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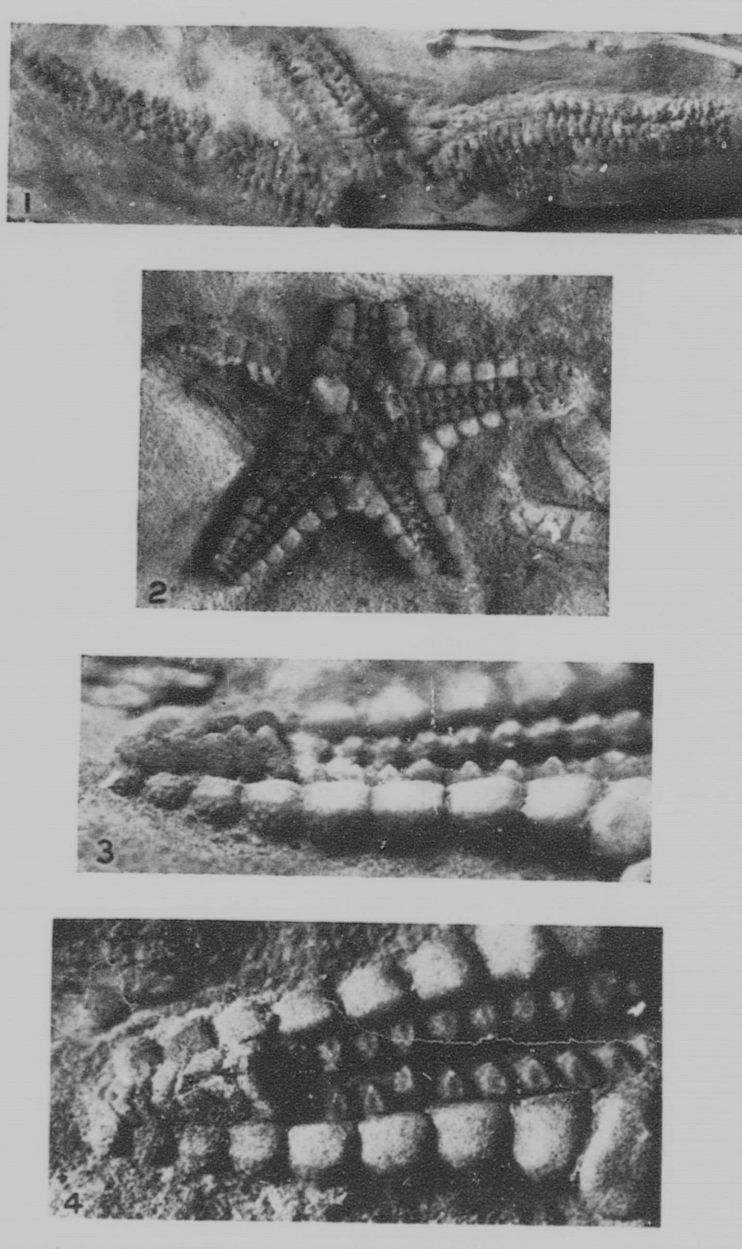

Fig. 1, UFASTERELLA PULCHELLA (BILLINGS); Figs. 2, 3, 4, PROTOPALÆASTER NARRAWAYI, HUDSON.

Figure I. Devonian limestone cliffs on Snake Island, Lake Winnipegosis.

Figure II. Ripple-marks on a block of limestone from the face of the cliff shown in Figure I.

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ON THE NATURE OF THE SO-CALLED "COVERING PLATES" IN PROTOPALÆASTER NARRAWAYI.

By Percy E. Raymond.

In the autumn of 1910, Mr. J. E. Narraway, of Ottawa, found a small starfish in the Black River limestone at City View, a short distance west of the Central Experimental Farm at Ottawa. On examining the specimen on his return from the field he found that the central groove in two of the rays was roofed over, for a short distance, by flat, alternating plates which met on the median line and formed a tight, tent-like covering over the groove. Furthermore, these plates were borne by two rows of small plates just inside the marginal series, and each plate was provided with a cup-like pit into which the proximal end of a covering plate fitted. The specimen had every appearance of being exposed from the actinal side, and assuming that such was the case, the plates were interpreted as being homologous with the covering pieces over the ambulacral grooves of cystids and crinoids. Mr. Narraway at once drew the writer's attention to the specimen, and I fully agreed with him as to its nature and importance. It was next shown to Professor Hudson, whose work on Ordovician echinoderms is well known. He concurred in our views of the specimen, which he studied with great care, and he finally described and figured the species in The Ottawa Naturalist for May and July, 1912. Before the publication of his paper, photographs and descriptions had been seen by three or four paleontologists and students of recent echinoderms, and, it must be confessed, all dissented from our view as to the nature of the "covering pieces."

