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The financial year is May 1 to April 30. New members joining after January 1 and before March 1 - half dues.
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NOTICE TO MEMBER SUBSCRIBERS

Please renew your membership now, so you can receive the Naturalist next issue.

Those members who do not receive their magazine in reasonable time, please contact Phoebe Williamson at 598-1091. If the delay is caused by anything other than slow postal delivery, she is in the best position to straighten it out in the least time.

Thanks - Jean D. McInnis, Membership

P.S.

Beginning this year, membership dues have been increased to the B.C. Federation of Naturalists from \$1.00 to \$2.00 per member.

This is one main reason our dues had to be increased, along with the fact that the costs of printing the magazine, etc. have all gone up.

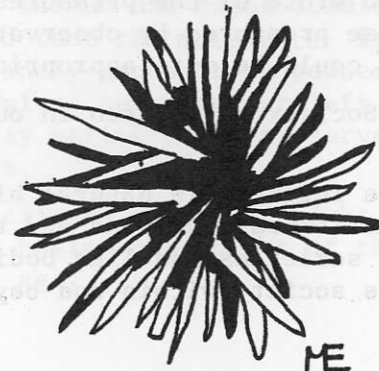
COVER - JULY-AUGUST ISSUE

What is the picture? Is it a topographical view of a planet in outer space -- a strange and intricate design beaten on ancient metal -- or even some weird skin disease? None of these -- it is a photograph of a segment of the exoskeleton or test of a small spiny, spherical creature that dwells in our rocky low tidal zones. It is sometimes nicknamed "sea porcupine" but is better known as a sea urchin. The particular species in the photograph is *Strongulocentrotus franciscanus* which is the largest of the sea urchins in our area.

The little knobs in the picture are, in reality, ball and socket joints to which the spines are attached, thus enabling them to move in any direction. The spines are used mainly for protection but also help with locomotion. The tiny pores or holes you will observe in the picture are called ambulacral zones. It is through these pores that the legs project. The legs are used for locomotion and function by means of a simple but most effective water vascular system which enables them to move about at will or attach themselves to rocks.

Their main source of food is the vegetation, primarily kelp, which is found on the ocean floor. They attach the holdfast of the kelp and can literally destroy a kelp forest. Because of their spiny nature, they have few enemies -- the sea otter being their chief predator. In southern California they have introduced sea otters to control them but the otter also controls the abalone much to the dismay of the abalone fisherman! Would you believe that such a tiny, spiny creature could create such havoc -- another interesting phenomena of our fascinating world!

Alice L. Elston,
Photograph by Bertha McHaffie Gow



MARY LOU FLORIAN ELECTED PRESIDENT*by Marjorie Ketcham*

Mary Lou Florian, Conservation Analyst with the B.C. Provincial Museum, was elected President of the Victoria Natural History Society at the Annual General Meeting on May 19, 1981. She has been a director of the Victoria Natural History Society since 1978, and served as Programme Chairman for 1980/81. Mary Lou was Senior Conservation Scientist with the Canadian Conservation Institute in Ottawa. Born and raised in Vancouver, B.C., she is a graduate of U.B.C., received a Masters Degree in Biology from the University of Texas, and did post-graduate work at both U.B.C. and Carleton University, Ottawa. Her husband Fred was a medical research scientist in Ottawa and is now retired. They live in James Bay and have two sons. In her spare time, Mary Lou is an accomplished artist.

Our new president has recently been appointed as a member of the Science Council of Canada and serves on their Science and Education Committee. Mary Lou asked to have anyone who ever has a question or wants to get in touch with her regarding the Victoria Natural History Society, call her at work or at home. "I am always available and want to help", she said.

The V.N.H.S. is proud to have such a distinguished member, and truly welcomes Mary Lou as our President and we wish her success and happiness in her new position.

PRESIDENT'S NOTE*by Mary Lou Florian*

In 1944, the first President, Archdeacon Robert Connell of the Victoria Natural History Society, wrote in the first edition of the Victoria Naturalist that the Society was formed to fill a "need of an association of all who are interested in the study and enjoyment of nature". The Society over the years, and as it is doing today, certainly is fulfilling this need.

