PROVINCE OF BRITISH COLUMBIA

REPORT

OF THE

PROVINCIAL MUSEUM

OF

NATURAL HISTORY

FOR THE YEAR 1937

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

VICTORIA, B.C.:
Printed by CHARLES F. BANFIELD, Printer to the King's Most Excellent Majesty.
1938.

To His Honour E. W. HAMBER,

Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The undersigned respectfully submits herewith the Annual Report of the Provincial Museum of Natural History for the year 1937.

G. M. WEIR,

Provincial Secretary.

Provincial Secretary's Office,

Victoria, B.C.

PROVINCIAL MUSEUM OF NATURAL HISTORY,
VICTORIA, B.C., February 24th, 1938.

The Honourable Dr. G. M. Weir,
Provincial Secretary, Victoria, B.C.

SIR,—I have the honour, as Director of the Provincial Museum of Natural History, to lay before you the Report for the year ended December 31st, 1937, covering the activities of the Museum.

I have the honour to be,
Sir,
Your obedient servant,
F. KERMODE,
Director.

DEPARTMENT *of the* PROVINCIAL SECRETARY.

The Honourable Dr. G. M. WEIR, *Minister.*

P. WALKER, *Deputy Minister.*

PROVINCIAL MUSEUM OF NATURAL HISTORY.

Staff:

FRANCIS KERMODE, *Director.*

I. MCTAGGART COWAN, Ph.D., *Assistant Biologist.*

MARGARET CRUMMY, *Stenographer.*

WINIFRED V. HARDY, *Recorder Botanist.*

LILLIAN C. SWEENEY, *Assistant Preparator.*

J. ANDREW, *Attendant.*

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REPORT *of the*
PROVINCIAL MUSEUM OF NATURAL HISTORY
FOR THE YEAR 1937.

By Francis Kermode, Director.

OBJECTS.

(*a.*) To secure and preserve specimens illustrating the natural history of the Province.

(*b.*) To collect anthropological material relating to the aboriginal races of the Province.

(*c.*) To obtain information respecting the natural sciences, relating particularly to the natural history of the Province, and diffuse knowledge regarding the same.

ADMISSION.

The Provincial Museum is open to the public, free, week-days, 9 a.m. to 5 p.m.; May 1st to October 31st, Sunday afternoons, 1 p.m. to 5 p.m.

The Museum is closed on all statutory holidays, except on notification through the press.

VISITORS.

The following figures show the difference between those who registered and those who were checked by the staff. While only 33,851 registered, the total of the check was 60,352.

	Registered	Checked.
January	610	1,284
February	810	1,621
March	1,242	2,471
April	1,376	2,419
May	2,093	3,892
June	3,085	5,497
July	8,441	14,504
August	8,832	15,596
September	4,042	6,968
October	1,702	3,070
November	939	1,678
December	679	1,352
Totals	33,851	60,352

ACTIVITIES.

The year 1937–38 being the fiftieth anniversary year of the opening of the Provincial Museum of Natural History in Victoria, British Columbia, it is proposed to celebrate this in a fitting manner some time during the year.

The first record that we have of visitors in the register is dated October 25th, 1887, and during this first year in which the museum was open to the public, slightly over 500 names were recorded. As will be noted by the list in this report, the number of visitors this year was slightly in excess of 60,000, a small decrease from the previous year, which no doubt reflects a corresponding slight decline in the tourist trade of the summer. A glance at the register shows that people from all parts of the globe visited the natural history collections in the Museum.

The staff of the Museum is now comparable with what it was prior to 1914, which places us in a better position to do the vast amount of scientific work needed in a Province of this size with its wealth of fauna and flora.

The routine office-work and correspondence is increasing steadily, more filing-cabinets are needed, as also is space for our display and in particular our study collections.

Early in the year, the Director, a member of the Canadian Advisory Committee to the Carnegie Corporation, arranged with the Committee that I. McTaggart Cowan, Ph.D., the Assistant Biologist, be granted a travelling scholarship to visit all the larger museums of Eastern Canada and United States and study their methods of recording, preservation, display, and museum technique which could be adapted to a smaller museum. A travelling scholarship of this kind is a great help to museum staffs, enabling them to visit other museums where scientific work is being pursued, and should be available to those studying the different branches of museum-work whenever possible. I speak from practical experience as I have visited many of these larger museums from time to time.

While Dr. Cowan was away he visited the National Museum, Ottawa; the Royal Ontario Museum, Toronto; the American Museum of Natural History, New York; the Academy of Sciences, Philadelphia; the Carnegie Museum, Pittsburgh; the Field Museum, Chicago; and the United States National Museum and Smithsonian Institution at Washington, D.C. The Director wishes to thank the Directors and staff of all these museums for the kindness and attention shown to the Assistant Biologist on this study tour. This trip East also gave Dr. Cowan the opportunity of attending the annual meeting of the Mammalogists' Society of America, which was held in Washington, D.C.

The Dodge truck, purchased two years ago, has proved an indispensable part of the Museum equipment. It is used frequently in collecting on Vancouver Island, and has proved a very simple and cheap means of transportation in making trips to out-of-the-way regions on the mainland of British Columbia and for lengthy expeditions to otherwise inaccessible parts of the Province.

This last summer the Assistant Biologist, ably supported by his wife in the honorary capacity of botanist, and Mr. Kenneth Racey as field zoologist conducted field studies through the Okanagan District, the Monashee Range, and also in the Selkirk Mountains in Revelstoke Park area. Thanks are due to the Dominion Parks Branch for permits readily granted and for the assistance rendered by the Parks officials. On this trip many desirable birds, mammals, and specimens of the flora of these regions were secured. A more detailed account will be found farther on in the report.

Collecting on Vancouver Island has been steadily carried on when time permitted absence from the office. One of the rare specimens secured this year was a Sharp-nosed Finner Whale taken in the vicinity of Sooke, about 20 miles from Victoria, and presented by Messrs. C. F. Todd and C. F. Goodrich.

Here again the truck proved useful as the Assistant Biologist, accompanied by Mr. E. A. Cooke, went out to Sooke and fleshed this whale, bringing the skeleton back to the Museum to be cleaned and reassembled.

Over 1,000 specimens of birds and mammals, including several Provincial records, which had been collected by the late R. A. Cumming, of South Vancouver, were purchased by the Museum. A number of the specimens thus acquired were not represented in our collections.

We were also fortunate in receiving through Mr. W. A. Maquire, of New Westminster, a specimen of a rare bird in this Province, the Barn Owl. This was taken at Sumas Prairie by Mr. H. Smith.

The Director wishes to thank all those in the Provincial Police and Game Departments and others who have so generously donated specimens for our collections, particularly Mr. G. A. Hardy for his kindly assistance in examining and determining Coleoptera and Lepidoptera.

A paper on "The Stomach Contents of Sperm Whales Caught Off the West Coast of British Columbia," a detailed report of the Assistant Biologist's trip to the East to study museum technique, and a paper by Mr. A. H. Brinkman on "Hepatics of the Pacific Coast and Adjoining States" are printed in this report.

Dr. I. McT. Cowan, Assistant Biologist, reports to the Director:—

From April 1st to May 22nd the Assistant Biologist was on leave of absence from the Department. During this period, through the generosity of the Canadian Museums Committee of the Carnegie Corporation, it was possible for him to undertake a study-trip to several of the largest museums in Canada and the United States. A brief account of some features of this trip will be found appended to this report.

During 1937, as in subsequent years, routine curatorial duties, particularly those dealing with the cataloguing and identification of the large accumulation of uncatalogued material

in all phases of our work, comprised the bulk of the year's activities. At the same time, during the year a number of the older historically valuable bird-study skins were cleaned, degreased, and remade; a number of bird and mammal specimens were received in the flesh and prepared; several specimens of birds and mammals were mounted for addition to the exhibition galleries; 760 skulls and skeletons were cleaned, labelled, and installed.