Recently, in searching the collection of starfish in the Museum of Comparative Zoology, Cambridge, Mass., the writer came upon what seemed to be a second specimen showing the "covering plates." (See plate VI, fig. 1). This specimen has three imperfect arms, all of which show the groove covered by alternating plates which are obtusely pointed at their distal ends, where they fit together closely. Some of the plates have been removed from portions of the arms, and it is then seen that the "covering plates" are supported by small plates with a pit on top, just as in *Protopalæaster narrawayi*. Outside the row of plates bearing the "covering pieces" is a row of small spine-bearing marginals, so that, though the plates are of very different size, there is a complete analogy in arm structure between this specimen and the one found by Mr. Narraway. If the specimen had shown no more than this, it would have been a valuable support to our interpretation of Mr. Narraway's specimen, but on examining it more closely, small patches of top-shaped plates were discovered. These patches are so arranged as to suggest that they once formed part of a covering over the structures now exposed on the arm. On comparing these plates with those on the abactinal side of *Urasterella pulchella*, (Billings), it was found that they were identical with them. Furthermore, the arms of the specimen are of the same shape as those of the *Urasterella*, and that species has small, spine-bearing marginals. The specimen figured is from the Walcott-Rust quarry at Trenton Falls, N.Y., and is associated with specimens of *Urasterella pulchella*.

This specimen shows that, in this case at least, the covering pieces are really ambulacral ossicles, exposed by the removal of most of the abactinal skeleton. Dr. H. L. Clark, to whom I am indebted for many helpful suggestions in regard to this matter, remarks that such a condition of preservation might be expected to be very common, as the actinal side of a starfish, being buried in the mud, might easily be preserved, even though the abactinal side, not so protected, disintegrated.

The chief reason that Narraway, Hudson and myself had for thinking that *Protopalæaster narrawayi* was exposed from the actinal side was that the covering pieces did not look like ambulacral plates, and that they made an apparently tight and imperforate roof over the groove. These plates, instead of being narrow and grooved at the sides for the protrusion of the tube-feet, were wide, thin, and fitted closely together at the sides and ends. But the same condition obtains in the specimen here illustrated, and our argument must fall. A fact in regard to Mr. Narraway's specimen to which we did not attach enough importance is the way in which the marginal plates are truncated on the side now exposed to view. The outer faces are rounded and granulated, and one would expect the lower (actinal) faces to be rounded also. The faces actually presented, however, are flat and smooth, as would be expected if they served as a foundation for the plates of the abactinal side.

The specimen of *Protopalæaster* also shows two plates resting on the disk for which a place can not be found in the structure of the specimen. (See figure 2 of the plate). Professor

Hudson interpreted the larger of these plates as an interradial marginal from another specimen of this species, but the writer is unable to accept this interpretation for two reasons. The first is, that although the shape is much the same as that of one of the interradial marginals, still there is an important difference. This plate is pointed at the wider end, and evidently had a plate resting against each of the two plane faces at that end. The interradial marginals, on the other hand, are not pointed, but have a plate resting directly against the end on a line with the long axis. Secondly, the large plate has another fairly large plate still in position, resting against one of the faces on the larger end, and this plate is larger and of different shape from any of the plates which abut against the inner faces of the interradial marginals. Moreover, if these were plates foreign to this specimen, they would not maintain their natural position in relation to each other, but would be separated. It seems probable that they are plates of the abactinal system of this same specimen, and that they are not far from their original position. A specimen of *Palæaster matutina*, Hall, in the Museum of Comparative Zoology, shows interradial marginal plates of this same form on the abactinal side.

It thus seems probable, both from analogy with the specimen of *Urasterella pulchella* here figured, and from the structure of the specimen itself, that the "covering plates" of *Protopalæaster narrawayi*, are really ambulacral ossicles exposed from the upper side.

EXPLANATION OF PLATE VI.

1. *Urasterella pulchella*, (Billings). A specimen exposed from the abactinal side, with nearly all the plates of the abactinal skeleton weathered away, exposing the ambulacral plates. Near the ends of two of the arms some of the ambulacrals are lost, revealing the pits in the adambulacrals. On the arm running to the left, a small patch of plates of the abactinal covering are still to be seen in position, covering the ambulacrals. The spinose marginals show but faintly in this photograph. The figure is three times natural size, and the specimen, which is from the upper part of the Trenton at Trenton Falls, New York, is in the Museum of Comparative Zoology.

2. *Protopalæaster narrawayi*, Hudson. A photograph of the holotype, showing the "covering plates," and the large displaced plate which is now believed to be an interradial marginal belonging to the abactinal size of this specimen. Note the pointed inner end of this large plate and the smaller plate still in position against one of its faces. This figure is 2.66 times natural size, and was made by Professor G. H. Hudson.

