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AGENCIES THROUGHOUT CANADA

THE OTTAWA NATURALIST

VOL. XXVII.

November, 1913

No. 8

THE HAUNTS OF SOME OF OUR NATIVE FERNS.

By A. COSENS, M.A., Ph.D., Toronto.

A plant is dependent on its surroundings for the raw materials of the food necessary for its nutrition, also the energy required to manufacture this food is supplied from agents that are without the body of the plant. Even the important functions of pollination and seed dispersal are left very largely to the care of external forces.

A consideration of these facts leads us to see that each plant has definite and vital relations to the various components of its environment. These life relations are often so numerous and complicated as to be only partially understood. As the component factors of any environment are never stable for any considerable length of time, the welfare of the individual plant is dependent on the fact that it exhibits a certain degree of plasticity in relation to its surroundings. If a plant is to exist it cannot present an unyielding front to the forces surrounding it. A certain structure is transmitted to a plant by its ancestors; an ever changing environment tends to vary this transmitted form. This feature of plant life is of such universal application that we may consider a pathological condition as a variation from the normal to such an extent that the life of the plant is endangered.

The study of the habitats of our native ferns presents several points of interest and opens up many avenues for investigation. As a rule these plants do not exhibit plasticity of structure to nearly the same extent as our ordinary flowering plants. As a consequence of this the conditions under which the various ferns can flourish are much more restricted.

The chief factors of the environment of these plants, arranged in the order of their importance, are: light, water, drainage, soil; of less importance are heat and wind. Their relations to other plants will be considered in connection with light, as many of the plants with which they are associated have important shade producing qualities.

In some cases a fern is so restricted in distribution that it is a matter of little difficulty to decide upon its natural habitat. In others, certain species are found in various locations presenting different conditions, and a comparison has to be made of plants and stations before a conclusion can be arrived at. As a general rule, a fern of normal size, of a healthy color and spore producing is growing in its natural location.

The conclusions of the writer are based on investigations made chiefly in the counties of York, Peel, Waterloo, Huron, Grey and Bruce.

PTERIS AQUILINA L. (Common Brake or Bracken). Is so widely distributed that we may say it is found almost throughout this hemisphere. In some localities the specimens are gigantic in comparison with ours. In Oregon it attains a height of six to seven feet; in the Andes of fourteen feet. It is found also in Great Britain. In the Journal of the Linnaean Society, Boodle gives its height in England as seven to eight feet. Its occurrence in the Highlands of Scotland is evident, as Sir Walter Scott mentions it several times in "The Lady of the Lake":

"From shingles gray their lances start,
The bracken brush sends forth the dart."

"Each warrior vanished where he stood,
In broom or bracken, heath or wood."

"The next all unreflected shone
On bracken green or cold gray stone."

A plant of such wide distribution must be capable of an extended range of variation without endangering its life processes. But as it often occurs in large patches extending over localities that introduce different ecological factors, a conclusion can be arrived at with a fair amount of confidence by a comparison of specimens from different parts of the station.

The preferred habitat of *Pteris* is the top or slope of a dry hill covered with sandy loam. The shade producing plants almost invariably present are poplars, paper birch, sumach, pin cherry and hemlock. It is found near Credit Forks on sandstone strata covered by only a few inches of loam; in this locality it is associated with *Aspidium spinulosum* and shaded chiefly by pin cherry and paper birch. On passing in from the face of the cliff the loam becomes of greater depth and the timber consequently larger and of greater variety. The additional shade producing plants are hard and soft maple and beech. This shade dwarfs the *Pteris* in spite of the increased depth of loam.

In the denser shaded stations the fern was in company with *Asplenium Filix-femina* and *Cystopteris fragilis*.

Before proceeding to a consideration of the cliff ferns, it will be necessary to give a short description of a station already mentioned, namely, Credit Forks. This location is situated in the northern part of Peel County; there the Credit River has cut through the Niagara escarpment, leaving an exposure of clay and rock of about 345 feet in height. Commencing below the level of the Credit River a slope of red clay extends upward for 175 feet; overlying this is about 20 feet of Medina sandstone, while the top of the section furnishes an outcrop of 150 feet of almost vertical limestone of the Niagara formation. The clay slope is covered with a talus of blocks of sandstone and limestone fallen from the cliff above, and in the crevices of these rocks many ferns find roothold.

CRYPTOGRAMMA STELLERI (Gmel.) Prantl. (Slender Cliff Brake). Found usually on narrow, moist, shaded ledges of limestone cliffs. It roots, in company with moss, in detritus derived from the weathering of the rock. It is a frail and delicate species, very sensitive to sun and to lack of moisture.

PELLAEA ATROPURPUREA (L.) Link. (Purple Cliff Brake). In crevices of limestone cliffs; not nearly so sensitive to lack of shade and moisture as the former species. It is often found in dry situations under full illumination. It thus shows closer affinities with *Pteris*.

