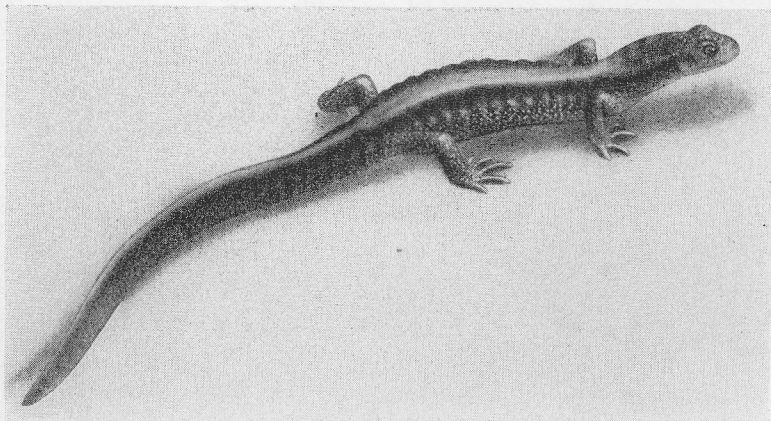


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Long-toed salamander.

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PRE-GLACIAL EROSION

by

A. H. Marrison

As most sedimentary deposits of pre-glacial time seem to have ended by or before the Tertiary age, one may wonder what was taking place until the beginning of the Pleistocene. The following condensed information is taken from memoirs 36 and 96 by Dr. C. H. Clapp and memoir 135 by Dr. W. A. Johnston and deals with the Nanaimo, Sooke and Fraser Delta areas.

Nanaimo Series

In Lower Cretaceous time, about 200 million years ago, the Vancouver group of volcanics was folded and deformed as a result of long erosion (down to the granite intrusives); conglomerates, sandstones and shales were deposited on a surface of considerable relief especially in valleys that were formerly anticlines. By Upper Cretaceous time under marine estuarine and land conditions, over 10,000 feet of sediments had been built up, covering the rocks far inland.

In Lower Eocene time there began a land uplift. By Lower Oligocene, 42 million years ago, erosion was acting on the folded sediments removing much of their thickness. The Pliocene age, one million years ago, finds the rocks maturely dissected and, because of their poor resistance to erosion -- reduced to lowlands.

The erosion continued until the Admiralty Ice swept forward and hastened the process.

Sooke Series

About the time the Nanaimo sediments were folding during the Eocene epoch volcanic ashes and lavas were forming deep deposits in the Sooke area to a depth of some 7500 feet. The close of the Eocene saw intrusive rocks thrust into the deformed volcanics.

This deformation started an erosion cycle which by Upper Oligocene or Lower Miocene, had reduced the area to a plain, the detritus being carried into the sea of that time

forming an extensive coastal plain against the steep mountain sides.

During the Pliocene the area was uplifted and a new erosion cycle started with the result the whole surface was maturely dissected and the Sooke formation reduced to lowlands -- thus paralleling conditions noted in the Nanaimo area.

Fraser Area

The Coast Range batholith (of material similar to Saanich granodiorite) was invaded in Upper Jurassic time by intrusives. The covering rocks of earlier ages were mostly eroded away, leaving the granitic rocks exposed as a mountain mass with the Fraser Delta and the depression between the mainland and Vancouver Island forming a syncline. As a result of this erosion period there may be found some Lower Cretaceous marine sediments near Yale. In Upper Cretaceous times sediments, perhaps of marine and land types, and corresponding to those of the Nanaimo series, were laid down between the mainland and Vancouver Island. The erosion exposed the granitic rocks of the mountains.

In early Tertiary the coast mountains were uplifted and during early Eocene the Cretaceous surface was deeply dissected, the sediments today being, perhaps deeply buried below sea level.

In middle Eocene time, about 80 million years ago, the Fraser Delta area itself was depressed and several thousand feet of sediments deposited as an alluvial plain on and outwards from the base of the mountains. (Burrard formation)

At the end of the Eocene an uplift of the region saw an erosion of the Burrard Formation and on the eroded surface a new thick series of sediments formed. (Kitsilano Formation). Accumulation continued into the Oligocene with the area still sinking, the final surface of deposition being nearly a flat plain at sea level. A later warping caused some parts to be a thousand feet above and others several thousand feet below sea level.