3. The same species. Side view of one of the arms, showing the tuberculate outer surface and the smooth and truncated upper surface of the marginal plates. This is 9.5 times natural size. Photograph by Porfessor Hudson.

4. The same species. View of the same arm, looking down from above, showing the pits in the adambulacrals, and the closely fitting "covering plates." This is 9.5 times natural size. Photograph by Professor Hudson.

NOTE ON A RIPPLE-MARKED LIMESTONE.*

By E. M. Kindle.

The occurrence of ripple-marks on sandstone is a common phenomenon to every geologist, and nearly every one has observed these beautiful flutings in process of formation on the sands of lake or sea shore. The literature on ripple-marks relates almost entirely to these familiar sand or sandstone ripples. The occurrence of ripple-marks on limestone seems to be a phenomenon of such relative infrequency that it appears desirable to record an example which has come under the writer's notice.

The ripple-marks which will be described characterize certain Devonian limestone strata in northern Manitoba. The basin of Lake Winnipegosis is excavated chiefly in limestone of Devonian age, and the principal outcrops of these beds in Manitoba occur around the shores and on the islands of this lake. The best exposures of the Devonian strata about the southern end of the lake, appear on Snake Island.

This island, as noted by Mr. J. B. Tyrrell[1], is classic ground in western geology, having furnished the collection of fossils made by Prof. H. Y. Hinde in 1858, which first determined the presence of Devonian rocks in Manitoba, but the ripple-marked limestone appears not to have been noted by previous observers.

I visited this locality during the past summer, and in company with Mr. A. MacLean examined the interesting ripple-marks which are best exposed on the surface of a large block of limestone which has broken down from the cliff near the northwest corner of the island. This cliff is shown in plate VII,

* Published with the permission of the Director of the Canadian Geological Survey.

[1] Tyrrell, J. B.—Report on Northwestern Manitoba with portion of adjacent districts of Assiniboia and Saskatchewan: Geol. Surv. of Can., Pt. E, Vol. V, 1889-90-91, (1892) p. 163 E.

figure 1. One of the large limestone blocks which has fallen from the face of the cliff, exhibits the large clearly moulded ripple-marks shown in figure 2. The crests of these are two feet apart, and rise about one and one-half inches above their troughs. The ripples curve slightly in crossing the surface of the limestone. The rock on which they are impressed, is a comparatively pure non-magnesian limestone. The surface of the ripple-marks show great numbers of finely comminuted shell fragments. These small fragments of various kinds of molluscan shells, comprise a large share of the material composing the limestone in the middle third of the cliff section in which the ripple-marks occur. These broken shell fragments thus strongly supplement the evidence of the large ripple-marks in indicating vigorous disturbance by wave action of the sea bottom in which they originated. Beyond this fact, it is perhaps not safe to make any deductions regarding the physical conditions under which these ripple-marks were produced. It is clear that the water was of sufficiently moderate depth to permit wave action to agitate the bottom, but it does not follow on the other hand, that the sea was extremely shallow. Nor is any valid ground afforded for the assumption of beach conditions which the discussion of ripple-marks presented in some texts[2] might lead one to make. It has been shown by Mr. A. R. Hunt[3] and others that "ripple-marks occur at much greater depths than is commonly supposed." Dana[4] has has stated that "ripple-marks may be made by the vibration of -3- waves even at depths of 300 to 500 feet." The unusually large size of these ripple-marks suggest water of greater depth than that which develops the ripple-marks seen along many beaches. Hunt's observations have shown that thousands of specimens of marine shells are sometimes killed in six fathoms of water by wave action. The same observer has found evidence of much damage to shells living in fifteen fathoms from the same cause[5]. The broken shell material in these limestones might therefore have been produced in water a few fathoms in depth. The limestones which immediately follow the ripple-marked beds in the cliff section of Snake Island show but little fragmental material, the fossils contained in them being in a good state of preservation. Ripple-marks appear to be absent from these upper beds.

[2] LeCont states (Elements of Geology 1888, p. 3a). "By means of these characteristics (ripple marks) of shore deposit, many coast lines of previous geological epochs have been determined."
[3] On the formation of ripple marks: Proc. Roy. Soct. Lond., Vol. XXXIV, p. 8, 1883.
[4] J. D. Dana, Manual of Geology 2d ed. p. 665.
[5] Op. cit, pp. 8, 12.

The ripple-marked beds of the Snake Island section lie not far above the *Stringocephalus* dolomite. Since the dolomite bearing *Stringocephalus burtoni* does not appear in the Snake Island section, the precise distance of the ripple-marks above this formation cannot be stated. They belong near the base of a formation called the Manitoban. The following fossils, determined by Prof. J. F. Whiteaves, are recorded from the limestones of this formation on Snake Island by Tyrrell:[6]—

Cyathophyllum vermiculare var. *precursor*.
Alveolites vallorum,
Atrypa reticularis,
A. aspera,
Cyrtina hamiltonensis,
Rhipidomella striatula,
Paracyclas elliptica,
Raphistoma tyrrelli,
Belerophon pelops,
Euomphalus subtrigonalis,
Omphalocirrus manitobensis,
Cyrtoceras occidentale,
Gyroceras submamillatum,
Dinichthys canadensis.