The two cliff brakes we have just considered are both found in the vertical limestone section of the Credit Forks' escarpment. It is worthy of note that they are entirely absent from the blocks of rock which cover the clay slope.

SCOLOPENDRIUM VULGARE Sm. (Hart's Tongue). This fern is found abundantly in Europe; in England it is reported as hanging from old ruins and even drooping from the stone curbs of wells. In America, however, it is exceedingly rare; it is found in Tennessee and New York, while in Ontario it is confined to the district between Collingwood and Owen Sound. At Woodford, near Owen Sound, it is found rooting in soil on the top of limestone rocks and cliffs; there it is associated with *Polystichum Lonchitis* and *Polypodium vulgare*. The ferns are shaded by paper birch, small maple and beech, with an occasional hemlock. It grows at Owen Sound from crevices in the walls of fissures in limestone rocks; but under these conditions, however, it does not thrive as well.

POLYSTICHUM LONCHITIS (L.) Roth. (Holly Fern). Has nearly the same distribution in Ontario as *Scolopendrium* and its habitat is practically the same.

POLYPODIUM VULGARE L. (Common Polypody). Found on the tops and upper ledges of rocks where the soil is well drained; the usual shade-producing plants associated with it in this habitat are poplar, paper birch, small hard maple and hemlock. Also found rarely on clay banks where the soil contained a little sand; in this habitat it was practically unshaded as the slopes were typical hemlock ridges. The plants under the latter conditions were dwarfed, probably from lack of shade rather than from the nature of the soil.

CAMPTOSORUS RHIZOPHYLLUS (L.) Link. (Walking Fern). Is found usually in crevices in limestone and sandstone rocks, but sometimes rooting in moss on narrow ledges. Appears to prefer the shady side of the rocks, but thrives fairly well in the sun. It is found in abundance on the rocks that cover the clay slope at Credit Forks.

ASPLENIUM TRICHOMANES L. (Maidenhair Spleenwort), and *ASPLENIUM VIRIDE* Huds. (Green Spleenwort) are found rooting in the crevices of shady rocks and cliffs: usually limestone or sandstone. They are not sensitive to lack of moisture, but *A. viride* does not stand exposure to the sun so well as the other species. Both the ferns are associated at Credit Forks among the talus on the clay slope.

ASPIDIUM THELYPTERIS (L.) Sw. (Marsh Fern). The ideal habitat of this fern is decidedly wet, as it is found growing usually with cat-tails. Shade is not an indispensable factor, but the fern is sheltered when thriving best. The shade producers are commonly cedar, black ash, soft elm, hemlock and occasionally basswood. In moist situations, under full illumination, the fern thrives and it will grow in a fairly dry situation until crowded out by grasses and sedges. It shows a high degree of plasticity in relation to the environment, more so than any of our native ferns, unless perhaps *Pteris*.

ASPIDIUM NOVEBORACENSE (L.) Sw. (New York Fern). In direct contrast to the preceding species, this fern is found in dry soil, but always under dense shade in the typical "cool woods." It is very abundant in a woods near Lake Huron; there it is associated with partridgeberry, pyrolas, and shaded by birch, hemlock and maple. Maple and beech underbrush were also important factors in shade production. As only a few inches of humus was covering a somewhat impervious substratum of sandy loam, sufficient moisture was ensured. The rootstocks of the ferns did not penetrate below the humus. In mucky parts of the same woods *Polystichum acrostichoides* and *Adiantum pedatum* were associated with this fern.

ASPIDIUM SPINULOSUM var. INTERMEDIUM (Muhl.) D. C. Eaton (Spinulose Wood Fern), and ASPIDIUM MARGINALE (L.) Sw. (Evergreen Wood Fern). Both of these ferns thrive well in a moist, typical "cedar swamp," with a mucky soil. They are usually shaded in such a habitat by cedar, hemlock, black ash and mountain maple. The latter species is impatient of too dense shade and will thrive in a fairly open situation. The former will also stand exposure, but as a rule thrives better if the shade is fairly dense. The glandular character of the indusium of this fern varies with the environment. These ferns also thrive well in clay loam, especially on the face of slopes. In this location they are shaded by hard maple, beech and ironwood, with cedars and an occasional hemlock.

ASPIDIUM CRISTATUM (L.) Sw. (Crested Shield Fern). This fern prefers a mucky soil; its locations overlap those of *Aspidium Thelypteris* and *Onoclea*. Trees peculiar to such a situation, such as ash, cedar and mountain maple furnish the necessary shade. In comparison with its associates, however, it appears always to select a somewhat higher station and is found growing on logs and around stumps. It stands exposure fairly well; this may be due to the fact that the sun exercises a directive influence on the position of the pinnae.