A specimen of the Sharp-nosed Finner Whale, received in the flesh through the generosity of Messrs. C. F. Todd and C. F. Goodrich, taxed our preparatory facilities to their utmost. The skeleton has been cleaned and now awaits further degreasing and bleaching before it is set up in the exhibition galleries.

In continuance of our co-operation with the Game Department, post-mortems were conducted to determine cause of death of certain game birds and fur-bearing mammals.

Several innovations have been started in the exhibition galleries. It has been decided to supplement the exhibit of fossil vertebrates with a scale-model restoration of each species known to have occurred in the Province. Already models of the three Pleistocene and Pliocene elephants have been prepared by Mrs. L. Sweeney and placed on display. It is hoped to complete the series as time permits.

With the able assistance of Mrs. Sweeney, a start has been made in the preparation of a new exhibit of the reptiles and amphibians of the Province. Already eighteen coloured casts have been prepared. These will shortly be put on display, to replace the almost unidentifiable alcoholics that have thus far represented this interesting section of our fauna.

A start has been made toward completing our series of coloured casts of the fishes of the Province. In this work the very latest techniques are being used with highly gratifying results. The extra time involved in preparation is amply repaid by the superiority of the finished product over the old type of replica.

Throughout the year work on the bibliographies of British Columbia amphibians, reptiles, birds, and mammals has been continued, with the addition of many hundreds of cards to these files.

The increased demand for identification of specimens by other Government departments, institutions, private collectors, and the general public has demonstrated a growing museum-consciousness within the Province.

The addition of new metal dust-proof storage-cases and a number of filing-cabinets has enabled the reorganization of the mammal collection, the catalogues, and bibliographies in a way that greatly facilitates their use.

Systematic work on the study collection in the Museum was continued. In this connection several special studies are under way, and the following papers have been published:—

A Review of the Reptiles and Amphibians of British Columbia. Ann. Rept. Prov. Mus., 1936 (1937): K 16–K 25.

The distribution of flying squirrels in Western British Columbia, with the description of a new race. Proc. Biol. Soc. Wash., *50:* 77–82.

Additional breeding colonies of the Herring Gull in British Columbia. Murrelet, *18*, No. 1–2: 28.

The House Finch at Victoria, British Columbia. Condor, *39*, No. 5: 225.

A new race of *Peromyscus maniculatus* from British Columbia. Proc. Biol. Soc. Wash., *50:* 215–216.

Educational Work.

Apart from co-operating with teachers in identification of material and demonstration of Museum exhibits, thirteen illustrated lectures were delivered at educational institutions, game associations, and natural history societies.

Field-work.

Field-work, especially with regard to vertebrate zoology and botany, has been conducted periodically throughout the year. In the vicinity of Victoria special attention has been paid to the water-birds. This has resulted during the year in the addition to the Museum of some rare species and some new to our collections.

During the summer the Museum field party collected first in the Monashee Mountains and later in the Selkirks. The working of these two regions marks one more step in the biological exploration of the Province. It will be many years, however, before, with the

limited staff and finances available for this work, we will have even an approximate idea of the distribution of many of our vertebrate inhabitants.

Mrs. Lillian Sweeney, assistant preparator, has continued to assist in the cataloguing of the Museum collections, the mounting of Herbarium specimens, and in the complete reorganization of the Museum correspondence files. The latter was made possible by the acquisition of a battery of filing-cabinets.

In addition, Mrs. Sweeney has during the year prepared or assisted in the preparation of eighteen casts of reptiles, amphibians, and fish, has prepared three scale models of extinct elephants, and has made a number of colour sketches of fish, etc., incident to the work of the Museum.

Miss M. Crummy, in addition to her regular stenographic work, has assisted in the library and in the compilation of the various bibliographies.

The Library.

Mrs. W. Hardy, botanist-recorder, has continued the recataloguing and reorganization of the Museum's quite extensive pamphlet collection.

External use of the library has greatly increased, and it is becoming appreciated by the public that there is a very fine reference library in the Museum, to which access may be obtained upon application at the general office. It is hoped that this will be taken advantage of by those engaged in scientific work, upon the understanding that as a general rule books loaned may not be taken out of the building.

Publications received during the year total 334. Of these, seventy-five were secured by subscription and purchase. We are indebted to the following for scientific separates received during the year: Mr. A. Budd, Dr. I. McT. Cowan, Mr. J. A. Munro, Mr. A. La Rocque, Dr. K. Lamb, Dr. H. St. John, and Mr. J. Dewey Soper.

Botany.

The seasonal wild-flower exhibit on the main floor of the Museum continues to be of great interest to visitors and students, and 275 species were shown throughout the year.

A noticeable increase of inquiries concerning the local flora was evidenced by students and visitors, for whom 1,047 specimens were identified, while many requests were received for information relative to the collecting and preserving of plants.

Additions to the Herbarium during the past year total 489 specimens. Of these, 396 have been mounted and placed in the Herbarium and the remaining eighty are awaiting determination. These include many species not hitherto represented in our collection, chiefly from Mount Revelstoke Park, B.C. (Mrs. I. McT. Cowan), Peace River District, B.C. (Bear Flat School), Alta Lake District, B.C. (K. Racey), and Mount Rooster Comb, Strathcona Park, V.I., B.C. (N. C. Stewart).

Botanical investigations within the Province during the past two years have resulted in securing for the Herbarium many species not previously contained therein. Furthermore, a somewhat cursory survey of the literature seems to indicate that several of the species in the following list have not been previously recorded from within the borders of British Columbia. Although admitting that we have not had access to certain publications which might contain such records, it seems to us that those species marked with an asterisk may be new Provincial records.

Selaginella scopulorum Maxon. Ootsa Lake, B.C., July 30th, 1936, Mrs. I. McT. Cowan.

**Alopecurus æqualis* Sobol. Ootsa Lake, B.C., July 26th, 1936, Mrs. I. McT. Cowan.

**Carex Hassei* Bailey. Ootsa Lake, B.C., July 26th, 1936, Mrs. I. McT. Cowan.

**Zygadene paniculatus* (Nutt.) Wats. Anarchist Mountain, B.C., June 20th, 1936, Mrs. I. McT. Cowan.

Alnus incana Willd. var. *pinnatifida* Spach. Cowichan Lake, V.I., August 8th, 1936, E. A. Cooke.

Rumex paucifolius Wats. Ootsa Lake, B.C., July 23rd, 1936, Mrs. I. McT. Cowan.

Arabis canescens T. & G. Anarchist Mountain, B.C., June 20th, 1936, Mrs. I. McT. Cowan.

Sisymbrium incisum Engelm. var. *filipes* Gray. Ootsa Lake, B.C., July 23rd, 1936, Mrs. I. McT. Cowan.