To this list may be added *Astraeospongia hamiltonensis*. The small six-rayed spicules of this sponge occur in large numbers in a band of limestone 8 inches below the top of the cliff shown in figure 2. On the evidence of this fauna these beds were assigned to an Upper Devonian horizon by Whiteaves.[7]

POPULAR ENTOMOLOGY.

THE ENGRAVER BEETLES (FAMILY IPIDÆ).

(Continued from Vol. XXV, page 145.)

BY J. M. SWAINE, Assistant Entomologist for Forest Insects, Division of Entomology, Ottawa.

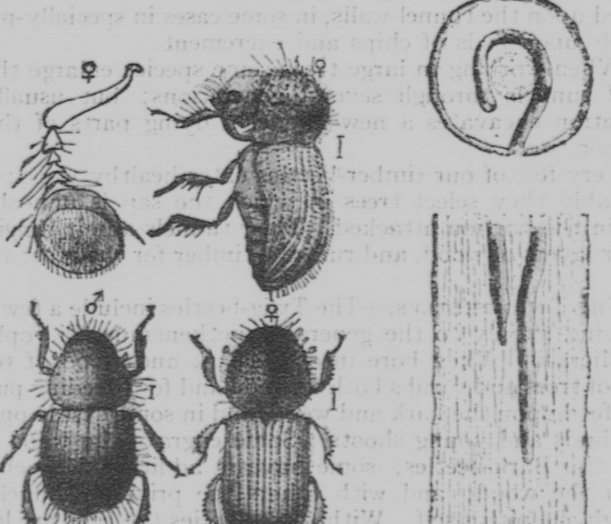
The Ambrosia-beetles, or Timber-beetles, breed entirely within the wood, the eggs of some species being laid well within the heart-wood. They bore small, round tunnels directly through the bark and into the wood. There may be several secondary egg-tunnels cut by two or more females, branching from a primary entrance-tunnel. On the other hand the tunnels

[6] Geol. Surv. of Can., Pt. E. Vol. V, 1889-90-91 (1892), p. 163 E.
[7] Contrib. Can. Pal., Vol. I, Pt. IV, p. 258, 1892.

of some species of Anisandrus consist merely of a short entrance-tunnel and one or two short lateral brood tunnels cut immediately beneath and parallel to the wood surface. Rarely, the tunnels of closely allied species may branch from a common entrance-tunnel.

The number of males in some genera of this group is small; in some species of Anisandrus there are seldom more than one or two males in a brood of from twelve to twenty. With some species the males are apterous, and the females are fertilized before leaving the brood trees.

In two genera, Anisandrus and Xyleborus, the eggs are deposited free in the tunnels and with most species the larvae feed solely upon the fungus without cutting any tunnels of their own whatever. The larvæ of Platypus live free in the tunnels until nearly ready to pupate, when short pupal cells (cradles) are cut from the sides of the tunnels deep within the wood.



THE SHOT-HOLE BORER, *Anisandrus dispar*. Adults, an antenna, and tunnels in an apple branch. (After Hubbard).

In Corthylus, Trypodendron, Pterocyclon and Gnathotrichus the eggs are laid in shallow niches cut by the female along the sides of the tunnel, and usually well within the wood; the larvæ extend these niches away from the tunnel, forming larval cradles, in which they remain until mature. The length of the completed cradles is slightly greater than that of the adult beetle.

The adults of the Ambrosia-beetles bestow a certain amount of care upon the young larvæ, furnishing them with the initial supply of food-fungus, referred to below, and removing the excrement from the tunnels outside the cradles.

The chief food of these beetles is a fungus known as Ambrosia, which they propagate within their tunnels. From this habit comes the name "Ambrosia-beetles." The tunnels are kept entirely free from chips and refuse, and the walls are covered by the fungus growth. So far as known, except in the cases of a few closely-allied forms, each species of beetle uses a characteristic species of fungus. The mycelium of the fungus pervades the tissue about the tunnels for one or two millimetres, colouring the wood dark brown or black, so that the tunnels have the appearance "of having been bored with a red-hot wire." By this means the tunnels of Ambrosia-beetles are easily distinguished from those of other wood borers. When new tunnels are cut, the fungus is carried there by the beetles, and started upon the tunnel walls, in some cases in specially-prepared tunnels upon beds of chips and excrement.

When working in large trees some species enlarge the same set of tunnels through several generations; but usually each generation excavates a new abode in dying parts of the same or other trees.