Archdeacon Connell also wrote of the pressures of a mechanical world and of the release from these pressures by observation and study of our natural environments. What could be more appropriate for today.

The objectives of the Society as written in our constitution today read:

- (a) to stimulate active interest in natural history
- (b) to study and protect flora and fauna and their habitats
- (c) to work with other societies and like bodies having interests in common with this society within and beyond the Province of B.C.

The impressive list of activities of the Society today show that it is fulfilling richly its objectives.

As Archdeacon Connell wrote and I agree, "our success depends on the enthusiasm of each flowing into the common stream" and "we look forward to many happy and profitable hours both outdoors and indoors in our particular group or groups in the larger forum of the Society".

LIMNOLOGY FIELD TRIP TO SWAN LAKE*By Terry Morrison*

The following is an excerpt from a programme given to a group of naturalists at Swan Lake on Saturday, May 30.

Although the bedrock underlying Swan Lake had its origins about 260 million years ago, the current phase of the Lake's history dates back only about 30,000 years. At that period, although an observer at Swan Lake would have noticed little difference in vegetation and climate from that of today's, another ice age was quietly building in the North. (The land had already suffered and recovered from three or more ice ages.) One change would have been evident -- as more and more water was trapped in the form of ice, the oceans dropped, until only a narrow channel separated Victoria and Port Angeles. Meanwhile, this great mass of ice spread southward as it accumulated, scouring across the land at the rate of about 150 feet per year. By 18,000 years ago, the continental ice sheet reached Victoria, where it stayed for 2000 years. At this point, our time-travelling observer would have seemed quite insignificant; being trapped under 3,500 feet of solid ice. The weight of this ice was so great that the land surface actually sank, with some startling results - as the climate warmed and the ice mass retreated from Victoria (about 13,000 years ago), the water released back to the oceans raised the water level until Victoria was under 250 feet of ocean. Our poor Swan Lake observer, finally freed from the ice, would now be standing about 200 feet below the ocean surface. Christmas Hill was a small island jutting 50 feet out of the water, where one could see Mount Doug Island and Mount Tolmie Island in the distance. It was during this period that the melt-water from the retreating glaciers washed huge amounts of finely-ground rock powder into the ocean, forming Victoria's clay-beds. Unless our observer left in time, he is now under 50 or 60 feet of blue-gray marine clay, preserved along with the many fine examples of marine shells.

Once the land was relieved from the weight of ice, it began to rise again, and the Swan Lake basin scoured out of the bedrock rose above sea level, about 8,000 years ago.

The Lake is thought at that time to have been about 85 acres in area, almost four times its present size. Like all lakes, Swan Lake has gone through a process called eutrophication, which includes addition of nutrients and filling in with sediments. By the mid-1800's, the Lake was visibly larger than it is now, but much of the original lake was now flat marshy fields, covered with hardhack, willow and red osier dogwood.

In 1850, lands including Swan Lake were purchased from Indians of the Kosampson Tribe by the Hudson's Bay Company, signalling the beginning of the next phase of Swan Lake's history. For some time, the lands around the Lake remained farm land out in the country. With the opening of the Swan Lake Hotel on Saanich Road in 1864, the Lake became a popular resort area, a weekend fishing retreat for early Victoria residents. But as the City expanded through the years, the Lake went through a period that has been referred to as "rampaging cultural eutrophication". Three "cultural" sources of nutrients were added to the inflow from the watershed - fertilizers from the Blenkinsop Valley and Swan Lake farms, effluent from a sewage treatment plant at Quadra and McKenzie, serving almost 500 households, and two wineries, which between them discharged some 4,500 pounds of sludge from the fermentation process into the inflow stream each year. Mr. Pendray, long-time farmer of Swan Lake, used to pump water from the Lake to water his garden. He once told me his sidewalks used to be stained red from the grape residue in the Lake water!