Parnassia montanensis Fern. & Rydb. Bear Flat, B.C., July 7th, 1935, Phyllis Freer.
Ribes glandulosum Grauer. Ootsa Lake, B.C., July 14th, 1936, Mrs. I. McT. Cowan.
Ribes petiolare Dougl. Ootsa Lake, B.C., July 28th, 1936, Mrs. I. McT. Cowan.
Fragaria pauciflora Rydb. Ootsa Lake, B.C., July 14th, 1936, Mrs. I. McT. Cowan.
**Potentilla dascia* Rydb. Ootsa Lake, B.C., July 24th, 1936, Mrs. I. McT. Cowan.
Potentilla macropetala Rydb. Ootsa Lake, B.C., July 23rd, 1936, Mrs. I. McT. Cowan.
**Potentilla longiloba* Rydb. Anarchist Mountain, B.C., June 22nd, 1936, Mrs. I. McT. Cowan.
Potentilla valida Greene. Anarchist Mountain, B.C., June 22nd, 1936, Mrs. I. McT. Cowan.
Rubus pubescens Raf. Ootsa Lake, B.C., July 24th, 1936, Mrs. I. McT. Cowan.
**Sieversia canescens* (Greene) Rydb. Anarchist Mountain, B.C., June 20th, 1936, Mrs. I. McT. Cowan.
**Lupinus alpicola* Henderson. Anarchist Mountain, B.C., June 22nd, 1936, Mrs. I. McT. Cowan.
Epilobium palustre L. Ootsa Lake, B.C., July 14th, 1936, Mrs. I. McT. Cowan.
Lomatium fœniculaceum (Nutt.) Coult. & Rose. Bear Flat, B.C., May 19th, 1935, Melba Proctor.
Androsace diffusa Small. Ootsa Lake, B.C., July 24th, 1936, Mrs. I. McT. Cowan.
Phlox linearifolia (Hook.) Gray. Vaseaux Lake, B.C., June 28th, 1936, Mrs. I. McT. Cowan.
Polemonium occidentale Greene. Ootsa Lake, B.C., July 24th, 1936, Mrs. I. McT. Cowan.
**Cryptantha affinis* (Gray) Greene. Anarchist Mountain, B.C., June 22nd, 1936, Mrs. I. McT. Cowan.
Cynoglossum boreale Fernald. 10-Mile Lake, Quesnel, B.C., July 5th, 1936, Mrs. I. McT. Cowan.
Castilleja purpurascens Greenm. Anarchist Mountain, B.C., June 20th, 1936, Mrs. I. McT. Cowan.
**Arnica confinis* Greene. Ootsa Lake, B.C., July 23rd, 1936, Mrs. I. McT. Cowan.
**Arnica humilis* Rydb. 10-Mile Lake, Quesnel, B.C., July 2nd, 1936, Mrs. I. McT. Cowan.
Aster Lindleyanus Torr & Gray. Ootsa Lake, B.C., July 26th, 1936, Mrs. I. McT. Cowan.
**Antennaria arida* Nels. Anarchist Mountain, B.C., June 20th, 1936, Mrs. I. McT. Cowan.
Crepis gracilis (D. C. Eaton) Rydb. Anarchist Mountain, B.C., June 20th, 1936, Mrs. I. McT. Cowan.
Erigeron pumilis Nutt. Anarchist Mountain, B.C., June 30th, 1936, Mrs. I. McT. Cowan.

In 1921 the Provincial Museum published "A Preliminary Catalogue of the Flora of Vancouver and Queen Charlotte Islands." Supplementary additions to this were printed in the Annual Reports from 1921–1926, inclusive. Supplementary additions since 1926 are as follows:—

Juncus fucensis. Comox, V.I., June 20th, 1915, John Macoun. (Original description in Ann. Rep. Prov. Mus., 1927, p. 14, H. St. John.)
Alnus incana Willd. var. *pinnatifida* Spach. Cowichan Lake, V.I., August 9th, 1936, E. A. Cooke.
Radicula sylvestris (L.) Druce. Sidney, V.I., June 19th, 1937, C. McTavish.
Sanguisorba annua Nutt. Keating, V.I., June 30th, 1937, S. Phillips.
Trifolium subterraneum Linn. Comox, V.I., June, 1936, per C. Tice.
Pentstemon ovatus Dougl. Saanich Arm, V.I., May 27th, 1936, J. and E. Lohbrunner.
Tragopogon dubius Scop. Victoria, B.C., June 9th, 1937, J. C. Bridgman.
Sanguisorba annua Nutt. Keating, V.I., June 30th, 1937, S. Phillips.
(Introduced plants are printed in Roman type.)

Grateful acknowledgment is made to the following contributors who assisted in maintaining the seasonal flower exhibit and donated specimens for the Herbarium: A. H. Bennett, C. Boyd, Captain and Mrs. Bridge, J. Bridgman, Miss M. Brooker, Miss M. Brown, A. C. Budd, A. E. Cooke, L. Constance, R. W. Costello, Mrs. I. McT. Cowan, A. Evans, G. A. Hardy, J. Hibbertson, Mr. and Mrs. R. C. Lett, C. McTavish, S. Phillips, K. Racey, Mrs. M. Rittenhouse, J. Shelford, N. C. Stewart, M. Testor, and Constable Tweedhope.

Correction.

In the Provincial Museum Report for 1936 on page 11, lines 4 and 5, for Mount Garibaldi read Mount Waddington.

ACCESSIONS TO THE MUSEUM.

To December 31st, 1937, the catalogued collections in the Museum number as follows: Anthropological and ethnological, 4,890; botanical, 10,572; ornithological, 7,092; mammalogical, 2,435.

Botanical Collections.

Mrs. I. McT. Cowan	237
Bear Flat School	117
K. Racey	74
N. C. Stewart	27
I. McT. Cowan	7
Miscellaneous	27

Ethnological Collections.

By gift 15

Salishan (Island).

Wm. Herod, Vancouver, B.C. Fragment of hand-hammer from Sooke, V.I.
P. W. Martin, Victoria, B.C. Grey stone chisel and iron adze-head.
H. Smethurst, Sidney, B.C. Stone hand-hammer.

Bella Coola.

T. W. S. Parsons, Assistant Commissioner, B.C. Provincial Police, and Constable M. J. Condon. A unique cedar-bark rattle.

Haidan.

J. Bridden, Masset, Q.C.I. One stone mortar, 1 fragmentary mortar, 1 hand-hammer, and 1 cranium.

Athapascan.

T. W. S. Parsons, Assistant Commissioner, B.C. Provincial Police. One large piece of obsidian, 1 obsidian arrow-head, 1 stone skin-scraper.
R. E. Bowser, *per* Assistant Commissioner T. W. S. Parsons. One obsidian spear-head.
P. deN. Walker, Deputy Provincial Secretary. A skull showing signs of trephining.
H. E. Collins, B.C. Forest Branch. One cambicum scraper made from rib of a caribou.

Correction.

In the Provincial Museum Report for 1936, page K 11, Anthropological and Ethnological Collections, Salishan (Coast and Interior), first line, read: H. Mortimer Lamb, Vancouver, B.C. Stone paint-dish found at Burnaby, B.C.

Zoological Collections.

Mammals received and catalogued	659
Birds received and catalogued	1,093
Amphibians and Reptiles received and accessioned	140
Fish received and accessioned	8
Insects and arachnids received and accessioned	745

Mammals.

By gift 300

J. C. Shelford, Wistaria, B.C. Skulls of 33 short-tailed weasel, 3 coyote, 3 fox, 2 bear, 1 beaver, 7 muskrat, 3 squirrel, 3 marten, 1 mink; skins and skulls of 1 little brown bat, 2 white-footed mice, 1 long-tailed weasel, 2 marmots, 5 flying squirrels.

D. Leavens, Vedder Crossing, B.C. One flying squirrel, 1 long-tailed weasel, 1 mink, 1 shrew mole, 1 mole, 2 short-tailed weasel.
R. A. Cumming, Vancouver, B.C. One meadow-mouse.
Game Warden A. Monks, Alberni, B.C. One elk skull, 3 wolf skulls, 3 otter skeletons.
O. F. Maisonville, Pultney Point Light, B.C. Partial skeleton of Least Rorqual.
P. W. Tow, Victoria, B.C. One marten skull, 1 otter skull.
A. Peake, Quatsino, V.I., B.C. Skulls of: 3 marten, 3 black bear, 3 mink, 4 racoon, deer, 2 sea-lion.
Game Warden F. P. Weir, Cowichan Lake, B.C. Three weasels.
J. Zarelli, Sointula, B.C. Skulls of 1 otter, 2 racoon, 36 mink.
P. W. Martin, Victoria, B.C. Two shrew, 2 squirrels, 1 white-footed mouse.
Inspector Robertson, B.C. Game Branch. Horns of mountain-sheep.
T. T. and E. B. McCabe, Berkeley, Calif. Ten squirrels, 21 shrews, 1 wolf skull, 5 red-backed mice, 2 meadow-mice, 1 silvery-haired bat, 89 white-footed mice.
K. Racey, Vancouver, B.C. Three squirrels, 1 white-footed mouse, 2 chipmunk, 1 red-backed mouse, 1 dusky shrew, 1 muskrat.
Mrs. T. L. Thacker, Hope, B.C. One Yuma bat.
Mr. Orchard, Victoria, B.C. One hair-seal.
J. Bridden, Masset, Q.C.I. Fragments of sea-otter skulls.
J. A. Munro, Okanagan Landing, B.C. Type specimen of *Glaucomys sabrinus reductus.*
E. Cooke, Victoria, B.C. One racoon skull, 1 black-tailed deer.
R. I. McPhee, Texas Creek, B.C. One mountain-lion skull, 1 mountain-goat skull.
P. deN. Walker, Victoria, B.C. Skulls of black wolf and bobcat.
H. R. Goodrich, Victoria, B.C. A Least Rorqual in the flesh.
A. Hammer, Hagensborg, B.C. Fragmentary skull of hair-seal from shell-mound.
E. Tait, Summerland, B.C. Two Hoary bats.

