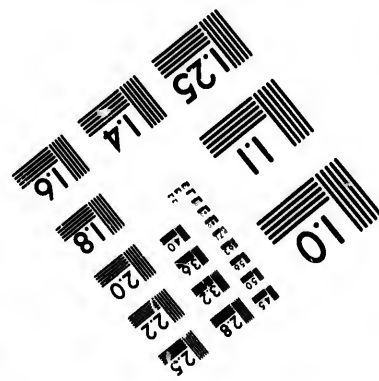
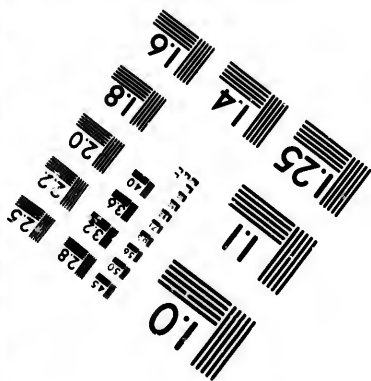
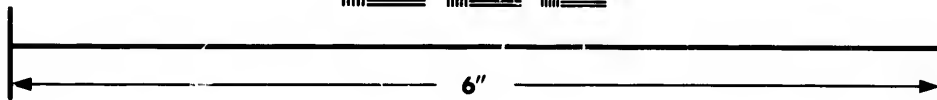
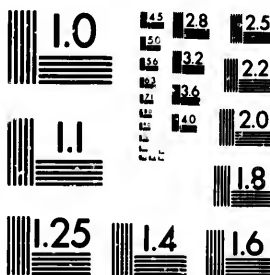


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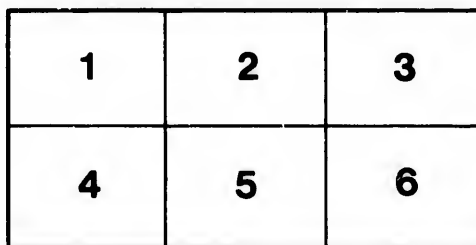
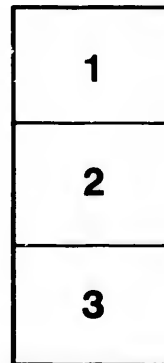
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XVII.—*Remarks on the Flora of the Northern Shores of America, with Tabulated Observations made by Mr. F. F. PAYSE on the seasonal development of Plants at Cape Prince of Wales, Hudson Strait, during 1886. By GEORGE LAWSON, Ph.D., LL.D.*

(Read May 25, 1887.)

The observations made by Mr. Payne on the progress of vegetation during the spring, summer and autumn of 1886, at Cape Prince of Wales, Hudson Strait, cannot fail to be of interest and use to those who are desirous of definite knowledge respecting the climate of the Hudson Strait shores during the period of active plant growth. But a knowledge of our northern vegetation is not only of interest in enabling us to form a judgment as to the general character of the climate, or ascertain how far a given district is capable of producing cultivated crops or plants that are in any way useful in the economical sense; there are other questions which, if more remote from immediate practical utility, are yet not of less interest from a scientific point of view, and every contribution of information, whether in form of observations or specimens, is of value. The floras of our northern shores gradually merge northwardly into the composite flora found within the Arctic circle, commonly called "the Arctic flora," the remarkable composition of which has given rise to speculation as to its origin. Sir Joseph Hooker accounts for it by assuming extensive changes of climate and of land and sea, leading to a spread of Scandinavian species over the whole polar zone, and the subsequent introduction of Asiatic and American species, with which the Scandinavian are so largely associated in all the Arctic districts except those of Europe and Greenland. Some of the difficulties of this view are overcome, if we admit, with Darwin and Hooker, the great antiquity of the Scandinavian flora, and the hypothesis originated by Edward Forbes and extended by Charles Darwin, that previous to the Glacial Epoch, that flora was more uniformly distributed over the whole polar zone than now; that during that period it was driven southward in every longitude, even across the tropics into the south temperate zone; and that, on the succeeding warmth of the present epoch, the surviving species again spread northward, accompanied by aborigines of the countries which they had invaded during their southern migration, and leaving behind on the northward march stragglers of the Scandinavian flora that found permanent refuge in the mountains of the warmer zones. The discussion of such an hypothesis necessarily opens up questions of variation, adaptation, and survival, under changing conditions of climate and over large areas of the earth's surface. It will be seen, at once, how important it is to have our Northern American species carefully collocated with those of Northern Europe and Asia, especially such of them as belong, or are allied, to species of the true Scandinavian flora. It is not the discovery of new species on our northern shores that is the object most to be desired in the interest of science, for we have already a confusing plethora of names, but rather the collection of material to enable us to ascertain more accurately the relations to each

other of the species that have been already described, so that duplicate names may be eliminated, and our nomenclature placed on such a basis that equivalent forms—whether species, so-called subspecies, or varieties, or even less pronounced forms—may be compared together from the several regions, as evidence of community of origin, or otherwise, or to indicate possible or probable sources of derivation.

At an early period in the century preceding the present one, long before questions of origin had arisen, and long before it was thought of any consequence to mankind to ascertain the possibilities of productive culture on our northern coasts, Linnæus's "Tour in Lapland" and the "Flora Laponica" had excited an interest in these little northern plants from the systematic botanist's point of view. And, while, subsequently, the Scandinavians themselves and the botanists of Russia, have been active in making known the vegetation of the northern verges of Europe and Asia, so the northern shores of America and the Greenland coast have been visited by whaling vessels, whose officers have, season after season, carried specimens to British botanists; but the principal botanical work on our shores has been accomplished by the numerous exploring expeditions sent out from time to time by England and the United States, whose collections have been elaborated in the most careful manner and the results systematised and published for general use.