This gross overloading of nutrients in the shallow warm lake led, of course, to problems. These conditions supported huge amounts of plant and plankton growth, and Swan Lake was very thick and green with algae and duckweed during the summer. As all this material died and was broken down by bacteria, large amounts of oxygen were consumed, and the lower levels of Swan Lake became devoid of oxygen. The lack of oxygen and warm temperatures made survival impossible for cold-water fishes such as trout. The Pumpkinseed Sunfish and Stickleback abound in Swan Lake -- these fish can tolerate warm waters, and therefore can survive in the upper waters of the Lake where oxygen is supplied by photosynthesis of algae. Large fish kills in Swan Lake were reported as early as 1952.

The other problem associated with an abundance of growth is the production of methane and hydrogen sulphide gases by anoxic bacteria. The Lake, stratified into various levels by differences in water temperature during the summer, would "turn over" in the Fall, and bring these foul-smelling gases to the surface. This was an annual occurrence for nearly 20 years, giving Swan Lake the reputation of a large cesspool, shunned by anyone who had a sense of smell.

Conditions began to improve immensely after early 1975, when the entire area was connected to the Sewer System, relocating (versus solving) the problem. The lake is still very green and thick with plankton in the summer, and always will be, because of its location and size. Oxygen levels are still low in the lower waters of the Lake, but trout coming up from the Colquitz River are able to survive much of the year around now. And that sulphur smell hasn't blanketed the neighbourhood since around 1975.

After the talk and a demonstration of Lake sampling techniques, the group took some plankton tows and spent the better part of an hour discovering a fascinating new world under the microscope.

NOTE: Some of the information on glacial history is from an article "Living With The Shapes the Glaciers Carved Us" by William Stավdal.

WITTY'S LAGOON BIRDING TRIP

By Ed Coffin

Sparkling sunshine, congregating birds, and Bill Sendall's excellent leadership combined to make the April 25th Witty's Lagoon Outing an outstanding success. Sixty-four bird species were logged. The turnout of humans was roughly the same.

The two-pronged trek, covering both the north and south trails, with time out for lunch, produced many thrills. To mention a few:

- * An overhead flight of a bald eagle as a welcome to the parking lot
- * A clear view, from several positions, of a male osprey beside an isolated tree-top nest containing the female
- * A group of about twenty dowitchers probing by the north shore of the lagoon
- * The people-watching antics of a rufous hummingbird from several positions around the party
- * Repeated circlings and landings by flocks of Western Sandpipers, on both the lagoon flats and the beach
- * The group of dunlins, some in spring plumage of black belly and rufous back, associated with the lagoon flock of Westerns
- * Black bellies also displayed by plovers on the beach

- * Plovers also represented by four semipalmated near the mouth of the stream
- * The Eurasian Widgeon evident in the crowd of Americans
- * The short flights over the marshy meadow by a succession of savannah sparrows, one of which was considerate enough to exhibit itself on a bush-top
- * The procession of black brandt on the seashore
- * The quiet-looking tree near the beach picnic area which turned out, on close inspection, to be alive with pine siskins

TO TUGWELL LAKE - MAY 24

by Chas. A. Trotter

Bluebirds were to be the main attraction. So few sightings had been made this Spring that, when several pairs were reported at Tugwell Lake, it was thought to be worthwhile to lay on a visit by the Society. We made an exploratory trip on the 16th and, sure enough, there were the Bluebirds. But, on the 24th, with thirty people to do them honour, not one Bluebird appeared. Of course there were other interests -- Swainson's thrushes, warbling vireos, yellow rumps, grouse drumming, a Townsend's solitaire, rufous hummers, olive-sided flycatchers, other warblers (orange-crowned, yellow and yellow-throated). Lunch was enjoyed on a knoll with a fine view of the Lake.

Tugwell Lake is in the Sooke Hills, 17 km. from the turn-off in Sooke Village then via Butler Main Line logging road to Access #1 along which you can walk for about a kilometer. It is interesting country and well worth the trip, even without the Bluebirds.

Because of the altitude, Spring was just coming to the area with alders not fully leafed and the flowers putting on a good show. One plant of special interest was the Ground Cone (*Boschiakia Hookeri*) whose purple spikes were spotted among the salal.

Rain cut short a side visit to the Sooke Potholes, but did not dampen our enthusiasm for the Tugwell area as an interesting spot.

