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# THE OTTAWA NATURALIST

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AGENCIES THROUGHOUT CANADA



# THE OTTAWA NATURALIST

VOL. X LVI.

JANUARY, 1913

No. 10

## A NEW CANADIAN CIRRIPEDE, PARASITIC ON A SHRIMP.

(Resumé of Mr. F. A. Potts' research at B. C. Biological Station).

By PROFESSOR E. E. PRINCE, Commissioner of Fisheries,  
Ottawa.

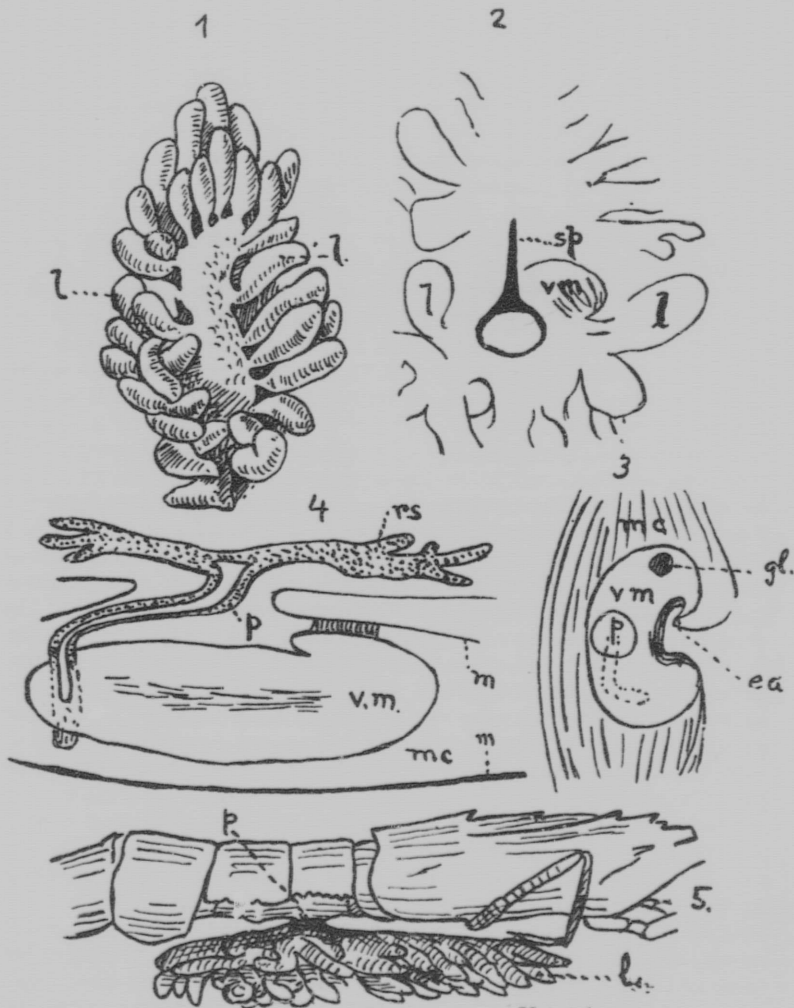
The naturalist who spends hours on the sea-shore, now and then finds specimens of shore crabs, on the under-side of which is attached a yellowish brown mass, resembling a small potato. This soft rounded lump is really the mature stage of a parasitic crustacean. Just as a pug and a greyhound show dissimilarities, though a child knows that both are dogs, so this sac-like parasite is a crustacean, a member of the Order Cirripedia or Barnacles, which Order, Dr. Starr Jordan says, furnishes an example of "degeneration through quiescence . . . the barnacles being most nearly related to the crabs and shrimps." Charles Darwin gained early fame by his studies of the Cirripedes, and his monograph on the Order is a classic of zoological science. In early life each passes through one or more active stages, and later becomes fixed and wondrously transformed. The transformation is one of degeneration, but while the barnacle (Fam. Balanidæ) is strange enough in its changes, the sub-order Rhizocephala furnish us with the most extraordinary examples. The sac-like parasite referred to above is rightly called *Sacculina*. It comes from the egg as a minute water-flea called a Nauplius, and changes into the more complex Metanauplius, and after swimming about freely it attaches itself to a crab, penetrates the crab's shell with one of its hollow antennæ. Now follows one of the most marvellous circumstances in the entire range of biology. The whole of the soft contents of the Cirripede's body is squeezed through the hollow tube or antenna into the body of the crab, rather recalling a cat squeezing its way through a small drain pipe. Soon it works its way to the intestine of the host, but later pushes to the exterior, hanging on as a sac, below the crab by a short peduncle. The top of this neck shows branching roots, which penetrate the organs of the crab,