By purchase 28
By the staff—
K. Racey 113
I. McT. Cowan 201

Birds.

By gift—
R. A. Cumming, S. Vancouver, B.C. Fifteen Chinese Starlings.
P. W. Martin, Victoria, B.C. One Peale's Falcon, 1 Cassin's Auklet, 1 Brandt's Cormorant, 7 Sooty Shearwater, 1 Yellow-bellied Flycatcher, 3 Bonaparte Gulls, 1 Beal's Petrel.
Game Warden J. W. Jones, Saanich, V.I., B.C. One Rough-legged Hawk.
M. Lohbrunner, Victoria, B.C. One Fork-tailed Petrel, 1 Albino Marbled Murrelet.
D. Leavens, Vedder Crossing, B.C. One Pigmy Owl, 1 Saw-whet Owl, 1 Great-horned Owl, 1 Goshawk.
T. T. and E. B. McCabe, Berkeley, Calif. Two Wandering Tattler.
A. Peake, Quatsino, V.I., B.C. One Steller's Jay, 1 Horned Owl, 1 Fox Sparrow, 1 Brewer's Blackbird.
E. G. Kermode, Victoria, B.C. One Fork-tailed Petrel.
E. M. Tait, West Summerland, B.C. Specimen representing first record of Black-crowned Night Heron for British Columbia.
K. Racey, Vancouver, B.C. One Pipit, 1 White-crowned Sparrow.
H. Smith and W. S. Maguire, New Westminster, B.C. One Barn Owl.
W. S. Maguire, New Westminster, B.C. One Albino Crow.

By purchase 1,002
By the staff—
I. McT. Cowan 50
K. Racey 70

Amphibians and Reptiles.

By gift 127

A. Peake, Quatsino, V.I., B.C. Twelve garter snakes, 53 toads, Rusty salamanders, 2 British Columbia salamanders.

K. Racey, Vancouver, B.C. Six toads, 1 British Columbia salamander.

By the staff—

I. McT. Cowan 13

Fish.

A. Peake, Quatsino, B.C. One hake.

Todd & Goodrich, Victoria, B.C. One barracuda, 1 thresher shark.

Kyuquot Trollers. One handsaw fish.

G. E. Pallister, Vancouver, B.C. One moon fish, 1 pomfret.

E. Cooke, Victoria, B.C. One tadpole sculpin, 1 window-tailed sea poacher.

Insects.

By gift—

Mrs. Hedley Peake, Colwood, V.I., B.C. A collection of 744 specimens of coleoptera.

S. L. Neave, Kyuquot, V.I., B.C. One eyed sphinx moth.

Marine Invertebrates.

A. Peake, Quatsino, B.C. One shrimp.

R. Doe and O. Alexander, Victoria, B.C. Seven gastropod shells.

PALÆONTOLOGICAL COLLECTION.

Mr. and Mrs. A. Lowe, Sooke Lake, V.I., B.C. One cast in stone of *Trigonia evansii* from Wellington, B.C.

REPORT ON STUDY-TRIP TO EASTERN MUSEUMS.

BY IAN MCTAGGART COWAN, BRITISH COLUMBIA PROVINCIAL MUSEUM.

The trip upon which this report is based covered the period between March 31st, 1937, and May 22nd, 1937, and took me to the museums in Ottawa, Toronto, New York, Philadelphia, Washington, Pittsburgh, and Chicago.

I want to tender my most cordial thanks to the Canadian Museums Committee of the Carnegie Corporation for their liberality in financing this study-trip and to the directors and staff members of the museums visited for their whole-hearted co-operation in furthering and facilitating my investigations.

As must always be the case, much of what was learned cannot be set forth in any formal report, but must remain in the recesses of the mind and note-book of the observer, to make their appearance as the appropriate occasions arise. The following report pretends to be no more than a summary of certain of the outstanding museum methods encountered.

In this survey I had three objectives—namely, to study methods of museum extension developed by the various institutions, to acquaint myself with the most effective display techniques adapted to the various fields of natural history and ethnology, and the most economical ways of carrying out these displays. Where time permitted I hoped to be able also to examine certain mammal specimens of critical importance to studies now in progress.

In each instance my observations were made with an eye for methods and techniques that would lend themselves to adaptation to the conditions in a small museum with but limited funds.

MUSEUM EXTENSION.

The methods of extending the influence of the museum beyond the confines of the casual visitor fall into two natural categories: (1) Methods primarily calculated to bring the public to the museum; and (2) methods designed to take the museum to the public.

To be practicable any museum extension plan must be capable of being organized and maintained by a small headquarters staff. It is in the failure to comply with this requirement that any large-scale attempt to bring numbers of people in study-groups to the

museum falls down. One of the larger museums, besides the regular ably conducted study-groups of school-children, has in co-operation with the railways promoted excursions to the museum from neighbouring towns. While this plan certainly reaches a part of the population not otherwise contacted, nevertheless, from my limited experience with such, the visitors are confronted with so much in so short a time that definite impressions on any one subject are probably few. An effort was being made to overcome this by dividing the hundreds of excursioners into groups of twenty-five, each with an instructor. Each group was taken through one or two sections of the museum and certain special features pointed out and explained to them. These periodic influxes necessitate large numbers of guides and consequently such a plan seems to me to be of very limited practicability.

Saturday-morning lectures for children and evening lectures for adults are conducted at several of the Canadian and American institutions and fill a valuable place in the educational programme of such museums. An adaptation of this developed at the Royal Ontario Museum is the "Open evening," on which an organized group, such as a service club, is invited. Short résumés of work in progress are given by various staff members and the visitors are then conducted through the portions of the museum they are most interested in. Oftentimes to take the visitor behind the scenes into the laboratories, etc., is sound psychology as it develops in that person a more genuine interest in the work of the museum.

Of necessity, plans to bring people to the museum are very limited in scope and cannot hope to tap more than a closely circumscribed area about the museum; they cannot reach to all corners of the state or province. Their great advantages are that the display collections of the museum are used and that the visitors have the advantage of the trained museum staff.

There are many ways in which the activities of a museum may be extended to a much wider public than it would normally reach.

A popular museum publication is one method. The business like annual report serves in a small way; better still is an annual report with appended articles of general interest. However, these are made even more effective by a periodic mimeographed news-letter outlining work in progress, any interesting new accessions, and requesting information on certain subjects. It has been found that persons who can be led to feel that they have in some way contributed to the research or display at the museum are henceforth more closely allied with the museum and will act as ambassadors in their district. Furthermore, the cost of carrying on such a news-letter is extremely small in comparison with the benefits derived.