FOSSIL HUNTING

On Saturday, April 4, the Junior Naturalists set off for Muir Creek to look for fossils. There were twenty-five children and adults, plus our leader Mr. Rick Kool, and though the weather was overcast, the rain held off for the morning. As we walked along the beach to the cliffs, a few curious seals peeped out from the water, to watch us go by.

Mr. Kool explained to us that the fossils we found were 25 million years old, and came from the Miocene period. Unfortunately, the fossils were not old enough to be really hard, so they often crumbled when we were getting them out of the rocks.

We found many good samples of whelk *Agasoma*; moonsnails *Polinices*; mussels *Mytilus*; and clams. Sadly, we did not find the *Cornwaliaus Sookensif*, a hippopotamus like creature that some of the Senior Naturalists had searched for previously.

It was an interesting day; we thank Mr. Kool and Mrs. Wainwright for their help.

by V.N.H.S. Junior Naturalist
Ann Marshall
Age 11

THE FLIGHT OF BIRDS

by Richard Sewell

As an aeronautical engineer, I have long been fascinated by the aerodynamics, flight control systems and navigational systems of birds. Man has reached the moon and returned safely, but only at the expense of billions of man-hours and billions of dollars. The fastest operational aircraft in the world, about which performance data have been released, is capable of flying at altitudes exceeding 25 miles and at speeds in excess of 2500 mph. Not too long ago, one of these aircraft took off from Lakenheath in England at 1:00 p.m. local time, and after a non-stop flight, landed at Los Angeles at 10:00 a.m. the same day, thus beating the sun by three hours. These are great achievements in terms of science and technology, but they pale into insignificance compared with the performance of birds.

The golden plover flies regularly every year from Alaska to Hawaii and back. The one-way distance is approximately 2800 miles, which the bird covers non-stop in about 60 hours. The plover weighs about one pound, and during the flight it consumes only a few ounces of fuel - that is, body fat which is converted into energy. The highly-accurate navigational systems for this long over-water flight are contained entirely within the bird's small brain. A Boeing 747 makes the same

flight in about one-tenth of the time, but the fuel consumption is in the region of 45 tons. The navigational systems consist of many highly-sophisticated instruments and an on-board computer. In addition, the aircraft requires a reinforced concrete runway not less than two miles in length at each terminal point.

All flight vehicles, both birds and aircraft, are maintained in the air by a force known as lift. This force is developed as a result of the airflow over the wing. Ideally, the airflow should be laminar, that is, completely smooth. If the airflow is disturbed and becomes turbulent, there will be a loss of lift, which in the extreme case becomes total, and is known as stalling. In 1911, Frederick Handley-Page invented a device known as a 'leading-edge slot'. This was a small secondary airfoil which could be extended forwards and upwards above the main wing, and its purpose was to delay the onset of turbulent flow at low forward speeds and high angles of attack, thus delaying the onset of the stall. Birds have had this device for tens of thousands of years. There is one on each wing, and they are known as alulae or 'bastard wings'. Some diving birds, notably the scaup, use their alulae for stability and control while under water.

The next time you are a passenger in a modern high-performance jet aircraft, have a good look at the wing just before landing. The Boeing 727 is an excellent example. Various bits and pieces drop down and pop up all over the place, until there doesn't seem to be much left of the basic wing structure except the main spar. There are leading-edge flaps, trailing-edge flaps, leading-edge slots, air brake fences and spoilers. The electrical and hydraulic systems for the control and proper sequencing of these very necessary aids to stability and control are incredibly complex - and, for reasons of safety, they all have to be duplicated. Then compare all this with the smooth and completely effortless performance of a very commonplace bird such as a glaucous-winged gull. This bird can execute a high-speed turn in mid-air and then reduce speed to practically zero, all in a fraction of a second. As the bird wheels and turns, the flaps extend, the leading-edge slots, air brakes and spoilers are deployed, and the landing gear extends to increase drag and improve stability. A modern aircraft attempting such a manoeuvre would break up in mid-air.

