inscription, etc., to be erected at the Experimental Farm, Ottawa, and that the Committee are hereby empowered to make all necessary arrangements for carrying out the work."

F. T. S.

TENT-BUILDING HABITS OF ANTS.

BY C. GORDON HEWITT, D.Sc.

(Dominion Entomologist, Ottawa).

The short and interesting article in the November number of THE OTTAWA NATURALIST on "Ant Roads," by Mr. Charles Macnamara, induced me to believe that an account of some further habits of ants might be of interest, and this is my apology for giving a *résumé* of some observations which my friend, Dr. Marie Stopes made during a recent sojourn in Japan, and an account of which she published with my collaboration in the "*Memoirs of the Manchester Library and Philosophical Society*," Vol. 53, (Memoir No. 20, 1909), under the title "On the Tent-building Habits of the Ant, *Lasius niger*, Linn., in Japan."

Lasius niger is the common brown or black garden ant and has a world-wide distribution. It usually constructs underground galleries and passages, and frequently keeps or cultivates aphides for the sake of the "honey-dew" which is an excretory product of the alimentary canal and is much sought after by the ants for food. It is not, as is frequently supposed, secreted by the small horn-like posterior appendages of the ants known as the syphons. The ants, as it has been stated, sometimes take the aphid eggs into their nests to protect them from the frost. *L. niger*, to my mind, is rather like man in the development of its agricultural methods. In some regions they are in these respects less advanced than in other places. Some are mere savages and leave their "cows," the aphides, out in the open to take care of themselves, others take great pains to keep their live-stock under such conditions as to be free from all danger and to ensure a maximum amount of "honey dew" production—they are the up-to-date farmers, so to speak. I do not intend to enter the arena of the vexed question of whether these actions are due to intelligence or instinct on the part of the ants: that is not my object. I am simply giving facts; let those who will analyse the motive power of these activities.

So that we find that whereas certain ants are content to wander along their well-worn paths to the pasture fields where their aphid stock is herded, others more advanced in their agricultural development make shelters or "tents," as they have been called, for their insect herds; we have called them "cow-sheds."

As early as 1810 Huber described these structures which *L. niger* was accustomed to make. He found small spherical

tents on the Spurge. They were of the "carton" type constructed of finely trituated wood and in these shelters the ants kept the plant-lice; they were thus protected from their enemies and also from the rain and strong sunlight. Forel, who has added so much to our knowledge of the lives of these insects, has described a number of different kinds of "cow-sheds" which several European species of *Lasius* constructed. A certain species, *L. brunneus*, constructs shelters made of detritus, that is, minute inorganic or mineral particles such as sand, etc., over large bark aphides. Certain species of *Myrmica* make earthen cells to enclose the aphides and these chambers communicate with the rest by means of covered galleries. Our greatest American authority on ants, Prof. W. M. Wheeler, informed me, when I was studying these interesting habits, that *Lasius niger* and its American varieties are in the habit of constructing shelters over plant-lice and mealy bugs, and he refers to this habit in his interesting paper on the habits of the tent-building ant, *Crematogaster lineolata*, Say. (in *Bull. Amer. Mus. Nat. Hist.*, Vol. 22, 1906). The common American variety, *L. niger* var. *americana*, occasionally builds detritus tents around the stems of plants.

The Japanese colonies of *Lasius niger* which Dr. Stopes discovered seemed to have reached the highest stage of agricultural development; even the ants seemed to be imbued with the Japanese spirit of progress! She discovered tents on the evergreen oak, *Ilex integra*, of a cylindrical shape, encircling the terminal portions of shoots arising from the stumps of a stem that had been cut down. These tents were of the detritus type and made of minute grains of black sand mixed with white fragments of broken shell—the trees were growing near the sea at Hayama. The whole twig, with the exceptions of the tips of the leaves, was enclosed in the detritus tent through which ran galleries swarming with ants. But these particular ants were not content to construct "cow-sheds" merely, but for their own comfort had built of the same detritus covered galleries which wound round the trunk of the tree and communicated with the nests which were underground, so that they could reach the "cow-sheds" in all weather. Other shelters which may have been the initial stages of the larger tents, were made by the ants by biting the undersides of the midribs of the leaves. This caused the leaves to become inrolled with their uppersides outwards and the spaces thus formed by the inrolling was filled with detritus to form chambers.

Ants appear to construct the two types of tents—the carton type made of fibrous material of a vegetable nature, and the detritus type made of inorganic material: both kinds of

material may be used by the same species to construct their "cow-sheds" or tents.

As we concluded in our memoir, "There is no doubt that this habit of building detritus and carton tents has developed for no other purpose than that of protecting the various species of aphides which are kept by the ants for the sake of their honey-like secretions. By the construction of such "cow-sheds" the aphides are able to continue sucking the juices of the plant and at the same time they are not only protected from their enemies, but also from alien ants. The protection from cold is also important, as Brandes (in 'Die Blattlaus und der Honigbau,' *Zeitschrift f. Natur wiss.*, vol. 66, 1894), has found that aphides are most active during the warmer part of the day, so that in keeping these warm the ants would also be obtaining a large supply of the secretion from them. In addition to these explanations of the tent-building habits of ants, Wheeler also suggests that the tents may be to prevent the escape of the aphides to other plants or other parts of the same plant.