A publication such as "Natural History," published by the American Museum, is the ultimate in this type of museum extension work—but it necessitates a large financial outlay and an organized editorial staff. In most states and provinces there is already a periodical devoted to news in the teaching world. This is read by nearly all the teachers in the province and is an excellent medium of contact with that part of the public. It has been found at Toronto and one or two other institutions that leaflets can be published in such a periodical, reprinted, and sold to teachers at a few cents a copy for distribution to the classes, or for use in teaching. This is a service much appreciated by the teachers in more remote areas, and as a source of contact between museum and public it can hardly be overvalued.

The most widely used extension technique is the distribution of lantern-slides and motion pictures to schools and other institutions desiring such. A plan of this sort can vary from half a dozen slide series, covering the birds, mammals, plants, etc., of the district involved, to a highly organized programme in which the teaching curriculum is used as a basis and slide series or motion pictures prepared to supplement the curriculum. Such a co-operative educational programme has been developed to a high degree at the American Museum of Natural History, where a fleet of trucks is engaged throughout the school year picking up and redistributing this material to the schools of New York. A list of available material is issued—arranged for the various school grades—and the teacher signs up for the service several months ahead of the requirements, delivery being made on a specified date.

Such slide series should always be accompanied by a descriptive booklet of some sort. Mimeographed sheets stapled together are found to be completely satisfactory.

It seems to have been the general experience of directors of such programmes that the silent moving picture with adequate titles is preferable to the sound movie for children up to high-school age—even at that age it is doubtful if the sound movie, except in special phases, justifies the extra expense involved.

A more recent innovation is the preparation and distribution of actual portable museum exhibits. These are primarily adapted for the use of the school-teacher, and with a little ingenuity on the part of the preparator and designer can be made to cover a wide variety of subjects.

In its simplest form such an exhibit may be a small case, with one glass side, this covered by a removable wood panel. Such a case may contain one bird, mammal, or other exhibit with no attempt at background or habitat accessories. In their more elaborate stage each exhibit is a portable habitat case showing one or several natural-history subjects, or perhaps an Indian village in miniature, with built-in lighting to be plugged into the school circuit.

The American Museum, Field Museum, and the Carnegie Museum have developed this most satisfactory extension service to a high degree. Catalogues obtained from these institutions will illustrate the adaptability of this type of exhibit, but to serve as an example I might cite the following subjects which impressed me as being particularly good: Bird habitat groups, bird bills and their uses, bird feet and their adaptation to different methods of locomotion, types of bird-nests, insect life-histories, mimicry and protective coloration among insects, insects of economic importance, mammal skulls, types of fossils, composition of rocks, zoological orders from amœba to mammal, Indian villages in miniature, growth and preparation of cocoa, coffee, rubber, wool, with wool-producing animals, etc.

In the preparation of the economic products cases, it will often be found that local companies handling these products will readily co-operate in supplying the component materials.

In addition to the cases described above, the Carnegie Museum has found the standard bird-study skin, prepared with a wire completely through the skin from head to tail and projecting at both ends, can be fixed into a glass tube by passing the wire through corks at each end of the tube. In this way, with the tube enclosed in a pasteboard mailing-tube, it is possible to send bird specimens by mail for use by teachers in more remote districts to which expense of forwarding a large case would be prohibitive. Inasmuch as this type of loan specimen cannot be handled, the mortality rate is very much lower than is the case where unprotected study-skins are loaned. The same museum has developed a simple yet highly effective technique for preparing loan exhibits of bird eggs and nests. Nests are soaked in a dull-finish lacquer, eggs filled with paraffin, with a wire anchored into each and clinched through the nest. When prepared in this manner nests and eggs in portable cases are almost indestructible.

It might be possible to develop the travelling collection on a somewhat larger scale for semi-permanent exhibition in towns and villages throughout the province, or as a moving exhibit installed in a truck. Such exhibits would require very careful preparation, and even then I am afraid that none of the present known techniques for the preparation of natural-history material would last more than a few hundred miles on most Canadian roads off the beaten track.

In my opinion, a lecture-truck with generating equipment for operating moving-picture projectors and lanterns is more practicable, less costly, and just as effective for natural-history subjects.

Exhibition.

While visiting the various museums I made a point of noting the action of visitors to the displays of various kinds of material. Some of the results, while probably widely realized by most directors, were most interesting to me.

In the first place, it may be said that display was almost 75 per cent. of the exhibit no matter what the material. An indifferent collection well displayed will accomplish more, attract more attention, and leave more impression than a splendid collection (as regards components) poorly displayed. Concise descriptive labels are essential.

The Royal Ontario Museum has by far the best displayed collection of anthropological material seen by me in North America. The care and thoroughness that has been used in

arranging the halls of anthropology at that institution reflect great credit on director and preparator alike, and their reward can be seen in the popularity of these halls. It would be next to impossible to pass through these halls without gaining some lasting impression. The same careful treatment and arrangement of the research material facilitate reference to an astonishing degree.

My analysis of the situation here was that one of the most important features contributing to the exhibit was the lack of crowding. In most institutions, to examine any single piece is like attempting to concentrate on one brick in a chimney—well-nigh impossible. Then again the totem-poles, feast-dishes, and other wooden objects had been carefully prepared; there was no dry-rot—no piles of insect sawdust. Each piece is soaked with kerosene and afterwards waxed and kept waxed. As a result deterioration is reduced to a minimum and the entire collection is given a "well-kept" appearance. The small individual stands, supplied for many pieces, are unique and contribute greatly to the effectiveness of the display.

The value of such painstaking display methods was emphasized for me as I went from Toronto to a large American institution having a much larger collection and a much larger population to draw upon. In spite of this, the dimly lit halls, with their indifferently cared-for, indifferently displayed exhibits, were almost without visitors.

In the anthropological collections it was very evident that a sharp line must be drawn between display material and study material. A case containing several hundred arrow-heads, spear-heads, bone needles, or other type of artefact is merely a glass-topped storage-case, while a few of the arrow-heads, etc., selected for their perfection, for their illustrative value in reference to method of making, use, etc., *and with these features pointed out in the labelling*, becomes a valuable exhibit that will accomplish its purpose of conveying a definite positive impression to the interested viewer.

For natural-history subjects many types of display are in use. For most of these absolute exclusion of daylight from the galleries is essential if the specimens are to last more than a very few years.

For birds and mammals the most pretentious is of course the habitat group as found in the American Museum of Natural History. These are in many cases breath-taking and awe-inspiring in their reaction on the viewer and will repay as much revisiting as it is possible to give them. Unfortunately the cost of this type of exhibit puts it completely out of reach of the small museum. However, the less pretentious habitat group is the only really effective way of displaying large- and medium-sized mammals and large birds.

Many different types of construction of such cases are being used by different institutions. The most costly is the lath and plaster background as used in the American Museum. For large cases the system used by the Philadelphia Academy of Sciences seems to me to combine effectiveness with low cost. The framework for the backgrounds is of vertical 2 by 4 timbers set 6 to 8 inches apart, with 2 by 4 blocks set on the horizontal between them in circles about 2 feet apart; behind these blocks long lath-like strips are nailed fast—after the fashion of barrel-hoops. On the inside (case side) of this framework is applied Mastex board that has been previously soaked in water for two days. Canvas is applied and painted. This institution has also reduced the accessories to a minimum without losing the effectiveness of the case.

For exhibition of medium-sized mammals such as skunk, muskrat, etc., I saw nothing to approach the exhibits in the Children's Hall at the Carnegie Museum, and though the labelling was in childish terms the adults seemed to enjoy the exhibits infinitely as much as the children. These habitat groups were small, about 4 by 2½ feet in floor-space; the cases were panel wood with the bottom of the exhibition compartment raised above the floor so as to be almost on the level with the eyes of a small child—the accessories were simple but effective. The background was what took my fancy. To a simple wood framework good-quality battleship cork linoleum was tacked, making a panoramic background at once cheap, easily constructed, and taking paint well. These cases were so constructed that the exhibit was assembled in the laboratory and slid into the case, the front being fastened into place afterwards. A separate compartment at the top with a ground-glass reflector sealed off from the rest of the case made it possible to change light-globes without opening the case.