More recently, substantial work has been done at the meteorological stations for observation on Hudson Strait, and especially by Dr. Robert Bell, scientist and medical officer of the expedition to Hudson Bay in 1881, a list of whose botanical collections, identified by Prof. Macoun, has been published.

Work still remains to be done by observers who have opportunity, and it may be thus summarised:—To collect and dry specimens in as many conditions or stages of growth as possible, carefully noting (1) dates of collection, (2) kinds of soil, whether sandy, loamy, clayey, peaty (these greatly affecting moisture and temperature), (3) distance from sea shore, elevation above sea-level, (4) surroundings of locality or particular spot where the plant is gathered, as regards protection from cold, or conditions of shelter favourable to prolonged humidity of atmosphere or to accumulation of warmth in time of sunshine. These particulars are specially mentioned, not only because they are intrinsically of special importance; but because we had scarcely any systematic observation of them, until the establishment of the stations of observation on Hudson Strait. It is to be hoped that what has been begun so well by the Hudson Strait observers, will be continued and developed by those who have opportunity from time to time, to add to the information already acquired. These regions are so seldom visited in the ordinary course of travel, and the collection and preservation of specimens is attended with so many difficulties, that even the veriest scraps are welcome to the home botanist. How much more valuable are specimens, carefully selected so as to show modifications of form, and thus serve to determine questions of specific identity or distinction, or those collected at different times during the seasons of sprouting or budding, leaf-development, flowering, ripening of seeds, and autumn withering, or fall of leaf or browning of evergreens, with dates carefully recorded, so as to show the beginning, progress and ending of the annual growing period for vegetation.

In the following tabulation of Mr. Payne's observations, the several columns after that containing the name of the species give,—

A.—Date of spring-budding in case of shrubs, and sprouting or appearance of new shoots from the rhizomes of herbaceous plants.

B.—Date when plant was found in leaf, i.e., when leaves of the season were fairly developed.

C.—When first found in flower.

D.—When specimens were found with ripe seeds.

E.—Autumn withering of foliage, or defoliation.

F.—Particulars as to the nature of the habitat of each species, or spot where found growing—especially with respect to proximity to, or distance from, the sea-shore, elevation above sea-level, whether in exposed hilly situations, or sheltered, or protected amongst rocks or in water-courses, etc.; general character of soil, whether gravelly, sandy, compact, or peaty, and whether moist or dry, etc. Northern plants have a special tendency to assume luxuriant forms when grown in sheltered spots where the air is kept moist by waterfalls, rapid streams, or even rocky brooks.

Corresponding observations of these several phenomena in the same species of plants in any other locality or country will enable a comparison to be made of its climate, so far as it affects vegetation, with that of Cape Prince of Wales. The variations of seasons in different years in the same locality may also be determined from such observations.

The names of all the species were determined from a careful examination by myself of Mr. Payne's specimens. The condition of the plants, as to progress of seasonal growth at the several dates, as noted by Mr. Payne at the time, was also ratified in each case by examination of the specimens. The abundant ripening of seeds is one of the features of Mr. Payne's collection, showing a marked difference from some of the collections taken to England by exploring expeditions. In less hospitable regions, although plants grow even luxuriantly, they are not known to ripen seeds sufficiently for germination. This has led to the belief that within the Arctic circle the permanent continuance of vegetation is dependent upon fertile seeds ripened farther south and transported to the belt of the Arctic flora. However this may be, it is interesting to note that in all the specimens from Cape Prince of Wales that were sufficiently advanced, the seeds were plump and perfect.

Additional collections have been received, but too late to be included in this paper. The results of an examination of these, as well as the consideration of some general questions regarding the northern shore flora, must consequently be deferred.

LIST OF PLANTS COLLECTED AT CAPE PRAGE OF WALES, HEDSON STRAIT, DURING THE SUMMER OF 1886, WITH NOTES OF OBSERVATIONS MADE ON THEIR GROWTH, OR SUCCESSIVE DEVELOPMENT OF ORGANS, DURING THE SEASON, NORTH OF LOCALITIES WHERE FOUND, ETC., BY L. F. PAULI. THE SHEETS FURNISHED FROM MR. PAULI'S SCHOLARS BY PROF. LAWSON.