POLYSTICHUM ACROSTICHOIDES (Michx.) Schott. (Christmas Fern), and ADIANTUM PEDATUM L. (Maidenhair). These ferns are both very sensitive to exposure and are found only where the shade is very dense. Their habitat seldom overlaps with *Aspidium spinulosum* and *A. marginale* in their cedar swamp location, but often does in the hardwood station. Thus on a slope where the humus overlies a clay loam the four ferns may often be found. A dense shade is produced in a typical location by maple and beech, while an occasional hemlock and basswood may also be present. In such a habitat, *P. acrostichoides* will almost invariably be found towards the top of the slope, while *A. pedatum* selects the rather more moist and sheltered location at the foot.

ASPLENIUM FILIX-FEMINA (L.) Bernh. (Lady Fern). This fern is found at its best when growing at the edge of a mucky soil location. Under these circumstances it will be shaded by cedars and hemlocks, but trees peculiar to the transition zone, such as birch, soft elm and basswood, will also be found. It stands exposure to the sun very well. Sometimes it is found associated with *Aspidium cristatum*, but, in general, it prefers a habitat that is wetter.

ASPLENIUM ANGUSTIFOLIUM Michx. (Narrow-leaved Spleenwort). In a station examined in Peel County this fern was growing

in a shaded ravine through which water flowed in the spring. It was rooted in clay loam and shaded densely by beech and maple. It was associated with *Adiantum* and *Aspidium spinulosum* var. *intermedium*. In Huron County the fern was found in abundance in rather mucky soil at the bottom of a ravine, which served as a water course during a part of the year. A dense shade was given by maple and beech, with an occasional hemlock. The ferns associated with it were those mentioned above and *Polystichum acrostichoides*. With the exception of the soil, the two stations are identical. The fact of the water course underlying the habitat in each case is important in the facilities it gives for drainage.

ASPLENIUM ACROSTICHOIDES, Sw. (Silvery Spleenwort). This fern requires a mucky, springy situation, but dense shade does not appear to be a necessity. The fern is found associated with *Impatiens* and fraternizing with *Onoclea Struthiopteris* and *Cystopteris bulbifera*. The station has usually scattered trees of beech, maple, ash and birch.

PHLEGOPTERIS DRYOPTERIS (L.) Fee. (Oak Fern). The favorite habitat of this fern is at the edge of mucky soil, especially where it is shaded by maple and beech. It is found growing, also, in cedar swamps, on knolls, in mucky soil. Shade in this case is produced by pines and cedars. In this station the fern is sometimes associated with *A. marginale*. This fern is able to do well under decidedly dry conditions if it is not exposed to the sun. Growing in the open it becomes invariably infested with a blight that shrivels the fronds.

PHLEGOPTERIS POLYPODIOIDES Fee. (Long Beech Fern). In most cases this fern and the preceding are associated, but the Beech Fern is much more sensitive to lack of moisture and requires shade that is extremely dense. A typical locality noted was one in which the fern was found growing in a slightly mucky, reddish clay loam, where the soil was overlying a sandstone stratum and was of little depth. The timber, in consequence of this lack of soil, was small, but so close together as to produce a very dense shade. Shade producing plants present were beech, maple and hemlock, but occasionally also birch and basswood. The location described is situated at Inglewood, in Peel County, about three miles south of Credit Forks. The same escarpment is found there as at the Forks, but the overlying limestone is absent.

DICKSONIA PUNCTLOBULA (Mich.) Gray. (Hay-scented Fern). This fern was found in the same locality as the preceding but the soil, while slightly mucky, was less so than in the habitat of that species.

ONOCLEA STRUTHIOPTERIS (L.) Hoffm. (Ostrich Fern), and *ONOCLEA SENSIBILIS* L. (Sensitive Fern). The well known Ostrich and Sensitive Ferns are almost invariably found together, and it seems impossible to differentiate between their habitats. Their typical station is a moist clay or sandy loam in a locality that is overflowed by spring freshets. Shade is not an important factor if other conditions are favorable. The most luxuriant growth of these ferns that the writer has found was in Huron County. Here they were shaded by only a few straggling willows. The ferns were associated with Virginia creeper, Impatiens, wood nettle and turtle head. A spring creek nearby would overflow the station in flood time. In "Ferns and their haunts" W. N. Clute gives *O. Struthiopteris* as, "at its best in the wet, sandy soil of a half-shaded island or river shore."

WOODWARDIA VIRGINICA (L.) Sm. (Chain Fern), and *OSMUNDA CINNAMOMEA* L. (Cinnamon Fern). May be considered the peat bog ferns. *Woodwardia* is found growing in sphagnum, moss and extending out nearly to the edge of the lake that often occupies the centre of the bog. It is associated with pitcher plants and orchids, such as *Calopogon*, and only slightly shaded by *Ledum*, *Kalmia* and *Cassandra*, with an occasional small black spruce. In fact, shade is almost a negative factor.