For exhibition of small- and medium-sized birds the small habitat bracket as used in the National Museum of Canada is as effective as any. An unbleached-linen background is ideal for this type of exhibit, as it is for all fish exhibits.

Apart from the usual displays of birds, mammals, etc., of certain regions, the ingenious director and preparator can conceive and execute many different types of systematic, anatomical, adaptive, evolutionary, or other types of exhibits. In all instances a carefully prepared and properly placed label is as essential as any part of the exhibit.

Other types of vertebrate material such as amphibians, reptiles, and fish are displayed in many ways. The poorest type—one with almost no educational value—is the row of glass bottles containing as many bleached specimens in discoloured preservative with no labelling beyond name and date of capture. All such specimens should be in the storage-cabinets of the study collection. The only effective methods yet devised for reptiles and amphibians are casts, or infiltrated specimens. Many techniques are in use; each has its advantages and its disadvantages. The celluloid casts prepared by the Field Museum are marvels of accuracy and appearance, but the technique is difficult and requires more facility and ingenuity than possessed by the preparators available in many smaller museums. The wax cast is almost as life-like in appearance and much easier to execute. To my way of thinking, for all smaller subjects wax is superior to plaster. Such casts when carefully coloured and displayed amid a small section of natural habitat are most effective. For fish one can but judge by results seen, and I must say that the finest display of small- and medium-sized fish encountered is that of the Royal Ontario Museum. The fish are all casts, most of them being in plaster with celluloid fins cast separately. Some are completely of celluloid, some of plaster, a few in plastic wood. Different fish lend themselves to different methods of treatment. The use of pearl lacquer is perhaps the greatest advance in colouring technique in years, as it gives the natural pearly sheen to the white parts of the fish impossible to obtain with the older methods.

Invertebrate material other than insects is extremely hard to display effectively. For the protozoa and many cœlenterata and other soft forms glass models constitute the best method in use to-day, but here again the technique is highly specialized. Certain types lend themselves to casting in wax or celluloid; others to modelling in wax. Dried or pickled specimens are almost hopeless, as bleaching rapidly renders them unrecognizable to the unpractised eye.

All techniques mentioned above can be found in the files of " Museum News."

In closing, the knowledge of museum methods and the contacts with other museums established through the granting of this travelling scholarship seem to me to be so valuable to myself and to the institution with which I am connected that I should like to recommend that any plan which would enable the museum-men of Canada to meet one another more frequently be given very serious consideration. While the American Association of Museums fulfils a felt need among the smaller museums of the United States, the distances to be travelled by Canadians going to meetings of that Association often preclude the possibility of attendance. The further growth of museums in Canada would be greatly fostered by the organization of a comparable association the regular meetings of which would serve to stimulate museum activity in a way nothing else would.

THE STOMACH CONTENTS OF SPERM WHALES CAUGHT OFF THE WEST COAST OF BRITISH COLUMBIA.

By Lewis L. Robbins, Frances K. Oldham, and E. M. K. Geiling.

(Department of Pharmacology, University of Chicago.)

*During the summer of 1936 and 1937, while collecting research material from various species of whales at the Consolidated Whaling Corporation's station at Rose Harbour, Queen Charlotte Islands, British Columbia, we became interested in the stomach contents of the sperm whale (*Physeter macrocephalus*). This interest was prompted by the fact that one of the legal requirements in connection with modern whaling operations is the routine recording of the stomach contents. The individuals at the station charged with this duty are not trained in biology, hence their reports are of a general nature only. However, the officials of the whaling company were desirous of having a more accurate identification of this material. At their suggestion, we undertook this work and our more interesting findings are reported in this note.

The fish most commonly found in the stomach of the sperm whale was colloquially called " bastard halibut," presumably because of it vague resemblance to a halibut. It is not unusual to find four or five large specimens in good condition in the first chamber of the stomach and many other badly mutilated individuals in the other chambers.†

Photographs and measurements were made and a head preserved in formalin was taken back to Chicago for further study. This was later presented to the Field Museum. From our data, which accord well with those of the standard texts, and with the help of Dr. Ian Cowan, of the Provincial Museum, Victoria, B.C., we were able to identify the specimen as the rag-fish (*Acrotus willoughbyi*). (*See* Fig. 1.)

The rag-fish are generally considered to be deep-sea forms (1, 2). Additional evidence in support of this fact was obtained by examination of the head and brain of our specimen. The skull is protected by a thick pad of a dense cartilage-like material suitable for withstanding pressure. The brain is that of any teleost, remarkable only for its small size in comparison with that of the whole animal. The eye appears normal, but the periorbital connective tissue is also peculiarly dense and resistant, another adaptation to the deep-water habitat.

The presence of these fish in the stomach of the sperm whale affords additional evidence that these animals obtain their food at a considerable depth.

The frequence with which the rag-fish is encountered in the stomach contents is of special interest in view of the fact that heretofore this species was regarded as rare. We can find records of the capture of only ten specimens since the species was first discovered by Willoughby in 1887 (2).

In all the individuals that were removed from the stomach, the skin was completely digested away, except for that portion which is under the operculum. One of us (L. L. R.), while out on a whaling-boat, had the opportunity of observing a rag-fish as it was vomited by a harpooned whale. The fact that the skin of that specimen was fairly intact suggested that it had been recently swallowed. Observation was of necessity at a distance; however, the skin appeared dark brown in colour, similar to that of the specimen in the Provincial Museum at Victoria.

In addition to the rag-fish, a species of giant squid was frequently found amongst the stomach contents. One intact specimen measured approximately 10 feet from the end of the mantle to the tip of the tentacles. So far as it was possible to determine from the rather mangled specimen in our possession (Fig. 2), this species is probably *Moroteuthis robusta* (3).

In the digestive chambers of the whale's stomach were found peculiar cartilaginous cones, 8 to 12 inches in length, an inch or more in diameter at the base, and tapered to an acute point. These are probably a part of the internal shell of the squid.

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*This work has been conducted through grants-in-aid from the Rockefeller Foundation and the University of Chicago and with the full co-operation of the officials of the Consolidated Whaling Corporation.

†The stomach of the sperm whale consists of four large chambers, the first of which appears to be a reservoir in which fish squid and octopi are commonly found in a good state of preservation. In the succeeding chambers the food is more mutilated and less recognizable.

The skin about the mouth and head of the sperm whales frequently bears many curious circular marks, half an inch or more in diameter. (Fig. 3.) It is believed that these are sucker-marks left by the squid in their attempt to free themselves from the jaws of the whale.

While these two forms seem to comprise the greatest proportion of the food of the sperm whale in the waters adjacent to the Queen Charlotte Islands, other types are occasionally eaten. Octopi of varying sizes, with tentacles from 6 to 18 inches in length, were quite often associated with the squid and rag-fish. On one occasion a small codfish had been eaten; on another a lamprey. It seems probable that the latter was ingested incidentally along with its host.

The sperm whales are caught some 30 miles west or south-west of Rose Harbour, Q.C.I. They frequent this area from the end of May until the middle of September, the greatest number being present in July and August. Possibly their appearance at this time is dependent upon seasonal movements of the food-supply, possibly upon seasonal variations in weather conditions and water temperatures. Since the station at Rose Harbour has been in operation, the proportion of sperm to baleen whales has increased many times. Of 36,908 recorded captures of sperm whale obtained from the log-books of 19th century whaling schooners (4), there were but twelve for the entire north-east Pacific Ocean north of the 49th parallel. To-day the majority of the 300-odd whales annually captured in this area are sperms. The reason for this increase is not known, but it may be related either to the food-supply or to change in water-temperature.

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3. A review of the Cephalopods of Western North America. Berry (Bulletin of the Bureau of Fisheries, Vol. XXX., 314, 1910).
4. The distribution of certain whales as shown by log book records of American whaleships. C. H. Townsend (Zoologica, Vol. XIX., No. 1).

