

The
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NATURALIST**

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THE LUCID PLEIADES

A photograph of the brightest Stars in the Cluster.
Taken Christmas night, 1944, by Dr. J. A. Pearce.

THE VICTORIA NATURALIST

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The Victoria Natural History Society

The regular monthly meeting of the Society was held in the Reading Room of the Provincial Library on Tuesday the 16th January 1945, with Dr. G. Clifford Carl acting as chairman.

Formal notice of an amendment to the Constitution in connection with membership, drawn up by the Executive Committee, was served to the members of the Society.

This amendment reads as follows:-

"Junior members, age 16 years and under will pay an annual subscription of \$1.00 which will entitle them to all the privileges of the Society except the right to vote and to hold office."

This amendment will be put to a vote at the next regular monthly meeting in February.

In response to the suggestion of the Executive Committee that a short period at the beginning of the regular monthly meetings be devoted to the examination and identification of specimens of interest brought in by members, Dr. Carl demonstrated the skull of a young killer whale and Mr. Mathews showed a specimen of marble from Taxada Island. The whale skull was from a young female, 8 ft. 1 in. in length, which was washed up on the shore at Cherry Point. It showed clearly the position of the teeth before they break through the gums and demonstrated the migration of the nostrils from the snout to form the blow-hole on the top of the head. The limestone of the specimen shown by Mr. Mathews had been recrystallized to form a very coarse-grained marble and the large calcite crystals showed the effect of stress. Subsequent weathering had etched the rock differentially, thus producing an extremely rough surface.

Dr. Carl appointed Mr. Winkler as the third member of the nominating committee to serve with Mrs. Woodward and himself. Dr. Joseph A. Pearce, Director of the Dominion Astrophysical Observatory, gave an extremely interesting lecture on the Pleiades.

M. R. Watson.



LESSER SCAUP DUCK IN VICTORIA HARBOUR

The Pleiades Cluster

by Dr. J. A. Pearce.

A brief synopsis of the illustrated address to the Society, January 16th, 1945.

The most interesting constellation to be seen these winter evenings is the little group known as the Pleiades. To the naked eye it appears as a small compact cluster of six to eight brilliant white stars within a circle having a radius of one degree - twice the diameter of the moon's disc. The stars are arranged in the form not unlike a dipper, and so striking is the resemblance that the constellation is frequently but incorrectly called the Little Dipper.

For four thousand years these stars have attracted the attention of people in all ages, and in all parts of the world. Great temples including the Parthenon have been built in their honour and oriented to their rising. Many myths and legends of the stars are to be found in ancient literature. Poets of all ages from Homer and Hesiod to Tennyson have sung of the sweet influence of the Pleiades.

The name "Pleiades" is of Greek origin, and various explanations of its meaning have been given. It has been suggested that it may come from the word "Plein" to sail, as the constellation was of some assistance to mariners; navigation in the Mediterranean was considered safe from May to November, the dates of the heliacal rising and setting of the group. It has also been thought to have been derived from the word "Pleiones" meaning many, referring to the number of the stars. This is quite unlikely, for while the cluster is composed of some hundreds of stars, fewer than a dozen are ordinarily seen with the unaided eye.

The most satisfactory and logical explanation is that the word is a patronymic, the stars representing the seven daughters of Atlas and Pleione, who with their half-sisters, the Hyades, were transported to starry skies by Zeus. The names of these beautiful nymphs were: Maia, Meropa, Asteropa, Alcyone, Targete, Electra and Celaeno. One legend relates that Perseus, to punish their father Atlas for his inhospitality, turned his

Gorgon-headed shield upon him, transforming him into the mountain which bears his name - Mount Atlas. The great grief and lamentation of his daughters was ever remembered. Centuries later, shepherds on the hills of Arcady and Boeotia, seeing the Pleiades rising through the spring showers, would say "There are the Pleiades weeping for their father and shedding sweet influence upon the earth."

Four thousand years ago the vernal equinox was close to the cluster, so that in the fall they would rise at sunset, culminate at midnight, and set at sunrise. In the spring they would rise with the sun. The Pleiades thus marked the seasons. Hesiod, the first Greek didactic poet who flourished in the eight century, B.C., in his great epic poem "Works and Days" which was a Boeotian shepherd's calendar said:

"When Atlas-born the Pleioid stars arise
Before the sun above the dawning skies
'Tis time to reap; and when they sink
Below the morn-illumined west, 'Tis time to sow."

Aratos composed an epic poem called "The Heavenly Display" in which he described the constellation depicted upon the celestial globe of Eudoxos. Referring to the Pleiades he said:

"The flock of clusterers. Not a mighty space
Holds all and they themselves are dim to see.
Seven paths aloft men say they take
Yet six alone are viewed by mortal eye.
These seven are called by name Alkyone.
Kelaine, Merope, and Sterope,
Taygeta, Electra, and Maia, queen.
They thus together small and faint
Roll on, notable at morn and eve
Though Zeus who bade them show
When winter first begins,
And summer and the season of the plough."