In the Boundary Bay area is found the latest and less unconsolidated sediments; this area was downwarped in, perhaps the middle or late Tertiary.

The whole Fraser area was uplifted at the close of the Tertiary to an elevation greater than at present with the result that mountain and lowland areas became deeply eroded -- (some river valleys being below sea level at the

present time).

The coming of the Pleistocene found this large area in a state of erosion. Whatever sediments were laid down in the pre-glacial erosion period in river deltas or on sea shore margins, were swept away during the great Admiralty ice period. Any fossils found in glacial outwashes belong to the earlier epochs mentioned. The elephant and mastodon molars and tusks now in the Museum were ploughed up by the ice from sediments in the old valley areas of the interglacial period. (The remains were found in the Vashon Ice advance outwash, as far as the writer can ascertain. Perhaps the animals lived in the Cowichan Valley, as the current bedded gravels between Victoria and Duncan bear evidence of east coast and valley material, such as coal fragments, limestone, and a certain type of rock, which is found only at one place according to Dr. William Mathews).

In the three areas, Nanaimo, Sooke and Fraser, erosion was taking place on uplifted surfaces. During the Pleistocene the ice not only continued the erosion but carried the process below sea level, removing hard rock and sediments.

There is therefore a blank period in fossil accumulation since about the Oligocene, except for some patches of marine shells and swamp material accumulated in the soft, non-consolidated interglacial period.

MALLARDS FEEDING ON ACORNS by Capt. W. Redford.

It was news to me when I was told by a friend that Mallards eat acorns.

Around Christmas time I noticed a drake mallard in my neighbour's garden that appeared to be eating something on the roadway. I thought at the time that this was gravel.

Some days later several of these ducks were in my garden on the lawn and in the vegetable patch near a big oak that grows on the fence line. It was about this time that I learned these birds eat acorns so I knew they were there under the trees to feed.

One morning I saw three flocks on Sylvan Lane in the half-light of dawn and it was surprising how these birds, when landing and taking wing, manage to avoid the wires that are strung at all angles in the vicinity.

I may add that my neighbour remarked on the tameness of the drake which on more than one occasion visited his garden.

AT HOME WITH THE OSPREYS

Last May, while living on a boat tied up in Sleepy Hollow, I first had the chance of keeping a weather eye lifted to an enormous nest that was kept in meticulous untidyness by a fierce pair of ospreys; (I call them fierce for the way they chased the herons). This nest was built at the extreme top of a lonely fir that had very few branches, luckily, because this lack prevented my bird-watching enthusiasm from becoming ungovernable and forcing me to the top. Through the telescope the osprey abode looked stable enough to withstand anything, but not to the eyes of ma and pa, who, immediately upon their arrival in the first week of May, proceeded to reinforce the structure with more branches. Twigs, as building material, seemed below their regard, for I never saw either of them carrying anything shorter than themselves. Most of their "lumber" was obtained on the beach and was always picked up in flight. No dive was involved, the osprey merely coming in low to the beach, suddenly swooping on a likely branch to carry it off without slowing, and adding it to the jumble at the top of the fir.

Then came the honeymoon. The ospreys did little but fish until the middle of May. Every morning around sunrise, there would be a great splash some yards away and I would go up on deck to see one of the great birds carrying its squirming prey to a nearby tree to eat in the tinting rays of the sunrise. I never tired of watching the ospreys fish. They would circle the muddy-bottomed cove endlessly, about three hundred feet up, occasionally giving an easy flap of their great wings. Then one would disappear, there would be a splash, a mighty heave out of the water, and a fish dangled in the air from the talons. Sometimes there would be a hover half way down, cutting the spiral dive in two, but in spite of the pause there was always a fish caught.

An osprey catches his fish with his talons, not with his bill like the kingfisher, which dives head first into the water. The trick of the osprey was to pull up sharply at the bottom of his dive and drop feet first onto the back of his quarry. The birds that I watched would sometimes disappear completely except for their wings which stay outstretched on the surface ready to be used on the "heave-ho" out of the water.

To see those striking looking birds whirling and diving into the dark, calm water to pull forth a flashing fish is a fine sight. In their dive the white streak extending back from their eye gave an even more streamlined look to a streamlined silhouette. The early morning sunshine would make the scene golden in the low mist and put a glint on the ripples spreading from the spot of the capture to make an unforgettable picture for the observer.