To this day, no-one knows just how birds navigate across thousands of miles, much of this distance over trackless oceans. The Arctic Tern migrates from the Arctic to the Antarctic and back again each year - a total distance of more than 25,000 miles. Migratory birds use an astonishing variety of sensory cues for navigation. These may be audio-visual inputs, sun positions, star patterns, Coriolis forces, or the

earth's magnetic or gravitational fields - either singly or in combinations of two or more. Some birds respond to ultra-low-frequency sound. It has been suggested that upland sandpipers flying high above the Mississippi Valley are capable of distinguishing between the sounds of the surf on both the Atlantic and Pacific Coasts, and are thus able to determine their course and position.

The next time you are out for a walk, take the time to study the flight performance of birds, and when you see some of our shorebirds like dunlin or surfbirds, think for a few minutes about just how they reached the Victoria coast after flights of several thousand miles. Man's achievements are literally no more than a drop in the oceans of the world.

NEW HONORARY LIFE MEMBERS

By Mike Shepard

For many years now, Vic and Peggy Goodwill have played an important role in communications for our Society. Although few members have personally met the Goodwills, most know them for their excellent work in maintaining the Bird-Alert, one of the best in North America. Vic's bird reports to the National Audubon Society have put Victoria on the map as one of the top birding areas in Canada, and Peggy's lists in the "Victoria Naturalist" have kept our members informed of local birding highlights.

In light of their untiring efforts and important contributions to our organization, the annual general meeting of the VNHS awarded Mr. and Mrs. J.E.V. Goodwill Honorary Life Memberships.

NEW OFFICERS AND DIRECTORS ELECTED AT GENERAL MEETING

The Victoria Natural History Society elected the following new officers and board members at the Annual Meeting, May 19, at the Newcombe Auditorium:

Mary Lou Florian President
Giff Calvert Vice-President

New Directors:
H.H.A. Davidson
Mrs. Mary Richmond
Ray Williams

Congratulations and good luck in your new positions.

APRIL BIRDERS NIGHT

We had our last birders night for the Spring at Windsor Park. The highlight of the meeting was our annual quiz. The winners were as follows: 1st Prize - Anne Knowles; 2nd Prize - Alice Elston; and 3rd Prize - Art Durkee, all members of our Board!

A special thanks to Mike and Teresa Shepard who organize all our Birders Nights, and to all the people who donate the goodies for our coffee breaks. Our next meeting will be in the Fall.

OKANAGAN BIRDING TRIPS, MAY 1981 *by Marjorie E. Elston*

A total of 31 people and our 2 terrific leaders, Mike and Teresa Shepard of Swiftsure Tours, went birding in the Okanagan on 2 separate trips in May. Our destinations were Manning Park, Osoyoos, Vernon, Kamloops, and Princeton. The weather was very good for that time of year, though it snowed in Manning Park! A grand total of approximately 210 species of bird were seen altogether, among which were Sandhill Cranes, Ross' Goose, Flammulated Owl, Ovenbird, and a Common Gallinule. Everyone came home with at least 1 "lifer". We also saw 23 creatures including a pair of coyotes and a moose.

Generally, we started at the crack of dawn every morning and quit in the late afternoon, and logged quite a few miles and species in-between time. Our luck did run out a couple of times; we never found a White-headed Woodpecker and after looking at every hawk between Knutsford and Princeton, failed to produce a Ferruginous Hawk.

Many thanks to Mike and Teresa for making our trips so rewarding and fun.

RETIRING BOARD MEMBERS

As a result of the General Meeting on May 19, 1981 there have been some changes on the V.N.H.S. Board. We wish to thank Winston Mair, Bill Barkley and Margaret Wainwright for all the hours of expertise they dedicated to the Society. Winston and Bill have agreed to stay on as our reps to the F.B.C.N. and Margaret will continue with the Juniors.

WITTY'S LAGOON

The V.N.H.S. Board has donated \$2500 to the Summer Naturalist Program at Witty's Lagoon to enable them to hire a staff of 3 for 1981. Ms. Robin Hood, Chief Naturalist, says she welcomes our expertise and invites all members of the Society to participate in the programs.