extend into its jointed limbs, and thus form a most elaborate network for absorbing the fluid nutriment from its host. The bunch of roots may form a compact matted mass in *Pellogaster*. The crab, though apparently incommoded by this fleshy bag attached to its body beneath, seems not to suffer greatly, but it does not grow much, as moulting of the hard shell is arrested. "Fortunately," says Dr. Arthur Shipley, "*Sacculina* appears to live only three years, and when it dies the crab resumes its growth," but some recent researches by Mr. C. G. Robson point to the death of the crab in some cases, owing to starvation; the fatty materials left being insufficient for its necessities. Professor Giard found in the helmet crab (*Stenorhynchus*) that the penetration of the cirripede-parasite caused the destruction of the ovaries and the spermaries. In the latter event, the male crab assumes some of the features of the female and exhibits a broader tail and smaller pincer claws; but in the female crab, the abdominal feet become smaller in size as in the normal male. The studies of Dr. Geoffrey Smith show, on the other hand, that more yolk-forming material (as in a female crab about to spawn) results in a crab with *Sacculina* attached; and Mr. Robson found an excessive production of fat in the liver and blood in affected crabs of both sexes, resembling the condition of the male when about to cast his shell; or, in the female, resembling her condition when maturing her eggs before depositing them.

It has been reserved for Mr. Potts, a Fellow of Trinity Hall, Cambridge, who came over from England, early in 1911, to pursue marine researches at the Dominion Biological Laboratory, Departure Bay, near Nanaimo, B.C., to discover a new Cirripede, which surpasses all previously described species in its strange structure and life history.\* Mr. Potts' main purpose was the study of the Annelids of the Pacific, and his investigation of this new parasitic Cirripede was a subsidiary piece of work, and abundantly shows what interesting original discoveries await biological students who will spend a season or two at any of the Biological Stations of Canada.

Called by Mr. Potts *Mycetomorpha vancouverensis*, this new species, for which indeed a new genus *Mycetomorpha* had to be established, appears as a fungus-like sac on the under-side of a Pacific shrimp (*Crangon communis*, Rathb.), close to the basal joints of the abdominal limbs. (Figs. 1 and 5). In form it is an elongated sac,  $\frac{2}{3}$  in. long and  $\frac{1}{3}$  in. wide, and beset along the margin by crowded club-shaped lobes, over fifty in number. (Fig. 1 L.) The sac is very thin-walled, a delicate muscle-layer being indicated by faint striations, through which the round

\* See Mr. Potts' paper in Spengel's Zoologisch, Jahrb. 1912, pp. 575-594, 2 Pls.



X 3 (about).

- Fig. 1. *Mycetomorpha* viewed from the ventral, lower side.  
 Fig. 2. *Myce.omorpha* upper or dorsal side, showing chitinous ring around the peduncle, and anterior spike.  
 Fig. 3. Diagram showing position of some organs, and bay on one side where mantle duct opens (ea).  
 Fig. 4. Diagram of visceral mass, peduncle and roots in section.  
 Fig. 5. Diagram of side view of *Mycetomorpha* attached to the shrimp.
- |                                 |                           |
|---------------------------------|---------------------------|
| ea. external aperture of duct   | p. peduncle of attachment |
| gl. modified colleterial gland  | rs. root-system           |
| l. lobes of <i>Mycetomorpha</i> | sp. chitinous spike       |
| m. mantle                       | vm. visceral mass.        |
| mc. mantle cavity               |                           |

visceral mass is visible, on the left side. The creature has no mouth or digestive canal, or other organs, excepting the egg-producing gland which consists of ovarian follicles between thin muscular septa, each follicle containing a syncytium or mass of united protoplasmic bodies, showing small deep-staining nuclei (the oogonia) and larger nuclei, which are centres of oocytes. Small vacuoles or spaces are present in each oocyte, but there is no trace of yolk in any of these primitive developing eggs. Egg-shaped bodies, much larger than the young eggs, occur in the ovary and in the ventral part of the sac or mantle cavity. These bodies exhibit a central mass of small cells, with nuclei, and a thin cuticle (like the embryonic cells of the Cypris-larvæ described later) around which is a yellow layer of globules, really yolk, outside of all being an external cuticle. There also occur, in the developing eggs, two or three vacuolated cells, each having a darkly staining nucleus. Mr. Potts could find no trace of spermaries, and he concluded that the species is parthenogenetic, the eggs in the ovary, in his opinion, hatching out embryos resembling the Ostracod, *Cypris*, and these migrating between the muscular layer and the inner ectoderm of the mantle, break through the latter, and then assume the form and structure of the Cypris stage. Among the Cypris-larvæ in the mantle cavity are large cells which may be degenerated ova, probably from the mantle wall, these having dropped into the mantle cavity. Mr. G. W. Smith found that in *Sacculina*, as Mr. Potts tells us, a few unfertilized eggs remained in the ovary after most of them had reached the mantle cavity; but, in *Mycetomorpha*, these developing eggs are in an advanced segmented condition, and so uniform in structure as to preclude any suggestion that they have degenerated.