The Number of the Pleiades:

The great Greek astronomer, Hipparchus, made the first observations of the Pleiades; four of the stars are recorded in his catalogue. While a normal eye

really sees eight stars in the cluster, a map showing eleven was made by Maestlin, the tutor of Kepler, before the advent of the telescope. Some observers have claimed to have detected as many as sixteen by averted vision. The illustrious Italian astronomer Galileo made a map of the cluster as seen through his wonderful "optic tube" in 1610. He discovered more than forty fainter members of the cluster. Long exposure photographs with modern telescopes record as many as 3000 stars in the region of the cluster - all but a few hundred being distant background stars. The illustration on the cover of this number is from a photograph taken Christmas night 1944 by the writer. On the original photograph more than 100 stars brighter than the twelfth magnitude were shown, the stars fainter than the eighth magnitude were lost in the reproduction. Over 250 stars, some as faint as the seventeenth magnitude, have been identified as cluster members. Many of the fainter stars remain to be discovered and it is probable that the Pleiades system is composed of at least 450 to 500 stars.

The Motion of the Cluster:

The physical members of the system are easily identified from the background stars when their motions are studied. The cluster members move with the same velocity through space, the stars travelling along parallel paths. The space motion may be completely solved if we know the radial and transverse components of the stellar motions and the distance of the cluster. The radial velocities in absolute units, kilometers per second, are obtained from spectrographic observations. The transverse components, displacements on the celestial sphere, are deduced from the measured positions of the stars, photographed at two widely separated epochs. To illustrate these motions the data for the twelve lucid Pleiades, visible to the naked eye is given in the following table:

Observed Motions of the Lucid Pleiades

Star	Radial Velocity km./sec.	Proper Motion per year	Direction
Celaeno	+7.2 \pm 0.9	0"0485	160°1
Electra	+11.4 \pm 0.5	.0512	152.9
H.D. 23324	+8.4 \pm 2.5	.0527	152.2
Taygeta	+5.7 \pm 0.4	.0503	152.4
Maia	+7.3 \pm 0.5	.0519	151.6
Asteropa	+6.7 \pm 1.3	.0447	158.4
Meropa	+7.0 \pm 0.4	.0517	149.7
Alcyone	+10.7 \pm 0.5	.0510	151.0
H.D.23753	+4.8 \pm 1.0	.0568	150.9
Atlas	+9.2 \pm 1.0	.0500	155.7
Pleione	+7.8 \pm 1.3	.0527	160.2
H.D.23950	+5.8 \pm 0.6	0.0424	152.6
Apparent Motion of the Cluster:			
	+7.86 km./sec.	0"0507	153°2
	\pm 0.38 "	\pm 0.0036	\pm 0.6

In the above table the name of the star or its catalogue number is given in column 1; the radial velocities as determined by the writer in column 2; and the observed transverse motion in magnitude and direction in columns 3 and 4.

It will be observed that the motions of the stars are strikingly similar, conclusively showing that they travel along parallel paths. The space motion of the cluster is 17.57 km./sec., a speed of translation of approximately 3900 miles per hour.

The Physical Characteristics of the Cluster:

The sizes of the stars, their distances apart and the dimensions of the cluster may be found when we determine the distance of the group. An analysis of the motions tabulated (p.111) gives a distance of 240 light years. That is, the light takes 240 years, travelling at the rate of 186,000 miles per second to come to us from the cluster. The light by which we see the stars left the Pleiades in the reign of Queen Anne, A. D. 1708.

The cluster members are arranged about Alcyone, the central star, sensibly in a sphere whose diameter is 40 light years. Within this sphere there are 500 stars, four times as many as the known stars in a similar sphere about the sun. In the central portion of the cluster the brightest stars are on the average only one to one and a half light years from each other, and are thus 100 times more numerous than in ordinary stellar space.

The great range in luminosity of the cluster stars is remarkable. Alcyone, the brightest, radiates 700 times more light than our sun; Electra 400; Atlas and Meropa and Taygeta 300 times; the average of the twelve brightest stars is 206 times the sun. The tenth magnitude stars in the cluster are similar to our sun in luminosity, mass and diameter. The faintest known members would be 200 times less luminous than our sun. The temperatures range from 16000°K for the white stars to 6000°K for the solar type stars, and 3400°K for the reddish stars of lowest radiative power. The range in mass would not be so great, the

white stars have mass eight to ten times that of the sun, and the faint reddest members about one-third that of the sun.