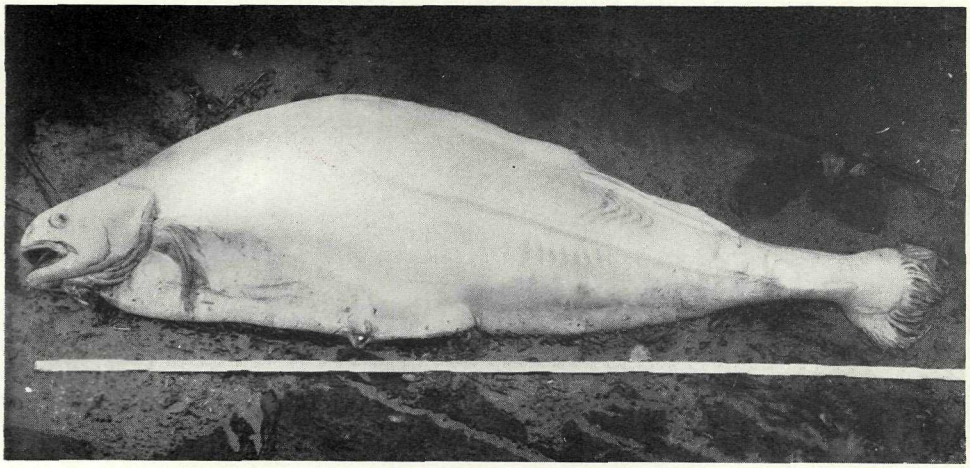

Fig. 1.—Side view of entire rag-fish (*Acrotus willoughbyi*). Six-foot ruler alongside.

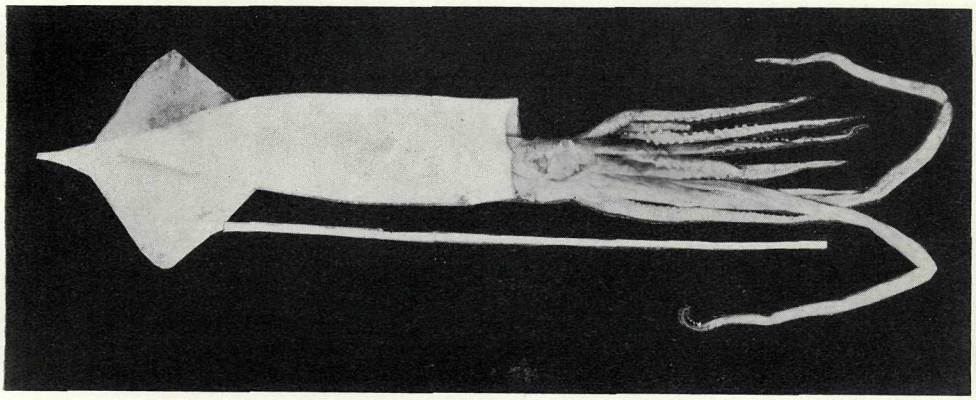

Fig. 2.—Giant squid with 6-foot rule alongside.

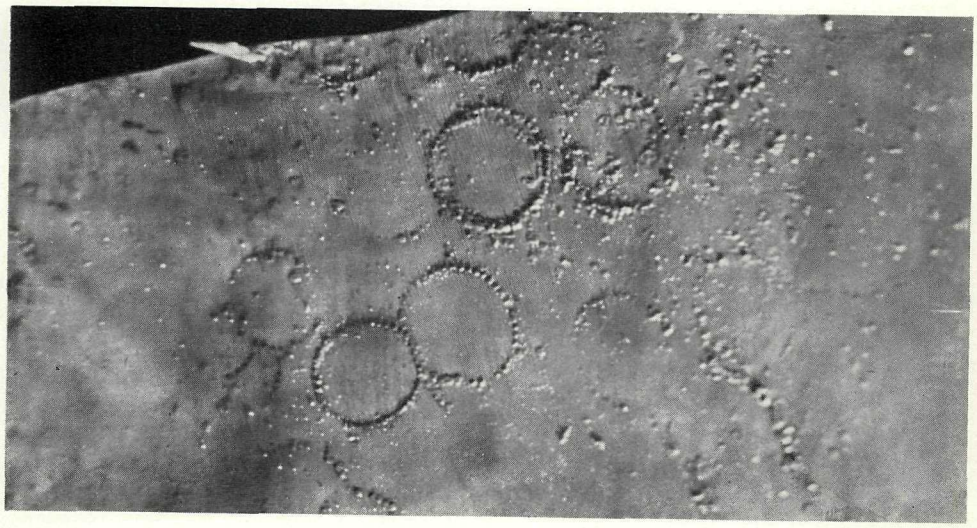

Fig. 3.—Circular marks in the skin of a sperm whale—probably sucker-marks from the arms of a giant squid.

HEPATICS OF THE PACIFIC COAST AND ADJOINING STATES.

By A. H. Brinkman.

Since the issuance of my two previous papers on the hepatics of this general region (Ann. Rep. B.C. Prov. Mus., 1933: B 24–B 33, and 1934: 14), continued interest in the group has made necessary the revision of certain state and provincial lists by the addition of newly discovered species for the region and new regional additions. In light of increasing information deletions have become necessary.

C. L. Porter (Bryologist, Vol. 38, 1935, pp. 101, 102) gives a list of Wyoming Hepatics, bringing the records for that state up to date. Clarke and Frye (Bryologist, Vol. 39, 1936, pp. 92–94) give a number of new records and extensions of range for California. The latter authors also (Bryologist, Vol. 40, 1937, pp. 13–16) give a list of additions and revised ranges for other Western States, among which is an unexpected addition for Wyoming, *Odontoschisma prostratum*, a plant of the South and East. M. Fulford, in a revision of the genus *Bazzania* in the United States and Canada, gives a number of records of *Bazzania denudata* and *Bazzania ambigua* for the West, the former new to the list (The American Midland Naturalist, Vol. 17, No. 2, pp. 385–424, 1936). A. W. Evans (Rhodora, Vol. 38, 1936, pp. 77–90) gives a number of Western references for *Scapania mucronata*. Fulford, in "Some Hepaticæ from Washington, etc." (Bryologist, Vol. 39, 1936, pp. 105–111), gives a long list of Washington Hepatics and some from Oregon and Idaho. Seville Flowers, in "The Bryophytes of Utah" (Bryologist, Vol. 39, 1936, pp. 97–104), gives a list of Utah Hepatics that covers a territory hitherto not included for lack of references, although within the area concerned in my investigations. The list below is almost entirely drawn from these references.

Mrs. E. A. Mackenzie, in her 1937 gatherings on Vancouver Island, found such rarities as *Diplophyllum plicatum*, *Gyrothyra Underwoodiana*, and *Scapania aspera*, along with a considerable number of other interesting species. But while there is an addition of two new species and one new variety to the list of Hepatics known to occur in the Pacific Coast region, others have had to be deleted.

In the report for 1934, doubt was cast on the record of *Scapania Evansii*, from Mount Arrowsmith, Vancouver Island, B.C. Evans (Postelsia, 1906, p. 229) lists this species for B.C., with a note to the effect that some critical species of *Scapania* have been referred to K. Muller. Among others was the plant referred to as *S. Evansii*, so named by Muller. Dr. Evans now concurs in the decision that the plant is really *Scapania intermedia*.

In reaching this decision it has been possible to make comparisons with type *Scapania intermedia* of Husnot and also type *Scapania Evansii* of Holzinger's gathering, and a number of *S. intermedia* collections.

It is believed that all Western records of *S. Evansii* will, upon examination, prove to be *S. intermedia*, or some other closely allied species of *Scapania*, and that the true *Evansii* is monotypic, plainly distinguishable from *intermedia*, though related to it. Besides the Mount Arrowsmith plant referred to, other *S. intermedia* collections are as follows: Nos. 620 and 622, Shuswap Lake, B.C., and a plant collected by A. S. Foster at Callumet, Washington, Oct. 20th, 1906.