On the left side of the thin-walled mantle sac is an indentation or bay, where a small round orifice occurs, (Fig. 3 *ea*) the exit of a duct, which curves round the visceral mass, and exhibits an internal opening or outlet from the mantle cavity. Through this duct some larvæ may be expelled, but it is unlikely, the walls being so thin and delicate, and lacking the strong musculature seen in *Sacculina* and *Pellogaster*, in which species the larvæ are forcibly ejected from the parent. Mr. Potts thinks that the larvæ escape in *Mycetomorpha* through apertures formed by the thinning away of the mantle at certain points. In the two Rhizocephalans, referred to, special colleterial glands secrete tenacious matter to bind the eggs in a mass and attach them to the mantle, and in this new form two disc-like patches occur on the upper (Fig. 3 *gl.*) and lower surface of the visceral mass, which from their position, etc., appear to correspond to such glands modified, and now secreting yolk-matter and nourishing

the growing ovary. This view is supported by the fact that they were in functional activity though the eggs had just been extruded, and the new series of eggs were in a very early stage.

As already stated, the eggs give origin to embryos which develop into active little crustaceans exactly like free-swimming Ostracods or water fleas (Cypridæ), possessing a transparent bivalve shell and numerous paired limbs, and crowding the capacious mantle cavity, until they finally find their way into the external water.

*Sylon*, a Rhizocephalan, parasitic on shrimps, is known to reproduce parthenogenetically, and the same doubtless applies to *Mycetomorpha*, as Mr. Potts found no trace of any male organs.

*Mycetomorpha* lives upon the juices of its host which are sucked in by the short branches of the root-system (Fig. 4 *rs*) and carried by a hollow space or lacuna into the short oblique peduncle (Fig. 4 *p.*) or neck of attachment to the shrimp, this neck being as usual strengthened by a ring of hard chitin, from which a median spike projects forward. (Fig. 2 *sp.*) The upper branching part or root-system of the peduncle (Fig. 4 *rs*) appears like a matted strip of short branches given off laterally along the under side of the great ventral nerve cord of the shrimp, these terminating in the ventral muscles. The root-system does not penetrate the host extensively, like *Sacculina*, but extends only about a segment and a half of the body in front of the peduncle and less than a segment behind the peduncle.

*Mycetomorpha* is a most interesting addition to the marine fauna of Canada. Like other Rhizocephalans it is, when adult, a most degenerate animal, with its rounded shapeless body destitute of limbs, sense organs, mouth and digestive canal, gills, heart or blood-vessels. Clinging tightly to its host by its peduncle with branching extensions, it sucks the nutrient juices, and devotes its sluggish energies to producing eggs, but in the absence of a male, these are parthenogenetic, and they give birth to embryos, which skip some of the larval stages of other Cirripedes, and appear in the mantle or brood cavity as active swimming Cypris-larvæ, and seem to then burst through the skin of the parent to wander about in the open waters of the sea.

Carl Claus said of the Crustacea, as a whole, that their development from the egg is "almost never direct, for it is rarely that the young, after hatching out, possess the form which they will have when adult. Almost always there is a complicated metamorphosis, and when they are destined later to live the life of parasites, the metamorphosis is regressive." *Mycetomorpha*, in its young stages, could hardly be more unlike its adult form, and in its development and mode of life it is a remarkable illustration of degenerative evolution or regressive development.



NEW OR RARE BIRD RECORDS FROM MANITOBA,  
1912.

BY NORMAN CRIDDLE.

The following notes refer chiefly to birds that have not hitherto, so far as I am aware, been recorded from the Province of Manitoba, and all are new to the fauna of Aweme.

SAY'S PHOEBE, *Sayornis saya* (Bonap.) Baird.

An example of this bird was secured by my brother Stuart, on April 23rd, close to some deserted farm buildings, and another one observed three days later. A bird almost surely of the same species was heard uttering loud cries in an old barn the previous year, but made its escape before it could be observed closely. Others have also been seen from time to time in past years, but the above constitutes the first authentic record east of Saskatchewan.

It has, however, been found breeding in North Dakota as well as from Saskatchewan westward to the coast, so there is good reason for expecting that it will eventually be found nesting in Manitoba also.