Very few of our timber-beetles enter healthy wood; almost invariably they select trees in which the sap is unhealthy, at least in the portion attacked. Their tunnels admit fungi to the deeper layers of wood, and ruin the timber for the most valuable uses.

THE TWIG-BEETLES.—The Twig-beetles include a few species belonging mainly to the genera Hypothenemus, Pityophthorus and Micracis. They bore into the bark and wood of terminal twigs of trees and shrubs both for food and for breeding purposes. They feed upon the bark and wood, and in some cases apparently upon buds and young shoots. Some engrave the wood surface as do the Bark-beetles; some have in addition deep chambers within the wood; and with others the primary tunnel is cut through the pith itself. With some species the eggs are laid free in the primary tunnels, and the larvæ either feed upon the tunnel walls or cut longer or shorter mines through the wood. Several species of this group have a very close relation to a fungus always found in their tunnels.

A summary of the borrowing habits of these first three groups brings out some interesting relations. Among the Bark-beetles the eggs are usually laid in niches along the sides of the primary tunnels, and the larval mines are usually well-developed. A few species cut their tunnels and mines entirely in the bark;

many cut them between the bark and the wood, the pupal-chambers being merely an enlargement of the ends of the larval-mines; others form the pupal-chamber by driving the ends of the larval-mines a half inch or less vertically into the wood, some even cutting the distal half of the larval-mines just below the wood surface; and lastly, a very few small species cut almost the entire system of tunnels and mines slightly below and parallel to the surface of the wood. The Twig-beetles cut both tunnels and mines, when the latter are present, through the wood and pith of twigs. Among the Ambrosia-beetles the tunnels are in all species entirely within the wood, but the depth to which they enter varies considerably with the species. In the genera Corthylus, Pterocyclon, Trypodendron and Gnathotricus the eggs are laid in niches along the sides of the tunnels, and the larvæ cut very short mines, known as cradles. The species of Platypus lay the eggs free in the tunnels, but the larvæ when nearly ready to pupate cut short cradles in which they pupate and remain until mature. In the genus Xyleborus the eggs are laid free within the tunnels, but the larvæ cut no cradles, pupating in the primary tunnels. There is thus a fairly well-marked gradation in habit, both as to the depth of the tunnels and mines below the surface and as to the degree of development of the larval mines.

The fourth group contains those species not included among the Bark-beetles, Ambrosia-beetles and Twig-beetles. The American species are few in number. *Coccotrypes dactyliperda*, an imported form, burrows in date seeds; *Cryphalus jalappæ* is found in jalap root; *Hypothenemus eruditus* burrows in nuts, book-bindings, and other dry substances, as well as in dead twigs of grape and orange; *Pityophthorus coniperda* occurs in pine cones; *Hylastinus obscurus* bores in the roots of clover; and *Cactopinus hubbardi* in the pith of the giant cactus.

Enemies of the Scolytidæ.—The Scolytids have many natural enemies. They are preyed upon by many predaceous and parasitic insects, by birds, and are frequently attacked by fungous diseases.

Adults and larvæ belonging to the families Cleridæ, Staphylinidæ, Colydiidæ, Histeridæ and others enter the burrows and feed upon the eggs, larvæ, pupæ and adults of the Scolytids. The predaceous larvæ often burrow through the larval-mines after the Scolytid larvæ, which they finally overtake and devour. Various dipterous larvæ feed upon the eggs and younger stages. Many small hymenopterous parasites prey upon the larvæ and pupæ, and have even been bred from the adults. Larvæ of large wood-boring beetles, such as Monohammus, destroy the Scolytid tunnels by their borings and prove serious enemies to the beetles.

Woodpeckers destroy large numbers of the Bark-beetles, and at times help considerably to check their ravages.

The tunnels, especially of the Timber-beetles, are frequently overrun with various species of mites. The eggs of these mites hatch before the young beetles are ready for their flight, and in this way young and adult mites are carried by the beetles attached to their bodies to the new tunnels. At certain times the declivity of the elytra of various species of Ips (Tomicus) will be found covered with minute mites, and *Pterocyclon mali* and *P. fasciatum* are frequently almost completely covered with them upon emerging from their tunnels in the spring. Many of these mites appear not to injure their hosts; but certain species are very destructive, and breed in the larval galleries or pupal cells upon the young of their hosts.

Fungous diseases are sometimes very destructive to them. All stages of the insects are frequently found, more particularly in wet weather, filled and covered with the white mycelium of the fungus. In a felled pine log I noticed that hundreds of adult *Ips pini* had died from this cause in less than two weeks.

Friends of the Scolytidæ.—As these beetles feed mainly upon dying and dead branches and trunks of trees, any cause which tends to weaken or destroy the trees aids the Scolytids in supplying the proper food-plant. Heavy storms, forest fires, other insects, and the destructive work of man, are perhaps the chief of these.