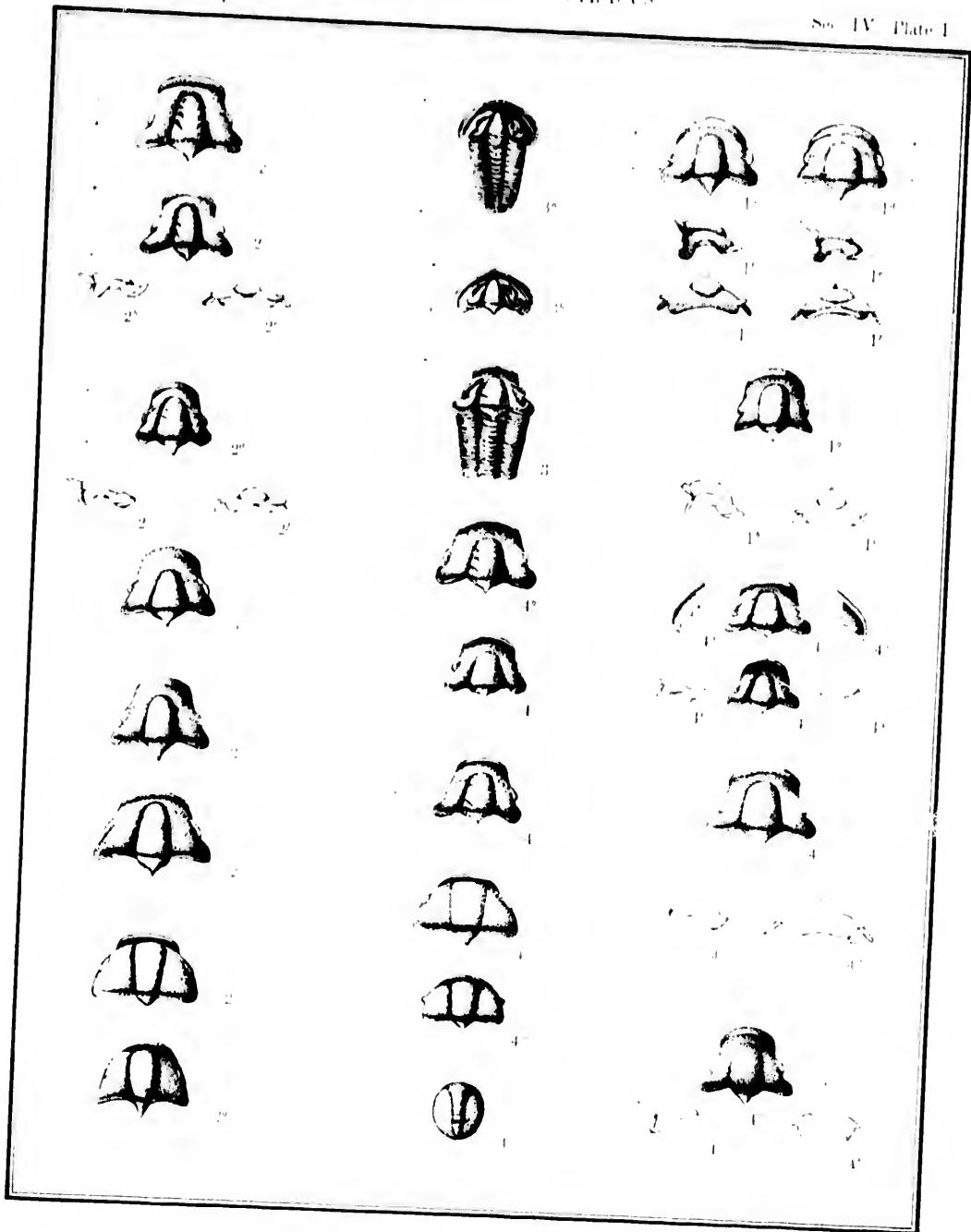
	A.	B.	C.	D.	E.	F.
1. <i>Ranunculus ovatus</i> , <i>Linn.</i>	June 30	July 5	Aug. 18	Aug. 20	In very strong, sub-sterile, markets of cliffs, well protected 100 yards from high tide mark. (H. 200 above M. S. L. in dry.)
2. <i>R. hyperboreus</i> , <i>Desf.</i>	July 25	.....	.....	.....	Similar situation as preceding species No. 1, but not over 100 yards, although in damp spots.
3. <i>Papaver alpinum</i> , <i>Linn.</i> (f. unfounded)	May 20	June 20	Aug. 6	Sept. 1	On dry gravel and sand, tolerably well protected, level ground and only 400 yards from shore. (H. 100 above M. S. L. in dry.)
4. <i>Pedicularis alpina</i> , <i>Linn.</i> var.	June 25	July 1	.....	.....	Similar locality as preceding, No. 3, but in soil more moist, 200 yards from shore.
5. <i>Cochlearia officinalis</i> , <i>Linn.</i>	June 15	June 22	Aug. 18	Aug. 26	Same as No. 1, twenty yards from shore.
6. <i>Cerastium alpinum</i> , <i>Linn.</i>	June 15	June 20	Aug. 15	Sept. 8	In dry and in localities similar to No. 3, very plentiful, isolated from other plants, except grass.
7. <i>C. vulgatum</i> , <i>Linn.</i>	In dry soil, but of a cross as in same locality as No. 6.
8. <i>Stellaria longipes</i> , <i>var. v. Turcz. et Gr.</i>	June 15	July 8	Aug. 20	Sept. 5	In dry soil, but of a cross as in same locality as No. 6.
9. <i>Eichornia aquatica</i> , <i>Linn.</i>	June 30	July 5	Aug. 20	Aug. 20	Same as No. 3, but in soil, probably, but not isolated.
10. <i>L. arvensis</i> , <i>var. affinis</i>	June 15	June 22	Aug. 11	Aug. 20	Same as No. 3.
11. <i>Silene acaulis</i> , <i>Linn.</i>	May 20	June 1	Aug. 22	Sept. 8	Same as No. 11, but in soil, probably, but not isolated.
12. <i>H. nokesya</i> <i>pedunculata</i> , <i>Ell.</i>	June 30	July 10	Aug. 1	Sept. 1	In dry soil, but in soil, probably, but not isolated.
13. <i>Astragalus alpinus</i> , <i>Linn.</i>	June 20	June 30	Aug. 15	Aug. 25	Same as No. 11, but in soil, probably, but not isolated.
14. <i>Oxytropis arctica</i> , <i>L. B.</i>	June 20	July 7	Aug. 20	Sept. 7	Same situation as No. 11.
15. <i>Prunella integrifolia</i> , <i>Willd.</i>	June 5	July 1	Aug. 20	Sept. 1	On dry soil, but in soil, probably, but not isolated.
16. <i>Potentilla nivea</i> , <i>Linn.</i>	On dry soil, but in soil, probably, but not isolated.
17. <i>P. maculata</i> , <i>L. L.</i>	May 25	June 22	Aug. 6	Aug. 20	On dry soil, but in soil, probably, but not isolated.
18. <i>Rubus Chamamensis</i>	June 20	July 5	Aug. 7	Sept. 1	Well protected, growing amongst moss on grass, 200 yards from shore, 40 feet above M. S. L. (H. 100 above M. S. L.)
19. <i>Engelmannia batifolium</i> , <i>Linn.</i>	June 2	July 15	Sept. 5	Sept. 9	Much exposed, but level beds of grass, very dry, 80 yards from shore and 40 feet above M. S. L.
20. <i>Hippuris vulgaris</i> <i>f. maritima</i> (det. Trübner)	In small pond, well protected, 80 yards from shore and 100 feet above M. S. L.
21. <i>Saxifraga cernua</i> , <i>Linn.</i>	June 20	July 10	Aug. 27	Sept. 5	Amongst rocks, well protected, 80 yards from shore and 100 feet above M. S. L. Soil, sand and gravel.