The honeymoon over, one of the birds was always on the nest. At the end of May three little squawkers hatched, but only in size were they small, as their screaming continued from dawn to dusk. No more did 'pa' dine alone at sunrise, in fact, no more did 'pa' dine, as far as I could see. The early-morning splashes became more frequent and always the catch was taken to the nest. And, as the physicists put it, the size of the catch seemed inversely proportional to the commotion its arrival produced at the top of the fir.

I was unable to have a good look at the infant ospreys due to my inability to climb and the apparent ferocity of the parents. These worthies protected their fuzzy-headed offspring against all comers, their most persistent intruders being the herons nearby. The fir of the osprey aerie was detached from the main forest and lay along the herons' most direct route from their abodes in the forest to the sea. But the first heron that so much as aimed in the direction of the ospreys was swiftly flown at, and it turned back to voice its disapproval in such a variety of screeches and squawks as to make Heronville quite a symphonic settlement.

Finally came the great day for the first lesson in flying. The youngsters appeared on the edge of the nest, teetering drunkenly, and, with a flap and a squeak, took off. The flight lasted perhaps a second and ended with a wobbly landing on a branch below, the "baby" osprey being at a disadvantage due to the lack of sufficient branches. But when the next gathering of the clan took place a few minutes later, after a tough return journey, the squealing that came forth put even the herons to shame. After the first effort, the rest seemed easy, for two days later the offspring were soaring with their parents.

I left Sleepy Hollow at this stage of the proceedings. 'Ma' and 'pa' osprey will probably be back next year to the same bundle of boughs on top of the fir. They must

know they can raise their family in peace to disturb the peace, since Sleepy Hollow is a bird sanctuary. They can fish and fly and chase herons without being shot by an addle-headed angler for preying on his precious perch. I intend to visit them to watch once more their dawn feeding and the flying lessons given to their awkward infants, from the boughs of the solitary fir.

Bill Patey,
(U.B.C.)

The Continental Midwinter Inventory of Waterfowl was undertaken on the 30th of December. Messrs. R. W. Sinclair, C.J. Guiguet, H.D.R. Stewart, J.H. Whitehouse, J.O. Clay, W. Adams, A.R. Davidson, Miss M.C. Melburn, Miss L. G. Roberts, in all, nine observers, took part.

Areas covered were much the same as for the Christmas Count on the 26th of December. Weather was gusty, southerly 24 m.p.h., temp. 43°. On exposed shores the count became an estimate owing to the choppy sea. In the bay west of Sidney Miss Melburn and Miss Roberts observed 17 species for the inventory. In addition, as "good measure" they listed the following species:

Heron, pheasant r.-n.(introd.);	creeper, Cal.
turnstone, b.;	wren, S.
pigeon, rock (introd.);	robin;
gull, g.w.;	kinglet, g.c.
gull, Cal.;	waxwing, c.
Kingfisher, b.;	meadowlark, w.
flicker;	towhee, s.
jay, S.;	junco, O.
crow, n.w.;	sparrow, s.
chickadee, c.b.;	

21 species.
Time 5½ hours.

J.O.C.

STRANGE SEAFOODS

by

D.B. Quayle, Provincial Shell Fish Laboratory,
Ladysmith, B.C.

When most of us use the term "seafood" we generally think in terms of the various species of fish and of clams and oysters, shrimps and crabs. But there are numerous other types of seafood, some of which most people know about but would not think of eating, and some which most of us have never heard or knew existed. Who would ever dream of eating jellyfish or seaworms? Yet these are articles of food in other parts of the world. Let us consider some of the strange seafoods that are eaten and we may see that if we are stranded on a desert island, we need not go hungry.

The myriads of tiny plants and animals, collectively called plankton, floating in the surface of the sea, when collected in sufficient quantity may be and have been used for food. The Germans have conducted a number of experiments, as did the British, during the last war to determine the possibility of using plankton for food. The material was suitable enough and apparently tasted like shrimp paste, but the cost of collection was so high the scheme was impractical. It may be remembered that the Kon-Tiki expedition demonstrated the use of plankton for food. It would appear that it is much easier to convert the plankton into food through an intermediary, such as clams or oysters, which feed on it.

One of the large jelly fishes (Rhizostoma) is eaten in Japan. It has a thick stout disk and is preserved with salt and alum or tanned with an infusion of oak leaves. Also in Japan a large fleshy anemone is eaten after being boiled. We have plenty of large anemones here in British Columbia though there is no record of them being used.