In a typical location examined the *Osmunda* formed an outer zone in immediate contact with the preceding fern. Its location, however, was drier and better shaded than that of *Woodwardia*. The shade producing plants were hemlock, larger black spruce and tamarack. *Ledum*, *Cassandra* and *Kalmia* were also present, but these were not thriving as well as in the inner zone. Occasional specimens of this fern are found also in the moist, mucky soil of cedar swamps, but locations that furnish peaty materials seem to be its natural habitat.

CYSTOPTERIS BULBIFERA (L.) Bernh. (Bulblet Bladder Fern), and *CYSTOPTERIS FRAGILIS* (L.) Bernh. (Fragile Bladder Fern) have well differentiated habitats. *C. bulbifera* is sharply marked out by the fact that spring water is an essential component of its environment. As long as this factor is present, others are not so important. As a consequence, it is found on dripping rock ledges or springy clay in cedar swamps bordering spring creeks, and in other habitats which present springy conditions of soil. Drainage is here a very important factor, as stagnant water does not present the proper conditions. *Aspidium Thelypteris* and *Onoclea* are not nearly so sensitive in this respect. One typical station examined presented the fern associated with Indian turnip and enchanter's nightshade near the base of a ridge with a decidedly springy soil. Another station

selected by this fern is a mucky, springy soil, shaded by hemlocks and cedars, with an occasional mountain maple. In this same locality the fern was found near the edge of a spring creek or on mossy logs overhanging the water. When growing under these conditions it is often the most convenient vegetation that can be found to line a trout basket. The bulblet loaded tips of this fern often approach so close to the water of the creek that it almost seems a legitimate conclusion that the running water is an important factor in the dispersion of these bulblets. At Credit Forks it grows along the base of the limestone cliff wherever springs issue.

C. fragilis is found associated with *C. bulbifera* along the base of springy clay banks and cliffs. It is found, also where that species will not grow, in crevices of shaded limestone and sandstone rocks, where spring water is not present. It does not stand exposure to the sun. It is found growing in mucky loam, shaded by cedars and basswood, often associated with *C. bulbifera*, if the station is springy. In this case it selects the drier locations around stumps and logs.

AN UNUSUAL COLOURED RUDBECKIA.

It is well known that plants are liable to produce progeny unlike the parents, in some striking particular, such as those with additional petals, odd shapes or variations in colour. A well known example of the latter is found in the brown-blotched *Lepachys*, which occasionally turns up among the yellow ones, and though a mere colour variety has been given the name *pulcherrima*. An homologous example, which I have not observed recorded, was discovered this summer near here and consists of a blotched form of *Rudbeckia hirta*, in which the rays had about a third of their basal portion rich brown, being in fact almost identical to the *Lepachys* in that respect. The plant consisted of seven heads, all alike, which I had marked with the idea of securing seeds, but being close to a roadway they were unfortunately destroyed before reaching maturity. Fortunately, however, the species is perennial, and so, if all goes well, will flower again next year.

NORMAN CRIDDLE, Treesbank, Man.

ON THE GENERA OF THE EODISCIDAE.

BY PERCY E. RAYMOND.

It has long been known that the name *Microdiscus*, in common use for small trilobites of Lower and Middle Cambrian age, is untenable, the genus *Microdiscus* having been founded by Emmons on a young specimen of *Cryptolithus* (*Trinuclens*). The name *Eodiscus* was suggested in manuscript by Professor Hartt when he was describing the Middle Cambrian fossils found near St. John, New Brunswick, for Dawson's *Acadian Geology*, but on the advice of Billings, he replaced it by *Microdiscus* at the time of publication. This name was, however, mentioned in Walcott's paper on the fauna of the Middle Cambrian (1884), and in 1896 Matthew used the name for a section of the genus *Microdiscus*.¹ Recently the writer proposed to raise the section name *Eodiscus* to generic rank, replacing *Microdiscus*. The type suggested was *Microdiscus schucherti* Matthew, which was the first species listed by Matthew under his section *Eodiscus*.² It seems wise, however, not to apply the term *Eodiscus* in too broad a sense, but to use it in much the same way in which Matthew did.

In reviewing the various species which have been referred to *Microdiscus*, omitting the *M. quadricostatus* of Emmons, we find three distinct types of shields. The first and most common is that typified by *Eodiscus schucherti* or *E. punctatus*, in which the glabella and axial lobe of the pygidium are both definitely defined by the dorsal furrows, and the cheeks of the cephalon and the pleural lobes of the pygidium are smooth. A second type of shield is seen in forms like *Microdiscus lobatus* or *M. dawsoni*, where the dorsal furrows are strong on both shields, and the pygidium has well defined ribs on the pleural lobes. To a part of this second section Matthew gave the name *Dawsonia*, a name which had been used in manuscript by Hartt for his *Microdiscus dawsoni*, and which had appeared in print in the Second Edition of the *Acadian Geology*, though not used as a generic name. This section name of Matthew's would also be raised to generic rank were it not for the fact that the name is no longer available, having been applied by Nicholson in 1872 to certain bodies found associated with graptolites. I therefore propose *Goniodiscus* for this section, with *Agnostus lobatus* Hall as the type.