## OBERHOLSER'S HORNED LARK.

This bird, known scientifically as *Otocoris alpestris enthymia*, was found breeding in company with a colony of Chestnut-colored Longspurs; a specimen was also collected by my brother, Stuart, on a ploughed field in April. He submitted two to Mr. Oberholser, who determined them as above.

This race, to judge from the latest Check List, has not yet been recognized as valid by the A. O. U., so may very possibly intergrade with other forms found further west. In Manitoba its nearest ally seems to be *praticola*, from which it is very difficult to separate during the migratory seasons. When breeding, however, it selects the open prairies, while the Prairie Horned Lark confines itself more to the broken wood-lands, where there are small plains or bare hills surrounded intermittently with trees, though it seldom, if ever, seeks shelter in or among the trees. When better known, *enthymia* will probably be found to be quite a common breeding bird in the province.

Another horned lark, the Pallid, has also been identified from Aweme by Mr. Oberholser, which adds yet another to the local list, though previously collected and recorded for Manitoba. Thus to date we have records of four races, *praticola*, *arctica*, *enthymia* and *hoyti*, while Mr. Seton enrolls a fifth, *alpestris*. Probably at least one other, *leucolæma*, occurs here also.

From time to time birds of usually more southern latitudes extend their range northward and for a time at least become domicile, occasionally permanently so, as the Square-tail, or Prairie Chicken of the south, which is now even more numerous than the native Sharp-tailed Grouse in the open country. The Bluebird, on the other hand, for a few years became fairly numerous and then gradually decreased again, though it is yet found breeding in small numbers. The Purple Martin is another fluctuating species. Yet another that has recently moved north and eastward is the Arkansas Kingbird. Dr. Speechly records two pairs as nesting at Pilot Mound both this year and last, while we at Aweme have seen two, and a pair are breeding only a few miles away in the village of Treesbank in some trees surrounding a house. The bird is not uncommon in the southern portions of the provinces to the west of us.

#### MEETING OF THE BOTANICAL BRANCH.

The first meeting for this winter of the Botanical Branch was held at the residence of Mr. R. B. Whyte, 370 Wilbrod St., on Saturday evening, November the 30th. There were present the following members: Dr. Malte, Messrs. J. M. Macoun, W. T. Macoun, L. H. Newman, E. D. Eddy, James Lawler, A. Eastham, J. W. Gibson, A. E. Attwood, J. J. Carter, J. W. Eastham, W. Dreher, H. A. Honeyman, F. T. Shutt, T. E. Clarke and Dr. E. H. Blackader.

The subject was "A Summer in Britain", by the Chairman for the evening, Mr. Whyte. He illustrated his observations by lantern views taken during the course of his trip; and he had about seventy-five very interesting photographic plates that were thrown on the screen by Mr. J. W. Gibson.

He travelled in company with Prof. Hutt of the Ontario Agricultural College, Guelph, and they went direct to London, where they made their headquarters during the five weeks they spent in England. From there they made daily trips in and outside of London, wherever they had an opportunity of studying the methods of horticulture and of decorative gardening as practised there.

Their first visit was to Covent Gardens Market, where they were amazed at the extent and variety of the fruits and flowers for sale. One section was entirely devoted to wild plants and flowers, natives of Great Britain. Other sections were devoted to small fruits such as strawberries, gooseberries, currants, raspberries and loganberries, and he remarked on the fineness of their quality, especially of the strawberries. One producer

told him that he sent in fifty tons of strawberries daily during the season, besides other products. Some of the persons he met either invited them to visit their estates and study the methods of cultivation, or gave them letters of introduction to the owners of large estates where there was something to be learned; and Mr. Whyte remarked on the unfailing courtesy and hospitality with which they were received and entertained merely on the strength of such letters. He then gave his impressions of the methods of cultivation.

A great deal of time and labour is given to the training and pruning of the small fruit bushes. The lower shoots are all cut off, and the upper branches are not left to topple over and drag their fruit in the ground, but so that plenty of sunlight and air gets in to ripen the fruit. He also illustrated on the screen the care that is taken of the larger fruit trees, and how carefully they are pruned and protected. And yet these trees do not look as healthy as ours. They are planted too close, and with shrubs or perennials between, and the trees are covered with moss; and Paris green as a destroyer of insect pests is practically unknown.

At some of the large estates they took photographs of the special "show gardens," where the owners displayed their artistic fancies for pleasure and beauty, and not for productiveness. For instance, there was shown the Japanese garden, the Elizabethan, the water, the rock, and many other peculiar and beautiful gardens.

Another group of views illustrated English country life: the well-kept but narrow road, with no sidewalks, with hedges instead of fences, and often bordered with flowers. The private residences of any pretention were rarely visible from the road; they would be carefully screened by trees, and only the gate with the name of the estate on the gate-post was seen. But these names were well-known and served the purpose of street numbers.