No doubt many have heard of the palolo worms of the genus Eunice which occur in Samoa and Fiji where its normal habitat is in the holes and crevices in the rocks and corals on the bottom. The posterior part of the worm becomes specialized for reproduction and when spawning time occurs, this part of the worm is separated off from the remainder of the worm and swims to the surface where the sexual products are released. The worms all spawn together in vast numbers and the natives catch them in baskets, where they are either cooked or wrapped in breadfruit

leaves or used raw. Taste and smell is said to be not unlike that of fresh fish roe. In British Columbia a small species of Odontosyllis swarms at certain times of the year but it is unlikely that we would find them palatable. A large Nereis also spawns at the surface here but they do not seem to swarm. A very large colony of the tube worm Eudistylia vancouverii occurs at Brockton Point near Vancouver. These are quite large and it would not require many to make a meal, if one were so inclined.

Of interest to the palaeontologists is the fact that the Brachiopod Lingula is eaten in the East. Lingula, as far as we know, does not occur in British Columbia.

Star fish or sea stars, as they are more appropriately called, are not, as far as is known, used by humans. However, a near relative of the sea star, the sea cucumber, is used extensively in the East and it is used to a limited extent in British Columbia. The boiled, dried skin of the cucumber, which is known as trepang or beche de mer, is used for soup stock. About fifteen years ago the retail price in San Francisco was more than one dollar a pound. The large cucumber Stichopus occurs in considerable numbers in British Columbia and is the one used in California. Some of our salt lagoons have considerable quantities of them.

Another relative of the sea star, the sea egg or urchin, which revels in the fine generic name of Strongylocentrotus, is used extensively in the Mediterranean and to a considerable extent here in British Columbia both by Indians and South Europeans. Only the eggs are eaten, generally in the raw state. Quite extensive beds of a large Strongylocentrotus occur in regions of fast currents.

The sea squirts or ascidians which have certain affinities to the lower vertebrates, are eaten extensively by Mediterranean peoples. Large numbers occur on floating material and piling in British Columbia, especially during the fall. It is unlikely that they will be anything other than a gastronomic curiosity here.

A most important seafood group is that which includes shrimps, lobsters, crabs and barnacles. Only the latter group may appear strange as a seafood, but they are eaten in various parts of the world and they are known to be used to a limited extent here in British Columbia. The very large Balanus nubilis is certainly large enough to provide a sizeable piece of meat. However, due to the relatively deep water habitat, harvesting is a problem. The so-called

goose barnacles Lepas and Mitella are more easily obtained and are probably just as succulent.

The molluscs offer more species as food items than any other group. In addition to the several species of commercial oysters, there is the rock oyster or jingle which has a bright reddish orange flesh. Several species of true scallops, as well as the purple-hinged rock scallop, occur in British Columbia but none is used commercially as yet. The clams, of course, are well known and little need be said about them, except that only three or four of the many species are used. Some are too difficult to obtain, others are too small, or occur only in small numbers.

For anyone with sufficient energy to dig it, the goe-duck (Panope generosa) provides a tasty seafood dish, as do the rock borers Philadidea and Zirphaea.

The small blue or bay mussel and the large sea mussel are not eaten much in British Columbia, which is strange for mussels are used extensively in Europe. It may be that the Bay mussel does not grow large enough and it may require special culture methods to grow it to a suitable size.

Of the gastropods or snails the abalone or Venus' Ear (Haliotis) is the only one that is used to any extent in British Columbia and even its utilization is quite limited. The abalone is fished extensively in California and in the East. There are several species of whelks (Thais) that might be used and the large moon snail Polinices is used occasionally. Limpets, the China hat shells, are used in Europe but not so here, although they are quite tasty, if a bit tough.

Another mollusc which has potential value as seafood is the chiton. The black chiton (Katharina tunicata) and the very large Cryptochiton are used by British Columbia Indians. The former species occurs in considerable numbers in exposed waters.

Finally the cephalopods or squids and octopus are used extensively in other parts of the world, but only to a limited extent in British Columbia.

A NOTE ON THE COELACANTH

The recent report of the discovery of another very ancient fish, the coelacanth, has aroused great interest among students as well as among laymen. And well it may, for here is a type of fish which was thought to have been extinct for about sixty million years.