1. Amer. Geologist, 1896, vol. 18, p. 29, and Trans. N.Y. Acad. Sci. vol. 15, p. 237, 1896.

2. Ottawa Naturalist, 1913, vol. 26, p. 139.

The third group contains but a single species, the *Agnostus? nobilis* of Ford. This form differs from all other known Eodiscidae in lacking the dorsal furrows on both cephalon and pygidium, and has thus the appearance of an *Agnostus* of the *laevigati* group. A nearly complete specimen of this species was recently found at the Lower Cambrian exposure on Pearl Street, North Weymouth, Mass., by Mr. T. H. Clark, and the specimen is now in the Museum of Comparative Zoology at Harvard University. The species has previously been known only by the single specimen which served Ford as a type. That specimen was poorly preserved, and has been lost since its description, so that the rediscovery of the species is of considerable interest, and it adds a new species to the rather scanty fauna of the Paleozoic of Massachusetts. Mr. Clark's specimen shows nearly all the dorsal shield, though the head is displaced from the body, and a part of one side of the thorax is missing. The presence of three segments in the thorax shows conclusively that this species belongs to the Eodiscidae and not to the Agnostidae. Both cephalon and pygidium are nearly circular, both have a narrow flattened border, and this border on the cephalon shows the row of small tubercles so often seen in this family. Neither cephalon nor pygidium shows the dorsal furrows or other markings, though by holding the specimen at a certain angle it is possible to make out the outline of a wide median lobe on the pygidium. The specimen is 7.5 mm. long. Since the type of *Agnostus? nobilis* is lost, this specimen may now take its place, and it becomes the type of the third group of the Eodiscidae, to which the name *Weymouthia* may be applied.

FAMILY EODISCIDAE, RAYMOND.

Hypoparia of small size, cephalon and pygidium sub-equal, free cheeks absent from the dorsal side, thorax of three segments. Pygidium annulated or smooth. Lower and Middle Cambrian. Northern Europe and Eastern North America.

GENUS EODISCUS, MATTHEW.

Eodiscidae with short glabella, and long or blunt neck spine, pygidium with a long ringed axial lobe and smooth side lobes. Type, *Eodiscus schucherti*, Matthew. Lower and Middle Cambrian. Europe and North America.

GENUS GONIODISCUS, NOV.

Eodiscidae with long glabella, usually blunt neck spine, and pygidium with rings on the axial lobe and ribs on the pleural lobes. Type, *Microdiscus lobatus*, Hall. Lower and Middle Cambrian. England and Eastern North America.

GENUS WEYMOUTHIA, NOV.

Eodiscidae without dorsal furrows on cephalon or pygidium,

both shields being smooth. Type, *Agnostus? nobilis*, Ford. Lower Cambrian. Eastern North America.

BIBLIOGRAPHY.

The writer will be very glad to receive additions and corrections to this bibliography.

GENUS EODISCUS.

E. belli-marginatus (Shaler and Foerste). Bull. Mus. Comp. Zool., 1888, 16, p. 35, pl. 2, fig. 9.—Walcott, 10th Ann. Rept. U. S. G. S., 1891, p. 630, pl. 81, figs. 2, 2a, b.—Grabau, Occ. Papers Bos. Soc. Nat. Hist., 1900, 4, p. 670.

E. belli-marginatus Mut. *insularis* Matthew. Trans. Roy. Soc. Can., 1899, ser. 2, vol. 5, sect. 4, p. 75, pl. 3, figs. 6a, b.

E. comleyensis (Cobbold). Quart. Jour. Geol. Soc., 1910, 66, p. 21, pl. 3, figs. 1-4.

E. connexus (Walcott). Am. Jour. Sci., 1887, 34, ser. 3, p. 194, pl. 1, figs. 4, 4b; 10th Ann. Rept. U. S. G. S., 1891, p. 631, pl. 80, figs. 9, 9a, b.—Matthew, Am. Geol. 1891, p. 287.

E. eucentrus (Linnarsson). Sveriges Geologiska Undersökning, 1883, ser. C, No. 54, p. 30, pl. 4, figs. 19, 20. (Referred by Lake to *E. punctatus*, and by Groenwald to a variety of *E. scanius*).

E. helena (Walcott). Proc. U. S. Nat. Mus., 1889, 12, p. 41. 10th Ann. Rept. U. S. G. S., 1891, p. 632, pl. 81, figs. 1, 1a.—Cobbold, Quart. Jour. Geol. Soc. London, 1910, 66, p. 23, pl. 3, figs. 14-16. *E. cf. helena*. Burr. Am. Geol., 1900, 25, p. 47.—Grabau, Occ. Papers Bos. Soc. Nat. Hist., 1900, 4, p. 671, pl. 33, fig. 3.