"The evolution of the forms of the tents which are found in the different genera of tent-building ants may have started with the small earthen cell covering a few aphides; this may have been constructed either on the stem or by filling the space formed by the inrolling of certain of the leaves. Further enlargement and elaboration would lead to the formation of a spherical or cylindrical tent having the stem as axis, and finally, to secure for themselves the greatest comfort and convenience, the ants would connect these tents either with the earth or with their subterranean nests by means of covered passages."

This great adaptability to its environment, the usage of the means at hand and variability of constructive power in a single species of insect such as *Lasius niger*, is of very great interest to the entomologist who becomes so accustomed to the fact of a certain species of insect making nests or structures of a particular and more or less fixed type, such as we find in the other social and solitary hymenoptera as the bees and wasps, and also in other orders of insects.

BOOK REVIEW.

FARM WEEDS OF CANADA.—By George H. Clark, B.S.A., and James Fletcher, LL.D., F.R.S.C., F.L.S., with illustrations by Norman Criddle: Second Edition. Revised and En-

larged by George H. Clark. For sale, by single copies only, at the office of the Superintendent of Stationery Government Printing Bureau, Ottawa. Price \$1.00.

We were particularly pleased to receive recently the second edition of this most useful publication. There are a number of splendid new features which are at once seen in a hasty glance through the book. In the first place it is of a more convenient size and the Table of Contents at the beginning is a useful addition. The general make up of the work is an improvement on the first edition, the type is better and the arrangement of the subject matter all that could be desired. Twenty full page additional coloured plates are included, the work of Mr. Criddle. As Mr. Clark says, considerable re-arrangement of the matter was made necessary in this second edition in order that the various plant families, genera and species might be adjusted to conform with the recommendations of the International Botanical Congress at Vienna and now generally adopted by botanists. In revising the descriptions of plants and seeds technical terms have been avoided wherever possible. Many most interesting quotations apropos of the subject are used throughout the book to complete pages. In the Preface it is stated that "Farm Weeds of Canada was one of the last of the many contributions to agriculture from the late Dr. James Fletcher. It is desired that this second edition of the book will further perpetuate to his memory that large measure of appreciation of his unselfish personality and zeal for useful service which he so richly deserved." This new edition of Farm Weeds is a particularly valuable work and is without doubt one of the best, if not the best, Government publication which has yet appeared in any country. The Dominion Department of Agriculture is fully alive to the enormous annual losses caused in Canada by Weeds. The first edition of Farm Weeds was eagerly sought after by farmers and others throughout Canada, and has already been of inestimable value to the country. The second edition revised and enlarged will doubtless too soon be exhausted. The nominal price fixed for its sale will restrict its distribution to those who will preserve and make good use of it. The Ottawa Field-Naturalists' Club is specially interested in this book, in that Mr. George H. Clark, Seed Commissioner of the federal Department of Agriculture, and Mr. Norman Criddle who made the drawings, are both members. Other members of the Club too, who assisted and whose names we notice in the Preface are Mr. George Michaud, Prof. John Macoun, Mr. T. G. Raynor, Mr. J. H. Grisdale, Mr. T. N. Willing, and Mr. James Murray.

A. G.

THE OTTAWA FIELD-NATURALISTS' CLUB. LECTURE PROGRAMME

1909 - 1910.

(All lectures will commence at 8 o'clock sharp.)

November 9th, 1909, (Tuesday)—"HOME BIRDS AND WANDERERS,"
Mr. W. E. Saunders London, Ont. (Normal School).

December 14th, 1909, (Tuesday)—8 p.m.—EXHIBITION OF BIOLOGICAL AND GEOLOGICAL SPECIMENS. Microscopes will be supplied for the examination of microscopic specimens.
9 p.m.—SHORT ADDRESSES by Dr. J. F. White, Mr. J. W. Gibson, Mr. A. Halkett and others. (Normal School).

January 4th, 1910, (Tuesday)—"INSTINCT AND EDUCATION," The President. (Carnegie Library).

January 18th, 1910, (Tuesday)—"LIFE," Mr. A. H. W. Cleave, F.R.M.S., Ottawa. (Normal School).

February 1st, 1910, (Tuesday)—"HOUSE FLIES AND THEIR RELATION TO PUBLIC HEALTH," Dr. C. Gordon Hewitt, Entomologist, C. E. Farm, Ottawa. (Normal School).

February 15th, 1910, (Tuesday)—"THE FLORA AND FAUNA OF THE WEST COAST OF VANCOUVER ISLAND," Prof. John Macoun, Ottawa. (Carnegie Library).

February 25th, 1910, (Friday)—(*Joint Lecture series*)—"BACTERIA IN RELATION TO PLANT LIFE," Prof. F. C. Harrison, Macdonald College, Que. (Normal School).

March 8th, 1910, (Tuesday)—"A PLANT DOCTOR AND HIS WORK," Mr. H. T. Gussow, F. R. M. S., Botanist, C. E. Farm, Ottawa. (Normal School).

March 15th—ANNUAL MEETING. Including Receipt of Annual Report, Election of Officers, Presentation of Revised Constitution and By-laws. *A full attendance of members is requested.* (Carnegie Library).

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