Professor C. M. Yonge of the University of Glasgow points out ("Spectator" Jan.9/53) that two questions now arise: How have these fishes managed to survive, and what are we likely to learn from a study of their anatomy? We might add a third question: Are specimens of these or similar ancient fishes likely to be found along our own coast?

Professor Yonge's first question is not easily answered. The coelacanth is a heavy-bodied fish, about five feet in length and with fins on the ends of fleshy lobes. It would not be easy for such a large, clumsy fish to find shelter from the competition of more modern types of fish. Isolation has provided such shelter for ancient fresh-water forms such as lung-fishes of Australia, West Africa and South America but there is no such isolation in the sea particularly in the shallows in which the two known coelacanths have been found.

In answer to the second question Professor Yonge states that the opportunity to study the anatomy of the latest specimen may tell us much about the structure of early vertebrates since the coelacanth fishes must have derived from the same basal stock as that from which all land vertebrates have evolved. We may then expect to learn many details which were not obtainable formerly by the study of fossils alone.

Regarding our third question the answer is probably "No". It is unlikely that such fishes will be eventually found in local waters. While it is true that relatively little collecting has been done off the coast of British Columbia conditions here definitely do not favour the existence of what might be called "prehistoric" forms.

G.C.C.

JUNIOR PAGE

Editor: Alex Peden. Phone G.7518.

Mr. Beebe's Pet Eagle: by Edward Lee.

Some time ago Mr. Beebe owned an eagle which he tried to tame where he eventually released it in Stanley Park, Vancouver. One day while Mr. Beebe was busy working in his office a woman came to complain that she had been attacked by four eagles. A little while later another complaint was received from a man who had bought some fish and chips. While he was eating them a big bird came down and snatched them from him and continued to eat them. A boy was playing with a ball, when a bird came down and took that away from him too. Children were being attacked by it too. When he investigated the matter he found out that it was his eagle causing all the trouble, so one day Mr. Beebe went down to Lumberman's Arch and found his pet eagle on top of a totem pole. When he whistled to his eagle it came down and alighted on Mr. Beebe's hand. He cut off the bird's sharp claws at the tip, but when the claws grew back it became another nuisance again so Mr. Beebe had to shoot it.

There was a hummingbird seen by the editor in Oak Bay. According to Dr. Carl most hummingbirds should be in California for the winter. This one was seen on February the 7th. It was feeding on a red-hot-poker plant in a nearby garden. Another one had been seen in the same location several weeks earlier feeding on the same plant which was still in bloom.

Birds seen on an expedition to Beacon Hill Park by some of our Junior members: Towhee, bewick, junco, greater scaup duck, mallard, coot, canvas back, glaucous-winged gull, wood duck, crow, meadow-lark, red shafted flicker, fox sparrow, robin, downy woodpecker, song sparrow, English sparrow, buffle head, American widgeon, European widgeon.

(continued on page 108)

NOTICE OF MEETINGS1953

Tuesday ANNUAL MEETING, Provincial Museum, 8 p.m. sharp.

March 10: Annual reports from Conveners will not be read but will be published in the April Naturalist. Speaker: Mr. C.P. Lyons of the Parks Division of the B.C. Forest Service whose very fine book on practical botany, "Trees, Shrubs and Flowers to Know in British Columbia", has just been published. Subject: "Believe it or not in British Columbia". Illustrated.

Tuesday MARINE BIOLOGY MEETING:

March 17: Biology Laboratory at Victoria College. 8 p.m. Speaker: Mr. J.A. Cunningham.

Friday AUDUBON SCREEN TOUR: Fourth in Series. Crystal

March 20: Garden Auditorium, 8 p.m. Speaker: Allan D. Cruickshank - "Santa Lucia Sea Cliffs".

Tuesday BOTANY SECTION: Provincial Museum, 8 p.m.

March 24: Subject: "The Conifers". Prof. C. W. Lowe.

Cont'd from page 107 - Junior Page:

We will be meeting next at 10 o'clock on April 11 and probably continue the meetings until the end of April. In the meantime come to one of the Museum Movie Shows Saturday mornings.

Ask for your specimens in the Display Cases, Junior Natural History Society, before the end of April. We have had nearly everything there from feathers to fossils and many visitors have looked at the two cases in our corner so well arranged by Alex Peden.

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