E. mecki (Ford). Am. Jour. Sci., 1876, 11, ser. 3, p. 371.—Walcott, Bull. 30, U. S. G. S., 1886, p. 155, pl. 16, fig. 4; 10th Ann. Rept. U. S. G. S., 1891, p. 632, pl. 81, fig. 3.

E. praecursor (Matthew). Trans. N. Y. Acad. Sci., 1896, 15, p. 239, pl. 17, fig. 7. Non text fig.

E. pulchellus (Walcott). Bull. 10, U. S. G. S., 1884, p. 24, pl. 2, figs. 1, 1a-c.—Matthew, Trans. N. Y. Acad. Sci., 1896, 15, p. 242, pl. 17, figs. 8a-f.

E. punctatus (Salter). Quart. Jour. Geol. Soc. London, 1864, 20, p. 237, pl. 13, fig. 11.—Matthew, Trans. N. Y. Acad. Sci., 1896, 15, p. 244.—Lake, Brit. Camb. Tril., 1907, p. 36, pl. 3, figs. 11-17.—Cobbold, Quart. Jour. Geol. Soc. London, 1913, 69, p. 37.

E. punctatus, non Salter. Whiteaves, Am. Jour. Sci., 1878, 16, ser. 3, p. 225.—Walcott, Bull. 10, U. S. G. S., 1884, p. 24, pl. 2, figs. 1, 1a-c.—Foerste, Bull. Den. Univ., 1888, 3, p. 117, pl. 13, fig. 5.—*E. pulchellus*.

E. punctatus praecursor (Matthew). Trans. Roy. Soc. Can., 1885, 3, sect. 4, p. 75, pl. 7, fig. 13.—*E. praecursor*.

E. punctatus pulchellus (Matthew). Trans. Roy. Soc. Can., 1885, 3, sect. 4, p. 74, pl. 7, figs. 12a-c.—*E. pulchellus*.

E. scanius (Linnarsson). Sveriges Geologiska Undersökning, 1883, ser. C, No. 54, p. 29, pl. 4, figs. 17, 18.—Groenwald, Bornholms Paradoxideslag, p. 79, 1902. (Referred by Lake to *E. punctatus*).

E. scanius eucentrus (Linnarsson). Groenwald, Bornholms Paradoxideslag, 1902, p. 79, pl. 1, fig. 20. (Referred by Lake to *E. punctatus*).

E. schucherti Matthew. Amer. Geol., 1896, 18, p. 30.—Trans. N. Y. Acad. Sci., 1896, 15, p. 238, pl. 17, figs. 4a-b.

E. speciosus (Ford). Am. Jour. Sci., 1873, 6, ser. 3, p. 137, figs. 2, a, b.; Ibidem, 1877, 13, p. 147.—Walcott, Bull. 30, U. S. G. S., 1886, p. 154, pl. 16, figs. 3a-c; 10th Ann. Rept. U. S. G. S., 1891, p. 632, pl. 81, figs. 5, 5a-c.—Matthew, Trans. N. Y. Acad. Sci., 1896, 15, p. 236, pl. 17, fig. 6.—Lake, Brit. Camb. Trilobites, 1907, p. 33, pl. 3, fig. 7.—Cobbold, Quart. Jour. Geol. Soc. London, 1910, 66, p. 23.

GENUS GONIODISCUS.

G. dawsoni (Hartt). Acadian Geology, 2d Ed. 1868, p. 654, p. 228.—Whiteaves, Am. Jour. Sci., 1878, 16, ser. 3, p. 225.—Walcott, Bull. 10, U. S. G. S., 1884, p. 23, pl. 2, figs. 3, 3a.—Matthew, Trans. Roy. Soc. Can., 1885, 3, sect. 4, p. 75, pl. 7, figs. 11a-c; Trans. N. Y. Acad. Sci., 1896, 15, p. 240, pl. 17, figs. 5a-c. (? 5a, 5b).

G. lobatus (Hall). *Agnostus lobatus* Hall. Pal. N. Y., 1847, 1, p. 258, pl. 67, figs. 5a-f.—Rogers, Geol. Penna., 1858, 2, p. 820, fig. 614 (1-4).—*Microdiscus lobatus*. Ford, Am. Jour. Sci., 1873, 6, ser. 3, p. 135 footnote.—Walcott, Bull. 30, U. S. G. S., 1886, p. 156, pl. 16, figs. 1a, b; 10th Ann. Rept. U. S. G. S., 1891, p. 632, pl. 81, figs. 4a, b.—Shaler and Foerste, Bull. Mus. Comp. Zool., 1888, 16, p. 36, pl. 2, fig. 13.—Matthew, Amer. Geol., 1896, 18, p. 30.—Grabau, Occ. Papers Bos. Soc., 1900, 4, p. 671.—Lake, Mon. Brit. Camb. Tril., 1907, p. 32, pl. 3, figs. 4-6.—Cobbold, Quart. Jour. Geol. Soc. London, 1910, 66, p. 22, pl. 3, figs. 17, 18.