Economic Importance.—Owing to the destructive habits of many of its members, the family Scolytidæ is of considerable economic importance. The injury done by these beetles may take two forms: living trees may be weakened and killed, and standing and felled timber and sawn lumber may be rendered useless for many purposes by the tunnels of the beetles.

But few Scolytids attack living, healthy trees, although there are a few species which apparently choose only trees in this condition. The majority of species attack only dying or dead trees, and a few breed in dead wood only. Stumps, diseased or dead branches, brush piles and recently-felled logs are their favourite breeding places. Most species will not, as a rule, molest living trees at all if rapidly-dying and recently-felled food-plants are available, but if trees in this condition are not to be had in sufficient quantity, many of these species will attack perfectly healthy trees and prove very destructive.

The injury done by the species which attack healthy and diseased trees is, in certain regions and at recurring intervals, very considerable. The work of *Dendroctonus frontalis* in the spruce and pine of West Virginia and the adjoining States, of *D. piceaperda* in the spruce of the Northeast, and of *D. ponderosa* in the spruce and pine of the Black Hills of South Dakota, may be cited in illustration. *D. frontalis* and *D. ponderosa* attack the living, healthy spruce and pine, and in spite of the resin are able successfully to rear their young within the back. The tunnels and mines thus formed interfere seriously with the flow of sap, and either kill the tree outright or induce an unhealthy condition favourable to the assistance of other borers and fungous diseases. It seems very probable that many destructive forest fires have been fed by trees dying or dead from the attacks of Scolytids. At present *D. murrayanae* is destroying Jack Pine in Manitoba; and several species of *Dendroctonus* are destructive to pine and spruce in British Columbia. *D. valens* is causing more or less injury at present in pine and spruce in Ontario and Quebec forests.

The Timber-beetles, by driving their tunnels through the wood in many directions, often render timber unfit for use.

Hylastinus obscurus breeds in the roots of clover in many parts of the Northeastern States and in Canada, and in some localities proves a serious pest.

Corthylus punctatissimus occasionally does considerable damage in young sugar-maple plantations.

Scolytus rugulosus, the fruit bark-beetle, attacks unhealthy fruit trees, and occasionally bores in those apparently sound.

Phlœotribus liminaris frequently attacks peach and cherry.

Xyleborus dispar sometimes occurs in diseased or weakened apple trees.

BIRD NOTES, 1912.

During February and early March three species of ducks were seen in London, Ont., at the forks of the Thames, just opposite Dundas Street bridge. Over this bridge the street cars, waggons and foot passengers were constantly passing. The ducks were apparently attracted to the spot by a stretch of open water, the severe frosts of last winter having rendered such feeding grounds unusually scarce.

Feb. 4th—A. Merganser about 20, Golden Eye about 10. Feb. 15th—A. Merganser 43, Golden Eye 15, Old Squaw 2 (1 m. 1 f.). They were seen at intervals till well into March.

A new record for Middlesex was the Red-breasted Merganser, 1 male, Thames River, near Springbank Park, April 27th.

Observed in Victoria County at or near Sturgeon Lake: Aug. 9th, one Black-bellied Plover; Aug. 16th to 30th, at frequent intervals, Caspian Tern, possibly six at once: they were usually with the A. Herring Gull or Ring-billed Gull. Two specimens were taken, one young and one adult.

J. F. CALVERT, London, Ont.

FIRST RECORD OF *AMARANTHUS SPINOSUS* L. IN CANADA.

Amaranthus spinosus L., the Thorny Amaranth, was sent from Swansea, Ontario, August 23rd, 1912, to the Central Experimental Farm, Ottawa, for identification. As far as we are able to judge from the literature at hand and enquiries made, we are of the opinion that this is the first record of this weed in Canada. It is hardly a desirable immigrant, as it has caused considerable annoyance to agriculturists beyond our southern border.

Like the other species of Amaranth, or Pigweed, it is a coarse annual plant producing a large number of seeds. It differs from them in having a pair of stout spines in the axil of each leaf. These spines are from ¼ to ½ inch in length, and no doubt would be extremely irritating to horses working in a field infested with this weed. A typical plant measured three feet in height with a root ten inches long and one inch in diameter, red in colour, graduating to white at the tip. The plant is very bushy in general appearance; the particular specimen in question had six branches from the base of the stem varying in diameter from ½ to ¾ inch thick. The flowers are monoecious, the staminate being arranged in long and slender spikes and the pistillate in clusters in the axils of the leaves.—F. FYLES.

BEE WITH POLLINIA ATTACHED TO ITS FEET.