THE NORTHERN SHORES OF AMERICA.

22	<i>S. truncata</i> <i>Retz.</i>	May 21	June 13	July 4	Aug. 20	Sept. 12	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
23	<i>S. oppositifolia</i> , <i>Linn.</i>	May 26	June 7	June 15	Aug. 17	Aug. 25	Very poor fall. Dry gravel, 100 yards from shore. 1 foot above M.S.L. Some flowers.
24	<i>S. rivularis</i> , <i>Linn.</i>	.....	July 1	July 10	Sept. 3	Sept. 8	Very poor fall. Dry gravel, 100 yards from shore. 1 foot above M.S.L. Some flowers.
25	<i>S. ovalis</i> , <i>Linn.</i>	June 23	June 23	July 7	Aug. 26	Sept. 7	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
26	<i>S. ovalis</i> , <i>var. b.</i>	.....	.....	.....	.....	.....	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
27	<i>S. oppositifolia</i> , <i>Linn.</i>	May 2	June 1	June 28	Aug. 25	Aug. 31	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
28	<i>Parnassia palustris</i> , <i>Linn.</i>	.....	.....	.....	.....	.....	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
29	<i>Erigeron uniflorus</i> , <i>Linn.</i>	.....	.....	.....	.....	.....	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
30	<i>Arctostaphylos alpina</i> , <i>Gray.</i>	June 27	June 27	July 10	Aug. 27	Sept. 1	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
31	<i>Antennaria alba</i> , <i>Linn.</i>	June 27	July 3	July 12	Aug. 27	Sept. 3	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
32	<i>Taraxacum officinale</i> , <i>var. palustre</i> , <i>DC.</i> <i>et in sum. Koch. A. Gr. var. palustre, F.</i> <i>Major Fl. Labradorica</i>	May 26	June 16	June 22	Aug. 12	Aug. 12	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
33	<i>Matricaria inodora</i> , <i>var. hana</i> , <i>Torr. & Gr.</i>	June 1	June 30	July 4	Aug. 1	Sept. 5	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
34	<i>Campumula andiflora</i> , <i>Linn.</i>	June 15	July 1	July 3	.....	.....	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
35	<i>Vaccinium uliginosum</i> , <i>Linn.</i>	June 1	June 25	July 7	Aug. 25	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
36	<i>V. vitis-idaea</i> , <i>Linn.</i>	May 29	June 1	July 1	Aug. 31	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
37	<i>Cassiope tetragyna</i> , <i>Linn.</i>	June 1	June 15	June 25	Aug. 25	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
38	<i>Arctostaphylos alpestris</i> , <i>Gray.</i>	June 1	June 22	June 22	Aug. 31	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
39	<i>Lesium palustre</i> , <i>Linn. var. decumbens</i> , <i>L. Eger.</i>	May 23	June 1	July 1	Aug. 25	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
40	<i>Diapensia leptophylla</i> , <i>Linn.</i>	May 20	June 1	July 1	Aug. 31	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
41	<i>Pyrola minor</i> , <i>Linn.</i>	.....	.....	.....	.....	.....	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
42	<i>Ribes bicolor</i> , <i>Lep. & Poir.</i>	May 15	June 25	June 25	Sept. 16	Sept. 16	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
43	<i>Mertensia maritima</i> , <i>Don.</i>	June 15	June 22	July 5	Aug. 25	Aug. 28	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
44	<i>Pedicularis flammula</i> , <i>Linn.</i>	.....	.....	.....	.....	.....	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
45	<i>P. Langsdorffii</i> , <i>var. lanata</i> , <i>A. Gr.</i>	June 1	June 10	June 29	Aug. 12	Aug. 18	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.
46	<i>P. hirsuta</i> , <i>Linn.</i>	June 1	June 15	June 20	Aug. 10	Aug. 20	Dry gravel, well exposed, 100 yards from shore. 1 foot above M.S.L. Some flowers.