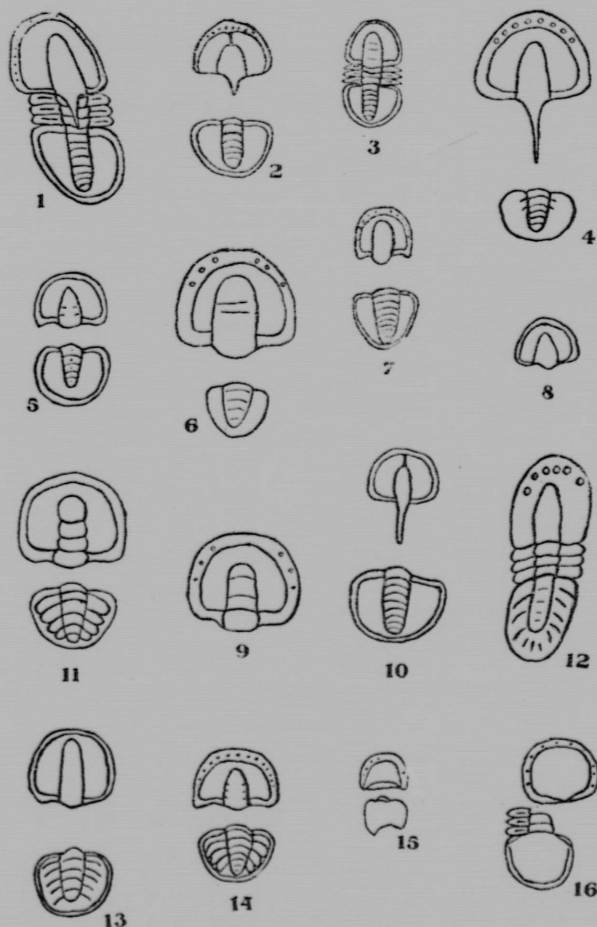
G. parkeri (Walcott). Bull. 30, U. S. G. S., 1886, p. 157, pl. 16, figs. 2, 2a; 10th Ann. Rept. U. S. G. S., 1891, p. 632, pl. 80, figs. 7, 7a.

G. sculptus (Hicks). Quart. Jour. Geol. Soc. London, 1871, 27, p. 400, pl. 16, figs. 9, 9a, 10, 10a.—Lake, Brit. Camb. Tril., 1907, p. 35, pl. 3, figs. 9, 10.

GENUS WEYMOUTHIA.

W. nobilis (Ford). *Agnostus? nobilis* Ford. Am. Jour. Sci., 1872, 3, ser. 3, p. 419, figs. 1, 2.—Walcott, Bull. 30, U. S. G. S.,

1886, p. 150, pl. 16, fig. 7; 10th Ann. Rept. U. S. G. S., 1891, p. 629, pl. 80, fig. 7, 7a.—*Microdiscus? nobilis*. Vogdes, Am. Geol., 1892, 4, p. 383.



EXPLANATION OF FIGURES.

1. *Eodiscus punctatus* (Salter). Middle Cambrian, Wales. After Lake.

2. *E. pulchellus* (Walcott). Middle Cambrian, New Brunswick. After Walcott.
3. *E. speciosus* (Ford). Lower Cambrian, Eastern New York. After Walcott.
4. *E. connexus* (Walcott). Lower Cambrian, Eastern New York. After Walcott.
5. *E. schucherti* (Matthew). Lower Cambrian, Eastern New York. After Matthew.
6. *E. helena* (Walcott). Lower Cambrian, Eastern New York. After Walcott.
7. *E. belli-marginatus* (Shaler and Foerste). Lower Cambrian, Eastern Massachusetts. After Walcott.
8. *E. praecursor* (Matthew). Middle Cambrian, New Brunswick. After Matthew.
9. *E. meeki* (Ford). Lower Cambrian, Eastern New York. After Walcott.
10. *E. scanius* (Linnarsson). Middle Cambrian, Sweden. After Linnarsson.
11. *Goniodiscus lobatus* (Hall). Lower Cambrian, Eastern New York. After Walcott.
12. *G. sculptus* (Hicks). Middle Cambrian, Wales. After Lake.
13. *G. parkeri* (Walcott). Lower Cambrian, Vermont. After Walcott.
14. *G. dawsoni* (Hartt). Middle Cambrian. New Brunswick. After Matthew.
15. *Weymouthia nobilis* (Ford). Lower Cambrian. Near Troy, New York. After Ford.
16. *W. nobilis* (Ford). Lower Cambrian, Pearl Street, North Weymouth, Mass. Original.