BIRDING IN GOLDEN*By Sheila Reynolds*

Recently, I spent a few days working in the Golden area and did some birding. On April 11th and 12th, the weather was cold with snow flurries. The following species were seen:

Canada Geese	Red-Tailed Hawk	Evening Grosbeaks
American Widgeons	Ravens	Nuthatch
Osprey	Canada Jay	Killdeer
Crows	Magpie	Common Golden-Eyes
Violet-Green Swallow	Black-cap Chickadees	Great Blue Heron
Snow Bunting (4800')	Flicker	Sparrow Hawk
Oregon Junco	Buffleheads	Robins
Pileated Woodpecker	Common Loon	Starlings
Belted Kingfisher	Baldheaded Eagle	Mountain Bluebird
Mallards	Western Meadow Lark	House Sparrow
American Coot	Pine Grosbeaks	Redwing Blackbird

Others observed either for too brief a period, or from too great a distance for definite identification were:

Harlan's Hawk	Herring Gull	Some other species of Sparrow
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The most pleasant observation was 3 Mountain Bluebirds - the soft blue colour is very delicate. An Osprey put on a beautiful display of soaring and gliding, giving such an excellent view that there wasn't any problem in identification. Another Osprey was seen several miles away on a branch near a large nest atop a dead tree, but I couldn't see any bird on the nest. The unusual sight of two Canada Geese sitting or standing on a huge nest about 40 feet up on top of a broken Cottonwood, was really quite amusing. Until I finally located them, I was searching in the sky for geese flying, but there they were, cackling away and looking as if they planned to stay up there!

Next time I go there, I hope that the snow will have completely gone and that I will see an even greater variety of birds.

STILL THE BEST HOUSE?*by Yorke Edwards*

In 1979 it was 113, last year it was 110 - bird species that is, seen on or from 663 Radcliffe Lane. Last year, in the "Naturalist" for March-April, I reported the 1979 total as 105 before I found my list incomplete by eight common species.

Now the total of species for the two years is 131. Not too bad for an area rarely visited by woodland species since there are almost no trees. For example, so far we have recorded only one thrush (Robin), only one flycatcher (Western Flycatcher), and no vireos at all.

Is it the best? Last year I threw out the challenge, hoping for some light-hearted opposition. Hearing none, I will surely get some action by wondering if my former property, far from the sea at 620 Rockland Place, is the second best. In six years there, we saw 67 bird species, counting only those well and surely identified.

Perhaps if I had stayed home last August, the 1980 list would have been longer. Still, there are now 18 new species for the property, notable among them a Yellow-billed Loon on January 14 with white bill filling my eye while its shape filled my mind with why a bill designed like that might be a better idea; a Tufted Puffin one August noon, almost under my favourite window, that took twenty minutes to swim out of sight toward Seattle; Caspian Terns, or maybe one repeater, that hunted by on June 26, July 5 and 16; a mysterious shorebird - all us birders have our haunting mysteries - that was almost a Pectoral Sandpiper but really more a Sharp-tailed Sandpiper, on July 30 (this one not counted); and a Franklin's Gull, wanderer from the Prairies, on October 1 that caught the eye because it avoided the hundreds of other gulls nearby and held the eye because its wings were so dark.

Mostly the new ones in 1980 were those sure to wander by sooner or later from their normal habitats, like a Cassin's Auklet well inshore, and our only tree finally holding Red-breasted Nuthatch, Townsend's Warbler and Yellow Warbler. Two others were Shoveler and Green-winged Teal that followed local Mallards to our rocky shore.

Listing species of birds, however, is really a recreational side issue. The main attraction is the joy of watching the predictable parade of the seasons change the large cast of birds on a spectacular shore. It is also the slow dawns of understandings that come with living right with the passing scene. White-winged Scoters stay farthest out. Buffleheads are the diving ducks usually closest in. Those far scaups are probably Greater Scaups; the ones near shore are usually Lesser Scaups. In 1979, there were three times as many Black Oystercatchers as in 1980, and they were ten times noisier. There were more Heermann's Gulls in 1980 through a longer period. And sometimes those loafing flocks of Mew Gulls are not Mew Gulls at all, but Thayer's Gulls, like when a flock of over a hundred on Trial Island was in good light and clear air, and a good telescope revealed the details of leg colour.

The whistle of a plover and the gossiping of Old Squaws reminds me as I write that it is good to be alive in good habitat with lots of other kinds of lives. But listing the species is the spice to sharpen the senses. Will the list for 1981 go to 115? Will the property list reach 140? Listen in, same time, same place, next year.