Long exposure photographs reveal that the Pleiades are involved in faintly luminous nebulous clouds. The spectrographic observations prove that these clouds shine by reflected or scattered light of the high temperature stars within. This suggests that the interstellar matter is in the form of small solid particles - a cosmic dust cloud scattered throughout the vast volume of the cluster. The clouds are brightest in the immediate vicinity of the hottest stars and their luminosities decrease rapidly with the distance from the involved stars. These bright nebulosities are but portions of an extensive cloud covering at least 100 square degrees of the sky, dimming the light of the background stars and affecting the light and colour of the fainter cluster members.

The starry skies would present a wonderful sight to an observer on a world encircling one of the Pleiades. While the nebulous clouds would not be visible as such, their light would increase the general illumination of the night sky. What glorious constellations could be formed by the hundred or more first magnitude stars and several hundred fainter stars. The lucid Pleiades, the fair daughters of Atlas, would shine with a splendour far surpassing the lustre of our planet Venus at its greatest brilliancy.

Dominion Astrophysical Observatory,
Victoria, B. C.

The Steller Sea-lion:

The Sea-lion most commonly seen off the coast of British Columbia is the Steller Sea-lion (Eumetopias jubata) which ranges from Bering Straits south to Farallon Islands, California. It reaches a large size, bulls averaging 1500 to 1800 pounds and measuring up to 12 feet in length. The cows are much smaller, weighing from 600 to 1000 pounds and measuring about 6 feet in length.

Several breeding grounds or "rookeries" are located on the coast, one at Scott Islands at the north end of Vancouver Island, one at Cape St. James at the southern extremity of the Queen Charlotte Islands and several small ones off the entrance to Rivers Inlet. Here, the cows give birth to the single pup usually during June or early July and the bulls guard their "harems" of 5 to 20 females.

Their food consists largely of fish and occasionally octopus, squid and clams. Because of their alleged destruction of salmon and other valuable food fishes, large numbers of sea-lions were at one time killed each year on the rookeries. Although the amount of damage to the fisheries has never been accurately or satisfactorily determined sea-lions are no friends of the fishermen since they are very destructive to nets and other gear.

Despite their large size sea-lions are extremely graceful swimmers. There is little doubt that the aquatic antics of these creatures near our beaches have been the foundation of some of the reports concerning our now famous "Caddy".

G. Clifford Carl
Provincial Museum,
Victoria, B.C.

Illustration page 119; courtesy of "Museum Notes",
City Museum, Vancouver, B. C.

Christmas Bird Count.

The first count undertaken by members of the Society was naturally experimental, but it produced some interesting information. It does not give, by any means, a complete list of the different species that winter in this area, as a number of places which have a large winter population were not visited by the members of the Society. Victoria Harbour is a haven for many species that are not seen elsewhere, the Gorge and Esquimalt Harbour would also show some very interesting results.

Among the many wintering species that did not come under observation one could name the Meadowlark, Skylark, Quail, Sratle Wren also Hawks and owls, and along the shores and harbours-- Hooded and American Mergansers, Red-backed and purple Sandpipers, Lesser Scaups, White-winged Scoters, Black-bellied Plovers and Short-billed Gulls.

It is probably not until a few years after a bird count has been taken that its usefulness becomes apparent; if counts cannot be published they should at least be filed in some place like the Provincial Museum so that they can be referred to in the future. If in years to come the lists are compared, some of the bird populations will show large fluctuations. Everyone will remember the winter of two years ago when we had an influx of the Varied Thrush that invaded all the gardens, and the previous year when the Stella Jay was so common in the James Bay district; few if any of these birds have been seen in Victoria since. There have been many changes in the duck populations in the park in recent years. It would be interesting to know where these ducks spend their summers and it is hoped that this will be made possible in the near future by banding.

The summer visitors have, in the past, been fairly well noted but the winter ones have not been tabulated with the same thoroughness; another important gap in our present knowledge is the lack of information on the use of local routes by migrants. It is the writer's opinion that Victoria lies between the two main fly-ways of the Island, which would account for the scarcity of birds seen here in migration. Comox appears to have a much greater migration population in both spring and fall and it is probable that they cross to the mainland just below that point and thence down the mainland coast. Those migrating down the west coast of the Island apparently bridge the Straits between Port Renfrew and Sooke thereby missing Victoria. All migration movements should be carefully noted with time, state of weather, direction of wind, etc. and kept for future reference. A great deal of information on bird counting and allied subjects can be obtained from the recent book by Hinkey entitled "A Guide to Bird Watching."