NOTES ON A CATERPILLAR.

By ANNIE G. H. WHITE, Toronto.

- September 22nd, 1912—Found a large green caterpillar of the Cecropia Moth on a lilac bush. Brought it in and put a branch of the lilac with caterpillar under a large battery jar.
- Sept. 24—Caterpillar commenced spinning about 10 o'clock a.m.
- " 25—Outer wall of cocoon finished; looks like a transparent silk basket.
- " 26—Cocoon almost opaque; looks like an airship; egg-

shaped, $3\frac{3}{4}$ in. long, $1\frac{1}{4}$ in. at widest part; caterpillar can still be faintly seen moving.

Sept. 28—Cocoon complete; caterpillar quiet.

Oct. 8—7 o'clock p.m.: heard a scratching noise like tearing of silk, continued all the evening and next day.

" 9—8 o'clock p.m.: must see what is going on, cannot resist.

" 10—The caterpillar life is over and the pupa lies within its silken case, not to move again till June awakens it.

How to tell what I saw! Words can scarcely express its wonder.

I carefully clipped the cocoon with a scissors, making two incisions, to a point at the top, so that I could bend down the section like a door.

The caterpillar lay within the smooth inner wall. It did not look any different than when last seen. Using a large lens, so as not to lose a single item of its proceedings, I set myself to watch. Presently it rose and fell as if heaving a deep sigh; then it began swaying round and round, then from side to side, very much like the motion of a bear.

After some time of this a crack appeared in the skin at the back of its neck. The motion became more violent. Extending itself, it raised its first pair of legs upward as if "throwing high hands to Heaven" in appeal for help. Then drawing back and down it crouched as if in depths of humility or despair. Looking more deeply into the cocoon I saw the object of these movements and also why a caterpillar wears spines and knobs.

In moving, the spines on the segments rubbed against the wall of the cocoon, and assisted in the removal of the caterpillar-skin, which was the object worked for. The crack in the skin had gradually lengthened down the back. Then the head parts and legs seemed to slide downward, just like a child's dress comes off after it is unbuttoned.

Now the new form of the insect appeared. Soft and of a velvety, indescribably beautiful, yellow, the heavy antennæ and legs looking as if made of gelatine. This new creature kept up the swaying till the whole caterpillar-skin was neatly packed beneath it like a concave cushion in which it rested in the bottom of the cocoon.

After this the pupa kept on moving slightly for some time. Then from around the legs and antennæ (which were now folded flat and close) and from the segments a yellowish glassy fluid seemed to ooze, which hardened and turned brown as it covered the pupa till it became as if varnished. All movement now

ceased, and I closed the opening with adhesive plaster, leaving the place at the top as near to nature as possible, so that I might see the moth emerge in its full beauty and thus will have watched a part of the life cycle of one of Nature's little children.

PROGRAMME OF WINTER LECTURES.

- NOVEMBER 25TH, 1913, (Tuesday). Open Meeting.
Exhibits and Addresses by members.
(Normal School Assembly Hall).
- DECEMBER 9TH, 1913, (Tuesday).
"The Old Iroquoian Religion and the Handsome Lake Reform." (Illustrated)
Dr. C. M. Barbeau, Assistant Ethnologist, Geological Survey.
(Normal School Assembly Hall).
- JANUARY 13TH, 1914, (Tuesday).
"Forestry and Conservation." (Illustrated)
Dr. Clyde Leavitt, Commission of Conservation, Ottawa.
(Normal School Assembly Hall).
- JANUARY 27TH, 1914, (Tuesday).
"The Shedding of Leaves, Flowers and Fruits." (Illustrated)
Dr. Francis E. Lloyd, Department of Botany, McGill University, Montreal.
(Normal School Assembly Hall).
- FEBRUARY 10TH, 1914, (Tuesday).
"Protection of Birds in and around Ottawa." (Illustrated)
Dr. C. Gordon Hewitt, Dominion Entomologist, Central Experimental Farm, Ottawa.
(Collegiate Institute Assembly Hall).
- FEBRUARY 24TH, 1914, (Tuesday).
"Views in the Dominion Parks." (Illustrated)
Mr. A. Knechtel, Chief Forester, Dominion Parks.
(Carnegie Library)
- MARCH 10TH, 1914, (Tuesday).
"The Mackenzie River Region." (Illustrated).
Mr. Charles Camsell, Geologist, Geological Survey, Ottawa.
(Carnegie Library)
- MARCH 24TH, 1914, (Tuesday). Annual Meeting and Presidential Address. "The Breeding of Economic Plants."
L. H. Newman, B.S.A., Secretary, Canadian Seed Growers' Association, Ottawa.
(Carnegie Library)

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