MARINE BIOLOGY OUTING - VICTORIA BREAKWATER

by Sharon Godkin

(continued from last issue)

We saw only two species of nudibranchs, those gastropods which discard their shells during larval life and live as marine slugs ever after. The yellow-margined nudibranch (*Codlina luteomarginata*) was a slightly oval flattish mound, basically white with lemon-yellow trim and encircling yellow spots, like a row of lighted windows in a miniature flying saucer. It seemed sluggish, perhaps because it has no need to chase its dinner, the sedentary sponge. More active and bizarre-looking, the creamy-white slug-shaped 5 cm. orange-spotted nudibranch (*Triopha carpensteri*) had many orange spots and wierd projections tipped with bright orange. It prefers to graze on bryzoans.

The only bivalve mollusc brought to our inspection was a small 2 cm. swimming scallop with a rose-pink shell. When the shell was open, rows of fine tentacles and tiny blue-green eyes fringe their margins. The scallop is the only bivalve with eyes. It uses them to detect its enemy, the prowling starfish, in time to clap its valves together, forcing water out near the hinge, and jet away.

Possibly the most fascinating and certainly the most alien organisms we studied were the echinoderms - members of a phylum of unique creatures characterized by radial symmetry in adulthood, hydraulically-operated tube feet, and a skeleton of small bony plates called ossicles embedded in the flesh and linked by a network of muscles. This arrangement gives the body rigidity plus flexibility.

The large starfish sub-group are flat, star-shaped animals with varying numbers of legs which bear clusters of simple eyes at their tips, and usually a forest of powerful suction cup tube feet along their ventral grooves. Unbelievably, the animal can coordinate movement in any direction, gliding smoothly as thousands of hydraulic tube feet push or pull. The large starfish are efficient predators who grasp hapless clams or oysters in a relentless tug of death which eventually forces the valves apart sufficiently for the starfish to evert its stomach and digest the victim within its own shell.

Certainly, the most impressive starfish brought up by the divers was the enormous sunflower star (*Pycnopodia helianthoides*), the largest star in the world, which can grow up to 1 m. in diameter. Ours was more than half that size, basically orange with reddish and purplish hues and repellingly slimy and flaccid. This starfish readily loses arms and grows new ones, having an indeterminate number. Ours typically had arms of various lengths, and left one attached to the diver's shoulder. It is distinguished further by being the fastest starfish in the world, able to sprint after its prey (abalones) at 8-12 inches per minute. Also a skilled gymnast, it demonstrated how literally to walk under itself to right itself in a few moments.

Contrastingly neat and dapper in comparison, the 20 cm. sunstar (*Solaster stimpsoni*) had about 10 slender arms. It was orange with a blue-grey stripe along each arm, and is said to prefer sea cucumbers as food.

The most beautiful star was a small (8 cm) 5-rayed star that glowed a brilliant orange-red against the grey day. Aptly called the blood star (*Henricia leviuscula*), it has a small disc and long slender tapered arms. It is one of the cold water starfishes which broods its eggs.

The most drab star was the 9 cm. 6-rayed or brooding star (*Lepasterias hexactis*), a dark brown chunky starfish. Between December and March, the females hump up on 'tiptoes' and brood their eggs and young. Our specimen was presumably a male as it was not in brooding posture.

The purple star (*Pisaster ochraceus*) was the only inter-tidal genus we saw. Several of these plump (20-30 cm.) 5-rayed purple stars were crammed into a crevice, typical behaviour for this animal which has to be stiff and tough and well-anchored to withstand desiccation at low tide and the pounding surf at high tide.