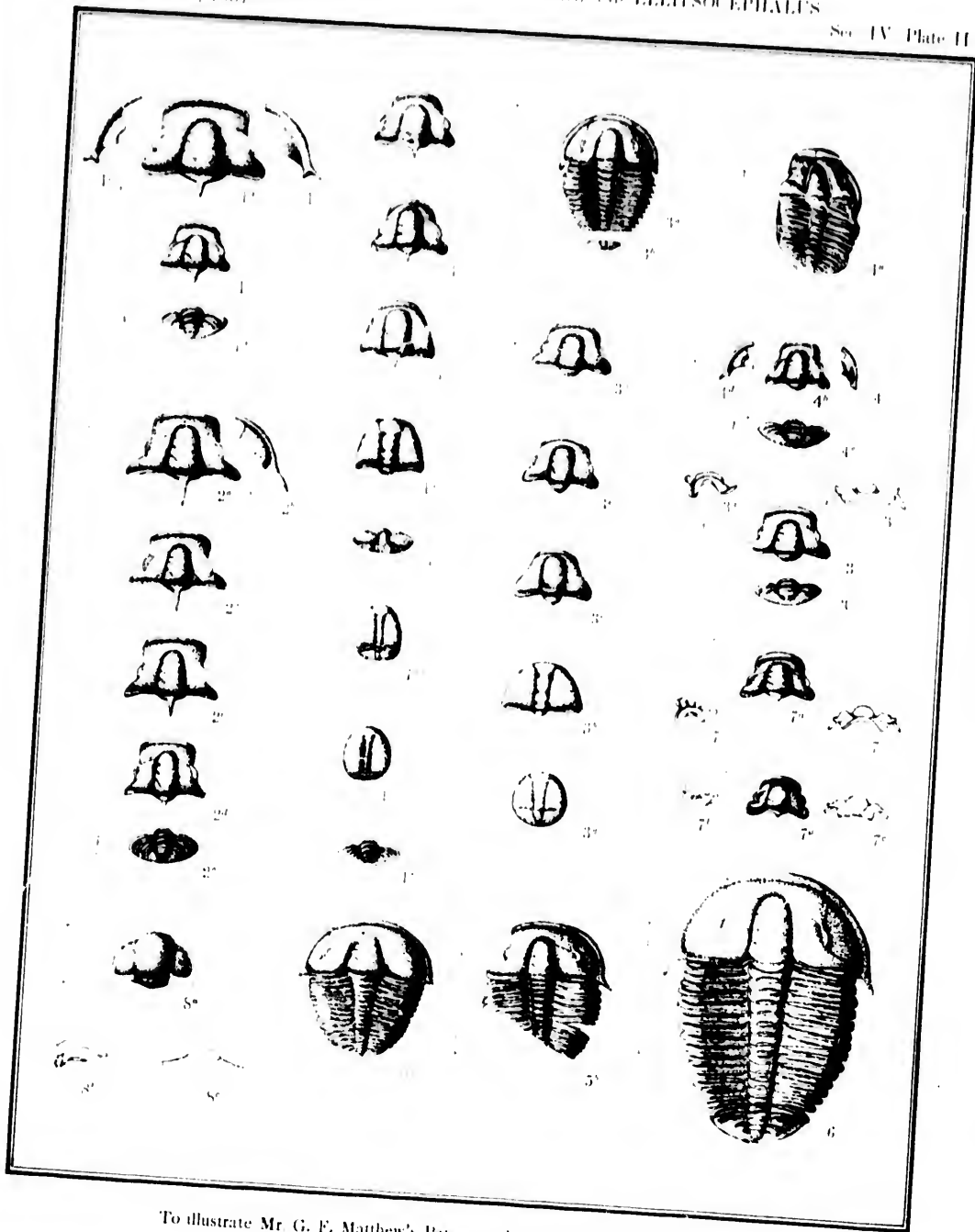
LIST OF PLANTS COLLECTED AT CAPE PRIME ON WALES, HURON STRAIT, DURING THE SUMMER OF 1886.—Continued.