One of their most interesting trips outside of London was when they were invited as the guests of the Horticultural Club on their annual outing, which this year was to Stoke Poges, Burnham Beeches, and Clevedon, the home of Mr. W. H. Astor, and winding up at East Burnham, the residence of Sir Harry Veitch, the President of the Club. The beech trees at Burnham Beeches are pollards, that is, with very short trunks, which in the course of several centuries have grown to great girth, and assumed weird and fantastic shapes.

Another trip was to Bagshot, the private residence of H. R. H. the Duke of Connaught. This place is famous for the great variety and beauty of ornamental trees. And there were

many other trips of which Mr. Whyte spoke enthusiastically, such as a trip up the Thames, to Kew Gardens, a walk up Box Hill, to Linten Hoo, to Gunnesbury House and Aldenham House, all of which one must visit one's self to thoroughly appreciate.

E. H. B.

#### A FORM OF *LINARIA VULGARIS*.

In the summer of 1910, in the neighbourhood of Toronto, I discovered a form of *Linaria vulgaris* that seems to be very unusual, at least I have met with no one who has seen it and so far I have not heard of any one who has found this form. The corolla is perfectly white and completely spurless. So far as I have yet discovered, the plant does not set seed.

The calyx seems to have undergone no change, but the corolla is regular. Its two-lipped appearance is wanting and the lobes of the gamopetalous corolla are nearly equal in size. The four stamens and the pistil seem to be perfect, yet so far I have failed to find a perfect capsule with seeds. The plant must spread by its underground runners.

My attention was first drawn to the plant by its whiteness. At first I supposed I had found a plant unknown to me, but on closer examination I came to the conclusion that it was a form of *Linaria vulgaris*. I was soon confirmed in this belief by finding another patch of it in which some of the plants had the white spurless corollas and the ordinary form of the corolla on the same stalk, the white regular form being always below the spurred form. It seems to be well established, for in 1911, and this summer, the variety is as abundant as ever. There are a number of patches of this peculiar form extending through fields and along the road for a quarter of a mile. The patch first discovered had only the variety growing in it and was at least 20 feet long by 4 feet wide and it had hundreds of plants growing in it.

W. SCOTT, TORONTO.

The above form is of much interest owing to the fact that it represents a spurless type of that monstrosity generally known as *Peloria*. This variation, which is merely an aberrant form of no systematic value whatever, is characterized, as is well known, by the presence of five spurs in the corolla. These *Peloria* types are merely accidental. They are to be found especially in autumn on specimens which had been mowed or pastured during the summer and, as a rule, they occur in the same head as typical irregular flowers.

M. O. M.

## THE HOODED MERGANSER NESTING IN SOUTH-WESTERN ONTARIO.

While examining the collection of living ducks and geese in the possession of Mr. Roswell Goldie, at Guelph, in December, 1912, he told me that a nearby farmer reported to him in 1908 or 1909 that he had found a wood duck's nest and promised to bring the eggs in for hatching.

Mr. Goldie is much interested in raising these birds and has a scheme for the liberation of some of them in spring so as to help to increase the native stock. He was therefore anxious to get these eggs to raise along with others laid by his own female wood ducks. The farmer brought them in, in due time, but Mr. Goldie suspected that they were not the eggs of wood ducks, and when they were hatched they turned out to be Hooded Mergansers. He worked overtime in trying to supply them with fish and worms in sufficient quantities, but failed to be able to keep them alive, although they ate greedily.

I do not know that there is any authentic record of this bird having bred in lower Ontario in recent years, which makes this occurrence very interesting. It is of course certain that this, as well as the larger Mergansers bred all over Ontario in former years, and that they still nest annually in the more remote parts of the country, but authentic instances are always important, and for lower Ontario, are very few in number.

W. E. SAUNDERS, LONDON, ONT.

## THE PRAIRIE DEER MOUSE AT LONDON.

The Prairie Deer Mouse, *Peromyscus michiganensis*, has been known for several years to be very common along the shore of Lake Erie near Point Pelee. Its range has been extended by means of specimens taken near Chatham and at the southeast corner of Lake Huron, but it has not previously been reported from the central part of the Western Peninsula.

On December 12th, I found one of these mice in a trap in my back yard in London. It had apparently been living for a short time at least under a shed where my wood ducks shelter, and had doubtless been feeding upon the grain for the ducks.

If we accept the probability that this mouse is a recent introduction to Ontario it will naturally follow that its further spread is to be expected. There is little doubt that a slight search would show its presence along the lake shore much farther east than Point Pelee, and it might even be traced as far as the Niagara Peninsula, as the circumstances all along the lake shore are favorable for its spread.