While *Evansii* makes some approach to *intermedia*, the following differences may be noted: Teeth of leaves in *Evansii* small and almost needle-like, usually one cell high, cells thick walled throughout with noticeable trigones below but not above, and showing no signs of a border of smaller cells; cells above averaging 13 microns, irregular in size; below a few reaching to 20 by 40 microns. Postical lobe high-arched decurrent, the decurrency reaching but little below the heel of the keel, gemmæ oval, ochraceus. *S. intermedia*, teeth large, 2–3, sometimes to 4 cells high, and broad at base, a noticeable margin of smaller cells present; about 13 microns diameter, basal cells to 20 by 50 microns, in a narrow band, gemmæ green. The perianth differs also, being in *Evansii* somewhat constricted at the mouth, giving it an oval appearance; in *intermedia*, wide at mouth and rather longer in proportion, cylindrical.

Evans (Rhodora, 1906, pp. 41–42) treats of *Scapania Oakesii*, and there agrees with Muller's decision, that the carinal teeth, the supposed main character of this species, are found in several different species, and that consequently *Oakesii* does not warrant specific rank. A conclusion that examination of various material by the writer seems to justify. In Rhodora, 1916 (pp. 75–77), the question of *S. Oakesii* is reopened, and though, as Evans

puts it, " its claim for recognition as a species are not very strong," he accepts it as a " kleine Arten " or species in the making. This was following the recognition by Kaalaas of *S. Oakesii* in Norway, and the concurrence of Muller in its recognition.

In an attempt to review the evidence with regard to the taxonomic status of this species, I have examined a specimen of Austin's White Mountain, New Hampshire, plant; Miss Lorenz' plant from Round Mountain Lake, Maine; the Eureka, California, plant; and the Observatory Inlet, B.C., plant collected by Scouler. I wish to thank Dr. M. A. Howe for the opportunity to make these examinations.

Austin's plant (the original of *S. Oakesii*, collected by Oakes), with well-developed carinal teeth on the wings of the keel, was considered by Muller to be *Scapania dentata*, a conclusion accepted previously by Evans. In this view the writer concurs. The plant collected by Miss Lorenz was also *dentata*, though making some approach to *intermedia*. This has the well-developed carinal teeth on the wings noted for *Oakesii*. A specimen from Lake Superior, referred to as a variety by Austin, has not yet been examined with certainty, though a full set of Lake Superior *Scapanias*, dated 1869, collected by Macoun, has been examined, and found to include *S. nemorosa*, *S. dentata*, and *S. subalpina*, as well as *S. undulata*. In this lot, however, there is no specimen with sufficiently marked carinal teeth to suggest its being the plant referred to by Austin.

The Observatory Inlet plant, however, has other characters. A coarse tooth-like, almost lobe-like projection is seen near the base of the antical lobe in some leaves, the perianth has longer and thinner walled cells, the wings may be either one or two at the base of the keel, and either, usually both, have the strong carinal teeth, stressed as peculiar to *S. Oakesii*. At the same time the leaves are strongly verrucose, the verrucæ showing plainly on the margins, a combination of characters good enough to mark the plant off from other North American *Scapanias*. The Eureka plant, while not exactly similar, comes closer to above than to any other *Scapania* known to me. In common with the Observatory Inlet plant, it has the following characters: A coarse tooth-like or lobe-like projection on some of the antical lobes; the keel often double-winged, with strong carinal teeth on both; the cells strongly verrucose, and quite obvious on the margins of the leaves. Howe was of the mind that the Eureka plant came closer to the Observatory Inlet plant than to *S. dentata*. The B.C. record of *S. Oakesii* proves to be *S. subalpina*, which occasionally has well-developed carinal teeth on some of the upper leaves. *S. cordifolia* has also been found with well-developed carinal teeth. In the face of this evidence, it seems best to place most of the records of *S. Oakesii* in synonomy, and if the character of the well-developed carinal teeth is thought of sufficient importance, make it *S. subalpina* (Nees) Dum var. *alata*, *S. dentata* Dum var. *alata*, and probably *S. intermedia* (Husnot) Pears var. *alata*, and if the usual procedure is followed, which is to drop those plants evidently belonging somewhere else and leave the name attached to the remaining specimen named by Austin, then the Observatory Inlet plant becomes *S. Oakesii* Aust. with the Eureka plant as a closely connected form.

Kaalaas' plant is unknown to the writer, but a reference in literature does suggest it may be a form of *S. subalpina* with strongly developed carinal teeth. If so, it could be partly duplicated by the B.C. plant of *S. subalpina* before referred to.

Diplophyllum apiculatum, referred to in the 1934 report, would seem to be a form of *Diplophyllum taxifolium*, and is referred to elsewhere, while the specimen of *Diplophyllum gymnostomophilum* upon examination and comparison is not that species, but an undescribed species of possibly *Scapania*.

This deletes *Scapania Evansii*, *S. Oakesii*, *and Diplophyllum gymnostomophilum* from the B.C. records, unless the Observatory Inlet plant is kept as *S. Oakesii*. Evidence submitted to me by W. A. Newcombe suggests that the place where Scouler collected the Observatory Inlet plant lies in B.C., though so close to Alaska as to suggest the probable presence of the same species there. If the Eureka plant is accepted as a form, then *S. Oakesii* holds good for California.

This brings the information up to date, as far as the writer knows, though, when circumstances permit, it is hoped to add for California a new *Jungermannia*, described and figured, but not published; for B.C. a new variety of *Jungermannia cordifolia*, and for the British Columbia-Alberta boundary district two species of *Scapania*, new and distinct, also described and figured but not published.

The following list will summarize the changes in known distribution of the Hepatics of the Pacific Coast and adjoining states since 1934:—

Riccia crystallina. W. B.C.
Riccia glauca. Wy.
Riccia sorocarpa. Wy. M.
Riccia fluitans. U.
Ricciocarpus natans. U.
Asterella Ludwigii. Wy. I. U.
Asterella saccata. Wy.-Al.
Gonocephalum conicum. U.
Marchantia polymorpha. U.
Riccardia pinguis. O.
Riccardia latifrons. U.
Pellia epiphylla. Wy. M.
Pellia Fabbroniana. C.
Lunaria cruciata. U.
Marsupella ustulata. W.
Nardia geoscyphus. Wy. M.
**Nardia geoscyphus* var. *insecta* (Lindb.) K. Muell. Wy. W.
Jungermannia atrovirens. C. M.
Jungermannia lanceolata. U.
Lophozia porphyroleuca. C.
Lophozia lycopodioides. U.
Sphenolobus exsectæformis. M.
Plagiochila asplenoides. M.
Mylia Taylori. W.
Chiloscyphus rivularis. U.
Chiloscyphus pallescens. U.
Calypogeia Neesiana. W. Wy.
Calypogeia suecica. C.
**Odontoschisma prostratum* (Sw.) Trev. Wy.
**Odontoschisma sphagni* (Dicks) Dum. M. Al.
Bazzania tricrenata. C.
Bazzania ambigua. O. W. I. B.C. Al.
**Bazzania denudata* (Torr) Trev. W. B.C. Al.
Scapania subalpina. Wy. Al.
Scapania paludosa. Al.
Scapania var. *vogesiaca.* M.
Scapania Evansii. C.
Scapania intermedia. W.
Scapania irrigua. M.
Scapania mucronata. B.C. Y. Al.
Diplophyllum plicatum. W.

* Species new to the list.

The letters used are for States and Provinces, and are as follows:—

C. California.
Co. Colorado.
I. Idaho.
Wy. Wyoming.
Y. Yukon.
O. Oregon.
U. Utah.
W. Washington.
M. Montana.
B.C. British Columbia.
Al. Alaska.
A. Alberta.

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