	A.	B.	C.	D.	E.	F.
	Date of springing time or plant growing.	Plant in leaf, new leaves of the spring developing.	In flower.	Four or more ripe withering.	Autumn withering.	Name of city or place where found, or height, elevation, direction, soil, moisture, &c. All the plants were collected within 200 yards and most of them within 100 yards of high water mark.
47	July 3	July 12	July 17	Aug. 26	Aug. 31	Same as preceding. No. 46 rather more cut in sand and gravel.
48	June 18	June 22	June 29	Aug. 21	Aug. 31	Dry sand and gravel level, exposed. 40 feet above M. S. L., towards beach where scattered.
49	June 10	June 15	June 22	July 5	Sept. 11	Generally on moist earth, along high water stream, 20 feet above M. S. L., but scattered on shore. 100 feet high.
50	June 12	June 23	July 1	July 25	Sept. 1	Sp. was where it now grows, out of damp soil. The same. Rotten part of this plant is hard, single piece. 100 feet above M. S. L.
51	June 28	July 1	.....	.....	Sept. 11	Among green mud on wet or shallow places. Green, while in leaf, well exposed Very round form, and by taking to many trees, never any rougher buds.
52	June 10	June 15	June 22	Aug. 9	Sept. 19	Among moss, well exposed, not on level, and generally in moss beds.
53	June 29	July 1	July 19	Aug. 19	Aug. 25	Dry sand on gravel, generally well protected, in moss, rocks, or small pebbles, 4 feet above M. S. L.
54	.....	.....	.....	.....	.....	Well exposed on hill of gravel. In light earth.
55	.....	.....	.....	.....	.....	Most exposed, where exposed, in wide open valley, 50 yards from shore, 20 feet above M. S. L.
56	.....	.....	.....	.....	.....	Well protected, moss, 30 yards high, 80 feet above M. S. L., 200 yards from shore, Peninsula.
57	.....	.....	.....	.....	.....	.....
58	May 25	June 12	July 19	Aug. 21	Sept. 5	Soil well protected, 2 feet above M. S. L., 15 yards from high water mark. Not fruitful.
59	May 25	June 1	July 17	Aug. 28	Sept. 1	Soil, only found where high water mark, 15 feet above M. S. L. (Sept. 19, with green, warm, sheltered place).
60	June 10	June 20	July 15	.....	Sept. 19	Among stones, protected, same as preceding, No. 58. Not fruitful.
61	June 1	June 22	July 19	Aug. 25	Sept. 1	Soil, same as preceding, No. 59, but not fruitful.
62	June 29	July 1	July 15	Sept. 1	Sept. 5	Well exposed on level, and south side of hill, dry, light soil, among rocks, 80 feet above M. S. L.
63	June 1	June 25	July 15	Aug. 31	Aug. 31	Well protected, moss, wet, 20 feet high, 20 feet above M. S. L. (Sept. 25, same shape of green).
64	.....	.....	.....	.....	.....	Well protected, among rocks, near shore, 20 feet above M. S. L., grouped, soil. (Sept. 19, fruit quite green, and fresh looking)
65	.....	.....	.....	.....	.....	Well protected, among high rocks and pebbles, 20 yards from shore, 60 feet above M. S. L., grouped, soles. (Sept. 19, fruit quite green, and fresh looking)
66	.....	.....	.....	.....	.....	Among moss, 200 yards from shore, further exposed, 60 feet above M. S. L.