We were charmed by several small (5-7 cm.) brittle stars (possibly *Ophiopholia aculeata*). Unlike the other starfish, brittle stars have a very distinctive disc and 5 thin tapering sinuous segmented arms, banded with white and purplish brown. They have relatively few short stiff tube feet which bristle from the bottoms and sides of the arms. Locomotion is swift, by means of rapid writhing of the very flexible arms, and makes them look much more like a living animal than their gliding relatives. Their only defence is to lose an arm, which fortunately regenerates quickly.

to be continued in the next issue

BIRD OBSERVATIONS

1981 JULY/AUGUST 1981

VICTORIA NATURAL HISTORY SOCIETY

Mailing Address: P.O. Box 1747, Victoria, B.C. V8W 2Y1

APRIL

No.	Species	Date	Area	Observer
1	Yellow-bellied Sapsucker	5	Mount Tolmie	Ray Williams
1	"Eurasian" Green-winged Teal	12	King's Pond	Ed Coffin
1	Green Heron	12	Esquimalt Lagoon	Harold Hosford
1	Rough-legged Hawk	17	4373 Prospect Lake Rd.	S.&G. Calvert
1	Gray Jay	18	Tugwell Lake	M.&V. Goodwill

MAY

3	Great Horned Owl	2	Elk/Beaver Lake	Rob Mackenzie-Grieve
1	Yellow-headed Blackbird	4	1570 Clawthorpe	Henri Wetselaar
1	Solitary Sandpiper	4	King's Pond	R. Satterfield
1	Barred Owl	8	6960 Grant Rd.	K. & B. Adams
1	Yellow-billed Loon	8	Boatswain Bank	Wayne Campbell
1	Black-legged Kittiwake	9	Clover Point	Dave Stirling
1	Sandhill Crane	12	Fredrick Norris Road	Bill Savale
2	Common Terns	12	Clover Point	R. Satterfield
2	Tufted Puffins	16	Trial Islands	Mike Shepard
1	American Avocet	17	Swan Lake	Mr. & Mrs. J.P. Dunlop (Scotland)
2	Cassin's Auklets	17	Point No Point	Don Carruthers
1	Wilson's Phalarope	18	Quick's Bottom	Don Carruthers
3	Caspian Terns	22	Jordan River	M.&V. Goodwill
1	Townsend's Solitaire	24	Tugwell Lake	C. Trotter, et al
1	Vesper Sparrow	26	Cobble Hill	M.&V. Goodwill
1	Baltimore Oriole	30	Swan Lake	Jo MacGregor

BIRD ALERT - 478-8534

It would be helpful if, when you see anything unusual or of interest, you phone 478-9715 right away, so others may see it too. This is what the "Alert" is for.

PROGRAM - JULY/AUGUST 1981

- Sat. July 11 Amphibians and Reptiles in Goldstream Park.
 Leader: Alton Harestad (Museum: Vertebrate Zoology) (387-3649).
 Meet at Mayfair Lanes 9:00 a.m. or Parking Lot by Bridge 9:30 a.m.
- Sat. July 18 Seining at Mill Bay - on beach just north of Indian Reserve.
 Leader: Grant Hughes.
 Meet at Mayfair Lanes at 10:00 a.m. or at the beach at 11:00 a.m. Bring your binoculars.
- Sat. July 25 Marmots and Wildflowers on Green Mountain.
 Leader: to be announced.
 Meet: Mayfair Lanes at 8:30 a.m. or Green Mountain Turnoff at 10:00 a.m. Note: Turnoff is north of Ladysmith near Cassidy - go under Island Highway and wait above at the railway crossing.
 (If woods are closed due to fire hazard, date will be moved to August 22 - listen on Bird Alert.)
- Sun. Aug. 9 Forestry Tour of Cowichan Valley.
 Leader: Mark Atherton (Can. Inst. of Forestry - 652-3013).
 Meet: Mayfair Lanes at 8:30 a.m. or at the Duncan Forestry Museum at 10:00 a.m.
- Sat. Aug. 15 Birding on Cowichan Bay.
 Leader: Rob Mackenzie-Grieve (477-2402).
 Meet: Mayfair Lanes at 8:30 a.m. or at the Robert Service Memorial at 9:30 a.m.
- Sat. Aug. 29 Fossils at Sooke.
 Leader: Rick Kool (B.C.P. Museum Teacher)
 Meet: Mayfair Lanes at 9:00 a.m. or at Whiffen Spit at 9:30 a.m.

VICTORIA NATURAL HISTORY SOCIETY
 Mailing Address: P.O. Box 1747, Victoria, B.C. V8W 2Y1

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RARE BIRD ALERT
478-8534