W. E. SAUNDERS, LONDON, ONT.



## BOOK NOTICES.

WORK OF THE CANADIAN BIOLOGICAL STATIONS. Contributions to Canadian Biology, being Studies from the Marine Biological Stations of Canada, 1906-1910. Ottawa. C. H. Parmalee, Printer to the King's Most Excellent Majesty, 1912.

A handsome well-bound volume of over 300 pages, which bears the title given above, has just been issued by the Dominion Government. The two preceding volumes of Biological papers, Supplements to the Annual (Fisheries) Report of the Department of Marine and Fisheries, appeared in 1901 and 1907; but the present volume is a great advance upon the slim blue books just referred to. The increased generosity shown by the present Government, and the great personal interest shown by the present Minister of Marine and Fisheries have, no doubt, much to do with the great advance shown in the present Biological Volume.

To all naturalists, and especially to persons interested in fishery researches, and in investigations into the life in the sea, this report will be welcome. It includes 19 papers, with 38 plates, two of them maps; and the excellent paper, the strong binding, and above all, the really beautiful plates, most of them works of art, add to its importance as a Canadian biological publication.

Professor Prince, Dominion Commissioner of Fisheries, as Chairman of the Biological Board, furnishes an interesting preface, and claims that the Canadian Stations occupy a premier place in showing substantial results, after so short a time of operation, and with so vast a field to cover as the waters of the Dominion.

It is difficult to review a scientific volume of such varied contents as this, but it may suffice to summarize them as Narrative (like the articles by Professor Prince and the late Professor Penhallow) Practical, Faunistic, Botanical, Physiological, Physical and Geological.

Among the practical fishery papers Professor Knight's (Queen's University, Kingston) takes first place. Bait is the most vital need of our fishermen, especially sea-fishermen, and Professor Knight reports fully his experiments on bait. From these it appears that fresh clam-bait is best, frozen clams less so, while herring bait comes next, fresh herring being rather better than frozen. Squid-bait ranks next, while the flesh of the detested sea dog-fish (*Squalus acanthias*) proved to be very attractive. Professor Knight's style is very fascinating, and his references to fishermen's theories very amusing. He embodies a large amount of valuable matter in the ten pages of his report.

Like his previous papers on "The Effects of Explosives on Fish-life" and his reports on "Sawdust and other Water Pollutions," Dr. Knight's present paper shows thoroughness and originality, and his exposition is most lucid. Professor McBride, late of McGill University, contributes a practical report on Oyster Culture, and refers also to the hardly less important Clam Fishery, the value of the latter in 1911-12 reaching \$332,803, whereas the oyster fishery only brought \$212,296. Dr. Joseph Stafford reports on an interesting piece of work, which the Biological Board gave him to do, viz., the study of the young stages of the oyster and other molluscs. Embryologists are of course familiar with the larval stages of the chief edible shell-fish in our waters, but some points remained which it was desired by the Biological Board should be cleared up, and the paper on the "Recognition of Bivalve Molluscan Larvæ" fills the lacuna. Dr. Stafford had previously investigated the Soft-Shell Clam and his report in the "Contributions" published in 1901, was valuable and illustrated by four beautiful plates, but the present three plates, with 44 figures, though heliograph reproductions, are much inferior, and somewhat coarse, showing little of the clearness of detail, such as one sees in the drawings of British, Dutch and German specialists, for example Dr. John Wilson, Dr. Hoek, Lovén, and others. Dr. Stafford followed precisely the method of the early investigators into larval fish-life in European seas, for they artificially fertilized and hatched sea-fishes' eggs, and reared them through early stages, and the latter stages were connected with these by securing the older stages in plankton nets in the open sea. Dr. Stafford's detailed descriptions of the young soft-shell clam (*Mya*), the hard-shell clam (*Venus*), the scallop (*Pecten*) and the oyster (*Ostrea*) are valuable, and he usefully adds the Silver-shell (*Anomia*), the young of which has often been mistaken for the young of the oyster. Dr. Stafford provisionally determines certain larvæ as those of *Tottenia* and *Clidiophora*, and gives six figures of them.

Professor L. W. Bailey (Fredericton, N.B.), reports on Diatoms, which form part of the food of the oyster and other shellfish, though less extensively than was at one time claimed. His interesting notes, chart of distribution, and plates, with 53 figures, admirably supplement the preceding molluscan papers. Dr. Stafford continues his Atlantic Fauna papers and adds to the lists of previous workers, giving three lists of the various classes from Protozoa up to Polyzoa, Molluscs, Tunicates and Vertebrates. A less discursive and thoroughly accurate list of our Atlantic marine fauna is a *desideratum*, and Dr. Stafford's three further papers now published will help towards that end.