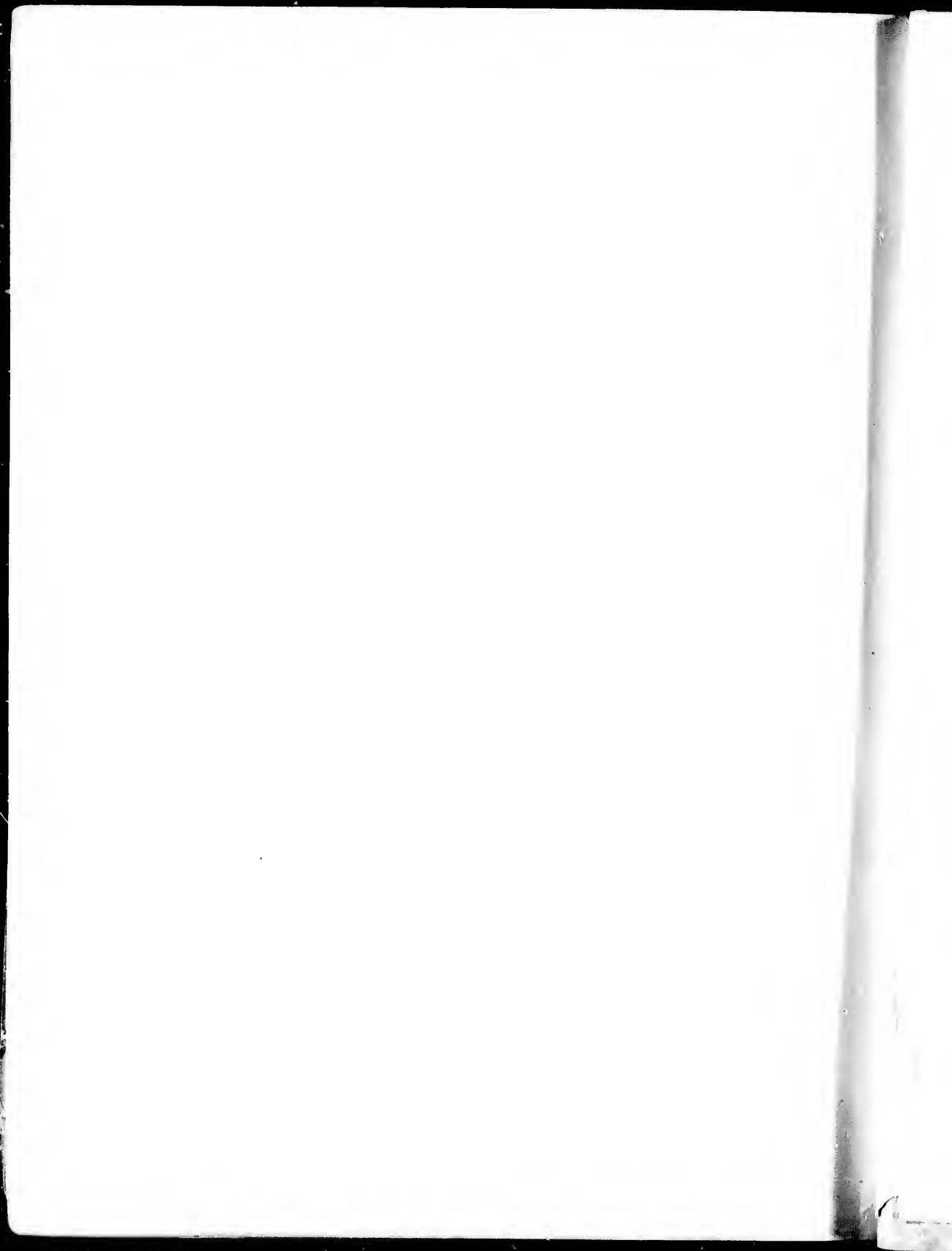


To illustrate Mr. G. F. Matthew's Paper on the Fauna of the St. John Group



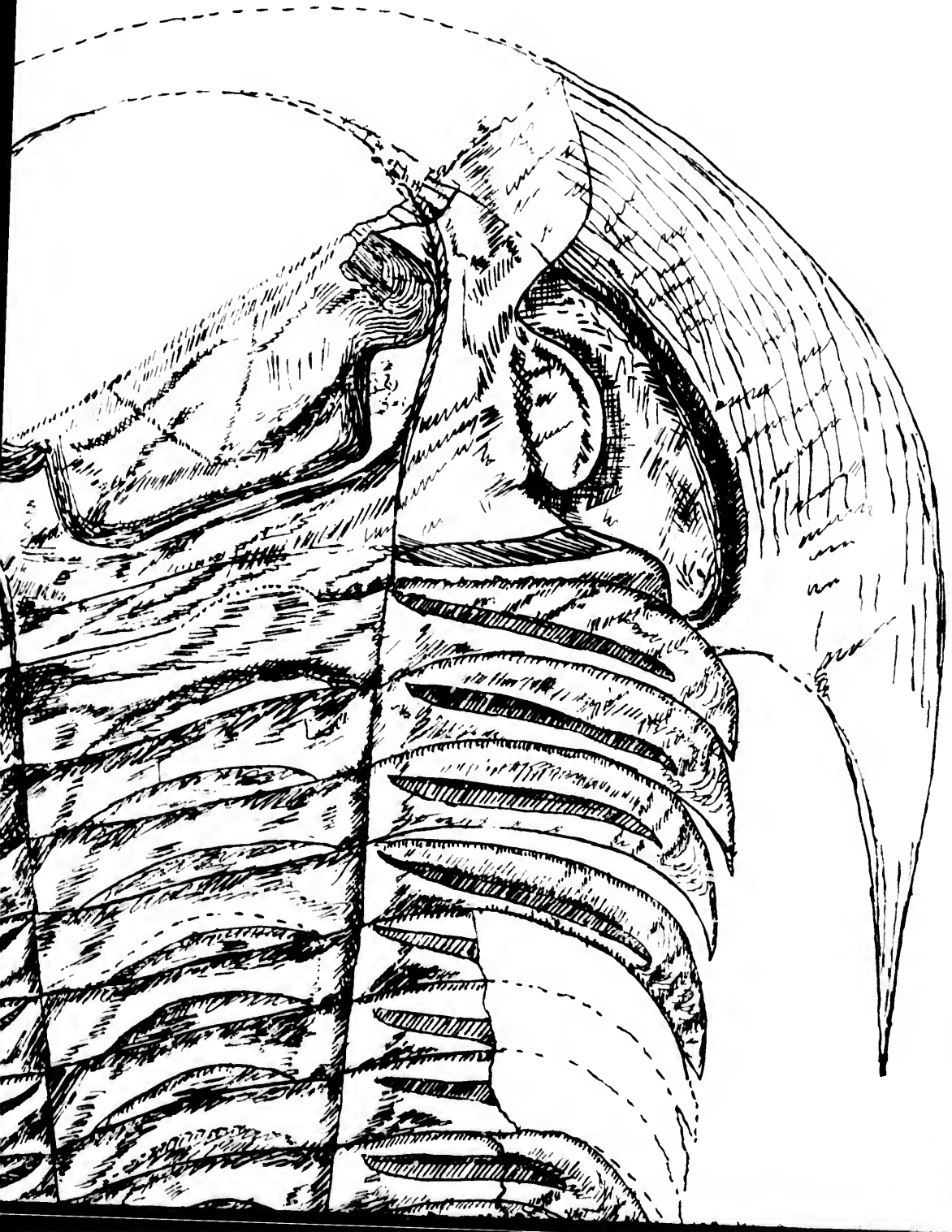


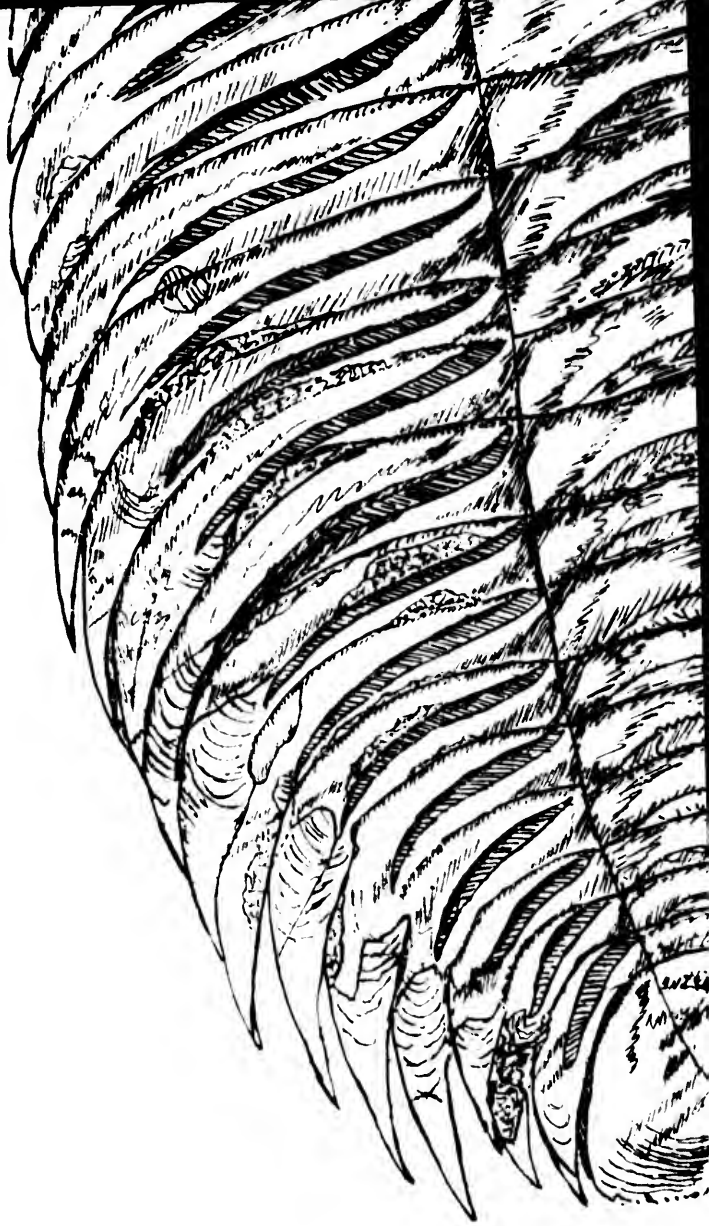