The lists sent in by members appear on the following page. Columns A, B and C were taken by a group of seven members of the Society under Mr. Clay from the following localities:-

- A. The three lakes in Beacon Hill Park.
- B. Cliffs, shore and sea by the Park.
- C. Woods and brush in the Park.
- D. The district at Breafoot.
Taken by G.A. and W.V. Hardy.
- E. The point on the East side of Shoal Bay.
Taken by John Redford.

Date Dec. 26th, 1944 Weather Still, overcast, snow on ground, lakes frozen.

Since the last issue of the Magazine we have had two further records of Hummingbirds being seen. One by Mr. Protheroe at Oak Bay on the 17th December and the other from Mr. Cunningham on the last day of the year.

A.L. Meugens.

	A	B	C	D	E
Horned Grebe		6			
Eared Grebe					5
Baird's Cormorant					1
White-fronted Goose	1				
Mallard	325				
Baldpate	250				150
Green-winged Teal	2				
Shoveller'					42
Wood Duck	2				
Canvas-back	5				
Greater Scaup Duck		20			139
American Golden-eye		4			8
Buffle-head		5			6
Western Harlequin Duck		4			8
Surf Scoter		12			7
Red-breasted Merganser		2			
European Partridge				5	
Ring-necked Pheasant				3	
American Coot	1				
Killdeer		2		2	
Black Turnstone		10			3
Gloucus-winged Gull	160			20	
Northwestern Flicker				2	
Gairdner's Woodpecker			1	2	
Chestnut-backed Chickadee				4	
Western Winter Wren			3	1	
Robin		5			
Varied Thrush			1	4	
Golden-crowned Kinglet			6	3	
Hutton's Vireo			1		
English Sparrow				2	
California Purple Finch				5	
Northern Pine Siskin			20	50	
Oregon Towhee			1	2	
Oregon Junco			2	36	
Fok Sparrow			4	2	
Song Sparrow			2	2	
Total	746	70	41	145	369
Species	8	10	10	18	10

NOTICE OF MEETINGSMONTHLY MEETING

Tuesday
Feb.20th

Provincial Museum.

Speaker: Mr. Lionel E. Taylor.
"Plant Collecting in South Africa."

Note: A large number of very beautiful coloured slides will be shown from Mr. Taylor's collection. The motion to change the Constitution will be voted on and nomination for Officers for the ensuing year will be accepted.

GROUP MEETINGS

Tuesday Geology - - - - - Mr. K. Watson
Feb.6th Biology Lab.,Victoria College, Joan Cres.

This meeting was scheduled as an Ornithology meeting but has now been changed to Geology.

Tuesday Ornithology - - - - - Major Allan Brooks
Feb.13th Biology Lab.,Victoria College, Joan Cres.

Tuesday Botany - - - - - Archdeacon Connell
Feb.27th Biology Lab.,Victoria College, Joan Cres.

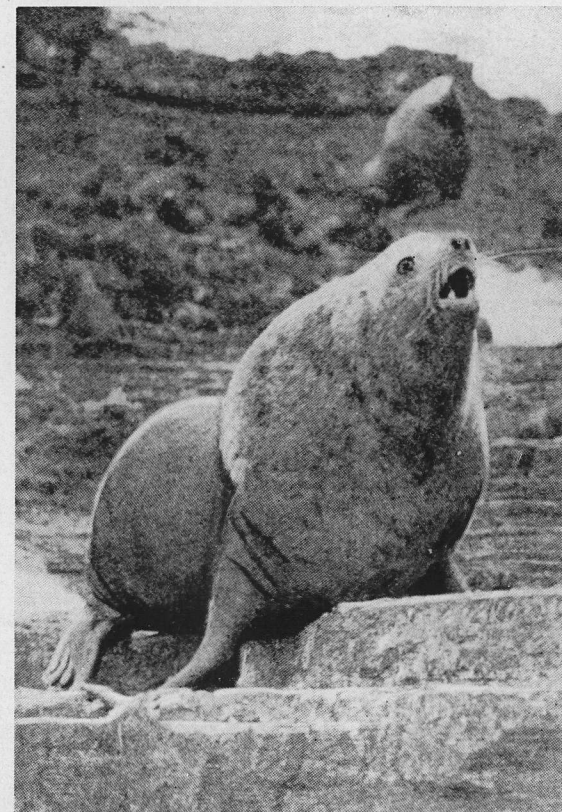
Tuesday Zoology - - - - - Mr. Fields
Mar.6th Biology Lab.,Victoria College, Joan Cres.

A N N U A L M E E T I N G

13th MARCH 1945,

at
8 p.m. in the

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Annual Subscription: Single, \$2.00; Family, \$3.00

NOTICE OF NEXT MEETING

The next meeting of the Society will be held in
PROVINCIAL MUSEUM, PARLIAMENT BUILDINGS
at 8 p.m. on Tuesday the 20th February, 1945

CANADA
POSTAGE
PAID