Dr. A. T. Huntsman's memoir on Pacific Ascidiens is in some respects the most important paper in the volume. This accomplished Toronto lecturer on Zoology has done admirable work at St. Andrews and at Departure Bay, B.C.; and this thorough, though somewhat technical, account of Holosomatous Ascidiens from the coast of Western Canada will add to his reputation. It has been stated that German specialists are already anxiously inquiring for copies of this important paper. Finer scientific plates have rarely been published in Canada, than the 21 heliograph plates, with 100 figures, which illustrate and embellish Dr. Huntsman's notable report. The Tunicates are largely devoured by the cod tribe, and other fishes, but this paper, in this respect of practical value, has also a value purely scientific, and its importance may be judged from the fact that, of 35 species described, no less than 18 are apparently new to science.

Hardly less important is Professor C. B. Smith's paper on "Parasitic Copepods from Nanaimo," illustrated by seven plates. These were collected by the late Rev. George W. Taylor, and of 14 species described, over half are new to science. The figures are outline reproductions, but so remarkably clear and accurate, that it is a pleasure to consult them. This paper, like Dr. Huntsman's, is of exceptional value, and it marks a notable advance in the study of Canadian Crustacea. Dr. Smith refers to the late Mr. Taylor's assiduous work, and rightly says that the present account of Copepods, parasitic on fishes, has great economic interest as well as scientific value. The Rev. Mr. Taylor, shortly before his lamented death, had made and studied a large collection of Crabs and other British Columbia Decapods, and compiled a list of 129 species, which is published in this volume. It is a valuable and most remarkable piece of scientific work. Following Mr. Taylor's list, there appears a short paper by Professor Charles H. Gilbert, of Leland-Stanford University, California, describing an interesting little fish, new to science, and named *Asemichthys taylori*. It was caught at the British Columbia Biological Station, and no other specimen is known, except the one secured by the late Mr. Taylor. Mr. Cornish (Toronto University), publishes some notes on Prince Edward Island fishes, and Mr. D. L. McDonald (McGill University), gives a short list of 35 species of Crustaceans obtained at St. Andrews. •

Passing from the faunistic papers we notice an important physiological paper on the innervation of the lobster's intestine. It is very technical, and many readers will wonder what practical value it can have; but the more we know about the vital functions of this crustacean and highly esteemed article of food, the

better for the lobster industry. It is claimed that the Nova Scotia fishermen, who ship live lobsters to the New England markets, lose no less than \$150,000 per annum, owing to dead and sickly specimens in the lobster-crates. Also, the Canadian and United States Governments found considerable losses in attempts to transplant live lobsters to Pacific waters, where no lobsters have ever occurred. If we knew more about the nervous functions and blood circulation of the lobster, complete success might be accomplished, for some authorities are of opinion that the delicate sense-organs of the lobster are affected by the train's vibration, resulting in sickness and death *en route*. Professor Miller's paper is a first instalment, and with its six fine heliograph plates it is an important contribution to science. Mr. Klugh (Queen's University), reports on two months' botanical work, and his account of the flora of St. Andrews, especially the ecological notes, are of great interest. The paper extends from the lowly diatoms through the non-flowering plants up to the flowering plants and conifers, and the interesting views, and the plates of sections of leaves and stems, show how thoroughly the author has carried out his plan of study on the distribution of species; and the atmospheric, geological, and other causes, which are potent in that distribution.

The physical researches carried on by Dr. Copeland, of Toronto University, are summarized in a report on temperatures and densities, which bear on the suggested culture of oysters near St. Andrews, while Professor E. M. Burwash's paper on the geology of the locality where the British Columbia Station has been built is most interesting and is accompanied by a large geological map.

No one can peruse this beautiful volume, which can be obtained *gratis* from the Commissioner of Fisheries, Ottawa, Chairman of the Biological Board of Canada, without a feeling of pride. It is indeed surprising that our ablest zoologists and professors in our various universities will year after year, without practically fee or reward, engage in labourious researches at the three Biological Stations connected with the Marine and Fisheries Department, and prepare for publication such splendid reports as the volume of Biological Contributions now under review.

One melancholy reflection is unavoidable. Two contributors, Professor Penhallow and Rev. George W. Taylor, did not live to see their reports in this volume published. Professor Ramsay Wright, to whom the Biological Stations owe so much, has recently gone to live permanently in Europe. It is difficult to fill such vacancies, but if Toronto, McGill, Queen's, Laval, Manitoba, and our other Universities, will stimulate their

graduates to engage in original research at the Biological Stations, future volumes of memoirs, not inferior to this, may be looked for in future years.