To illustrate Mr. G. E. Matthew's Paper on the Fauna of the St. John Group.





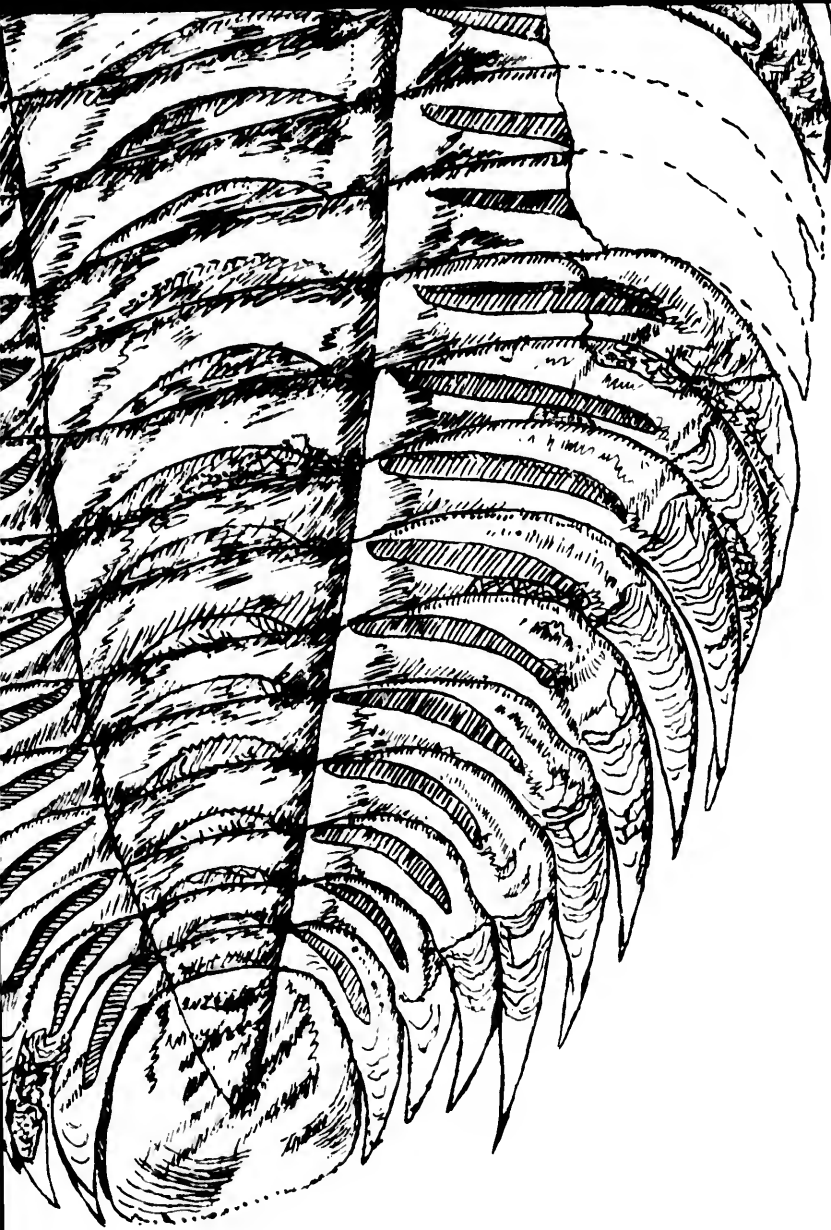






PARADOXID

To illustrate Mr. G. F. Matthew's Paper



ADOXIDES REGINA.

F. Matthew's Paper on the Fauna of the St. John Group.