In the collection of insects in the Division of Entomology at the Central Experimental Farm, is a specimen of *Epeolus mercator*, a solitary bee, with the pollinia of a species of *Asclepia*, probably *A. syriaca*, attached to its feet. Each appendage consists of a small hard implement with two arms which grips the claws of the bee like a clip, and attached to this clip by ligature strands are the two pollinia which are in the form of translucent, yellow, horny, shining leaflets about one millimetre in length.

The flower of the *Asclepia* produces an abundance of easily accessible honey, and is consequently visited by many insects, but it is smooth and slippery and offers no convenient place for the insect to alight upon, so that the only way it can support its weight is by inserting its claws in the slits between the anthers where the clip-like bodies are situated. Endeavouring to obtain a firm hold the insect inserts its claws in the slit in the clip, and then when it withdraws its foot the clip comes with it and also the two pollinia of the adjacent stamens which are dragged out of their niches. The pollen masses are conveyed on the feet to the stigmas of other flowers, the approaches to which lie through chambers concealed in the slits. When the foot is withdrawn the ligatures attaching the pollinia to the little clip are broken and the pollinia are left in the cavity while the clip maintains its grip of the claw.

Further particulars of the process of fertilization in the Asclepiadaceae may be found in Dr. Oliver's translation of Prof. Kerners' "Natural History of Plants," from which much of the information here given has been extracted.—F. W. L. SLADEN.

A NOTE ON THE NORTHWESTERN DISTRIBUTION OF THE SUGAR MAPLE.

BY O. E. JENNINGS, B.SC. (AGR.), PH.D., CARNEGIE MUSEUM, PITTSBURGH, PENNSYLVANIA.

As the current manuals are not definite as to the northwestern distribution of the Sugar Maple (*Acer saccharum* Marsh.) it is probably worth while to note its occurrence near Fort William on the northwestern shore of Lake Superior.

It became the writer's good fortune to spend three months botanizing along the northern shore of Lake Superior during the past summer. The region explored extended from Fort William on the west to Heron Bay on the east, and a delightful region this is for a botanist or nature lover in any form. Upon becoming acquainted with Chief Penassie of the Fort William Indian Reservation, the writer soon found him well versed in the distribution of many of the native plants of the region. Mr. Penassie was kind enough to point out a rather obscure trail leading up through a narrow defile in the mountains about four miles south, and a little west, of Fort William, where is located a colony of perhaps fifty sugar maples. The maples are well protected by precipitous walls on either side of the defile, which is here about one-third of a mile wide, and they are on a shelf at an altitude of probably 1,500 feet above the sea, in well-drained soil.

The trees are mostly rather gnarled and, from the fact that a number of saplings were found on the outskirts of the colony, it would appear that the colony is now spreading and that the sugar maple may have been a rather recent immigrant into this particular location. At the bases of the trees there are deformations, due to the rather crude method by which the Indians have been obtaining the sap. A birch-bark teepee is located in the grove and there the sap is gathered and boiled. The sap is obtained by cutting a chip out of the base of the tree, inserting a thin chip in a nick cut in the bark just below the larger incision, and placing below the point of the chip a crude bucket formed by folding upwards the ends of a piece of birch bark. The ends of the birch bark are kept in the folded position by means of thongs of spruce root. This crude but serviceable bucket catches the sap as it flows out of the hacked wound and drips off of the end of the slanting chip, and the sap thus caught is easily carried to the teepee.

BOOK NOTICES.

COMPARATIVE ANATOMY OF VERTEBRATES.—By J. S. Kingsley; 401 pages, 346 illustrations. Price $2.50 net. P. Blakiston's Son & Co., Philadelphia.

We have here a really good elementary text on Comparative Anatomy of Vertebrates. The subject matter of the introduction is well chosen, and includes just the proper groundwork for the later study. The first 120 pages are devoted to the Integument and the Skeleton. The discussion is clear and comprehensive, and particularly well illustrated. There is a short but excellent discussion of the Coelom, pages 121 to 124. I was somewhat disappointed in the section on the Muscular System, pages 125 to 136. As a short discussion, this section is excellent, but a more complete account would seem to me justified in a text of this kind. The Nervous System and the Organs of Special Sense, are dealt with on pages 137 to 205, and receive excellent treatment. Several of the new diagrams here presented will prove very acceptable to both teacher and student. I should have preferred a discussion of the human brain at the close of the section on that organ. The Digestive, Respiratory, Circulatory, and Urogenital Systems occupy the remaining half of the book, and receive capital discussion. The many new diagrams, some of which are particularly useful, add appreciably to the value of the text. There is a well chosen Bibliography at the close, and a valuable series of Definitions of Systematic Names. The book is altogether an excellent one. The author has compressed an immense amount of information into its 400 pages, and has presented it in a very clear manner and with logical sequence. It will fill a decided need in the teaching of comparative anatomy. The publishers are also to be complimented on the excellent appearance of the work. It is of the ideal size, shape and strength for a student text.