Science Fellowships from our Royal Society, or Government Science Scholarships, would induce our best and most brilliant students to resort to the Biological Stations, which are unequalled in the world in providing splendid facilities for valuable research.

### C.

SEA-FISHERIES OF EASTERN CANADA.—The Commission of Conservation has just issued a report on the "Sea-Fisheries of Eastern Canada" that is of more than passing interest to all who are interested in the fisheries of Canada. The volume, which is bound in cloth and illustrated in colours, consists of a report of the proceedings of the Committee of the Commission on Fisheries, Game and Fur-bearing animals, which was held in Ottawa on June 4th and 5th last. At this meeting a number of experts delivered addresses on different subjects relating to fisheries, and these were thoroughly discussed by the members of the Committee.

The following is a list of the addresses which the report contains:—

Chairman's Address, by Dr. C. C. Jones; Whitefish of the Great Lakes, by M. J. Patton, M.A.; Conservation of the Oyster, by Joseph Stafford, M.A., Ph.D.; The Lobster Fishery of Canada, by W. A. Found; Oyster Fishery of Prince Edward Island, by Hon. J. A. Matheson, K.C.; Needs of the Fisheries of Nova Scotia, by Dr. Howard Murray; Sea-Fisheries of Eastern Canada, by J. J. Cowie; The Shad Fishery of Canada, by E. E. Prince, LL.D.; Fish Culture in Canada, by W. A. Found.

The appendices contain a number of useful statistical tables respecting fisheries, especially whitefish and shad.

### KILLING FROSTS.

Every plant has its own particular freezing temperature by which it is killed. In all cases it must be at least 2° C. (3° .6 F.) below the freezing point of water (32° F.)

The experiments of Rein show that the critical killing temperature for *Musa ensete* is 2° .10 C. (28° .2 F.); for *Begonia*, 2° .26 C. (27° .9 F.); for *Tulip*, 3° C. (26° .6 F.); leaf-stem of *Laurel*, 3° .5 C. (25° .7 F.); of the *Olive-tree*, 4° .1 C. (24° .6 F.); of the *Oleander*, 5° C. (23° .0 F.); of *Celandine*, 6° .99 C. (19° .4 F.); of the *Daisy*, 7° .9 C. (17° .8 F.); of the *Violet*,



9°.3 C. (15°.3 F.); of the Saxifrage, 14°.2 C. (6°.4 F.); and of the black Heliebore, 15°.8 C. (3°.6 F.); that is, when the temperature in the inner part of the above plants has fallen to the respective temperatures. Only a few of the examined seed-plants show a lower temperature; e.g. the pontine Rhododendron, 23°. C. (9°.4 F.); Ivy, 23°.3 C. (9°.9 F.); Holly (*Ilex aquifolium*), 24°. C. (11°.2 F.); and the Yew, 24°.9 C. (12°.8 F.). The mosses are killed between 14° and 19° C. (6°.80 to 2°.2 F.); the lower vasculiferous plants, which live in water, are not killed above 15°.5 C. (4°.1 F.); those living on land even not above 31° C. (23°.8 F.); and the one bacterium experimented upon by Rein required 47° C. (52°.6 F.) for killing it.

The above temperatures are somewhat affected by the temperature to which the plants have been subjected for some time beforehand. For instance, potatoes that have been at a temperature for some time between 0° to 1° C. (32° to 30°.2 F.) are frost-killed at 3°.08 C. (26°.4 F.), whereas potatoes that had been kept for four to seven weeks at 22°.5 C. (72°.5 F.) were killed at 2°.14 C. (28°.1 F.), that is at .94 C. (1°.7 F.) higher temperature. And this is the case too with other vegetable products.

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#### CORRESPONDENCE.

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The Editor, OTTAWA NATURALIST:

Mr. Macnamara's interesting article on "Poison Ivy" in the May Number has only just come under my notice. Poison Ivy (*Rhus Toxicodendron*) is common in our local bush. To educate people in its characteristics I sometimes pick it and have it in the house for a few days. Cases of dermatitis ascribed to Poison Ivy are fairly common every summer. Surely an important point is missed in all discussions on this subject by neglecting the main underlying cause of this, as of so many other skin inflammations. This cause is the blood condition induced by auto-intoxication, a term now well understood by the medical profession. This is not the place to go further into details, but I may say that in my eleven years of western experience I find the best treatment is the preventive measure which cleanses the intestinal canal thoroughly and which instructs the susceptible individual in a right dietary. My belief is that very few people are susceptible to Poison Ivy if they protect themselves in this way.

H. M. SPEECHLY, PILOT MOUND, MAN.

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