J. M. S.

PLANT BREEDING IN SCANDINAVIA.—By L. H. Newman, B.S.A., Canadian Seed Growers' Association, Ottawa, 1912; 193 pp., with 63 illustrations (photographs, diagrams and tables) in the test. Price $1 (cloth $1.50).

In this book the author, for many reasons, has confined his investigations largely to the work which is being prosecuted at the plant breeding station at Svalof, in southern Sweden. This work became known to English speaking nationalities chiefly through Hugo de Vries' well known book "Plant Breeding," published in Chicago, 1907; but unfortunately the information given in the said book, and the conclusions drawn from statements made were not in full accordance with the actual work and results at Svalof. The same can be said, more or less, of practically all accounts of the above work published outside of Scandinavia.

Any charges of the kind indicated cannot be laid against the book presented by Mr. Newman. On the contrary, the statements made and the conclusions drawn are in most perfect accord with the actual facts and can therefore be accepted with absolute confidence. The accuracy and completeness with which the different problems have been treated, do the author the greatest credit. They are due to his efforts "to know what is true in order to do what is right," a most difficult task in this particular case, as practically all original publications on the breeding work at Svalof are published in Swedish, a language which it requires hard and untiring efforts to become familiar with.

The book deals not only with the plant breeding methods, as they have been developed in Scandinavia, but it also gives in concise form a general survey of the different theories on which breeding methods are based. For this reason it becomes of interest to all students in any way connected with the study of breeding in general.

M. O. MALTE.

ONTARIO NATURAL SCIENCE BULLETIN, 1912; Journal of the Wellington Field Naturalists' Club, Guelph, Ont.

We were glad to receive, recently, Bulletin No. 7, of the above club. This annual publication contains contributions of much interest to naturalists in Canada. In the present issue of 77 pages, the following articles appear: The Myxos of Middlesex, by John Dearness; The Plant Formations of the Bruce Peninsula, by A. B. Klugh; Ginseng and its Diseases, by H. H. Whetzel; The Rosaceæ and Leguminosæ of Galt, Ont. and Vicinity, by W. Herriot; Jungle Life on the Hills of South India, by G. J. Spencer; Liliaceæ of County Peel, by J. White; The

Bartramian Sandpiper Breeds near Guelph, by Herbert Groh; The Flora of the Sand Dunes of Prince Edward County, by A. B. Klugh; Food Habits of the Bullfrog, by E. W. Calvert; The Edible Toadstools—The Smooth Lepiota, by W. A. McCubbin; Weed Migration, by F. Mitchell; An Addition to the List of Toronto Butterflies, by Arthur Gibson, and Notes on the Mammals of the Bruce Peninsula, by A. B. Klugh. A. G.

HOUSE-FLIES AND HOW THEY SPREAD DISEASE.—By C. Gordon Hewitt, D.Sc., Dominion Entomologist. Cambridge: at The University Press, 1912. Price 1s. net. New York Agents: G. P. Putnam & Sons, 2-6 West 45 St., New York.

This volume of 122 pages, one of the series of the Cambridge Manuals of Science and Literature, has recently appeared. It is replete with concise, accurate facts concerning the subject of house-flies and disease, a subject which every day is becoming of more vital interest to every wide-awake citizen who values the health of the community in which he resides. There is no more deadly and rightly much abused insect than the house fly, and such reliable information as is contained in this volume will do much towards making wider and better known the habits of this "potential disease-carrier and constant frequenter of filth."

The volume is divided into two parts. Part I—The Natural History of the House-fly, contains six chapters: I—Introduction; II—The Structure of the Fly; III—The Life-history and Breeding Habits of the House-fly; IV—The Habits of the House-fly, V—Other species of flies found in houses: The Lesser House-fly; The Latrine-fly, The Stable-fly, The Blow-fly or Blue-bottle, The Cluster-fly, and *Muscina stabulans* (which has not yet received a popular name); VI—The Parasites and Natural Enemies of the House-fly: *Empusa muscæ*, Chelifers, mites borne by the House-fly, Thread-worm parasites, Protozoal parasites, and Insect Enemies. Part II.—The Relation of House-flies to Disease, embraces chapters VII to XI. Chapter VII deals with The Carriage and Distribution of Micro-organisms of Flies; VIII—The Dissemination of Typhoid Fever by Flies and their Relation to Summer Diarrhoea; IX—The Relation of Flies to certain other Infectious Diseases: Tuberculosis, Ophthalmia, Cholera, Plague, etc.; X—House-flies in relation to (1) Myasis of the Intestinal and Urinal tracts, and (2) The Spread of Parasitic Worms; XI—Preventives and Control Measures.

In the text there are 19 illustrations, the author being responsible for all with the exception of two. The general appearance, the printing and the paper used in this manual are all excellent, and what will please the lay mind, there is a total absence of all technical terms. A. G.

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