

is seldom as great as fifty per cent. of the total number capable of development.

At any time during the growth of the gametophyte, development may be arrested. Many megasporangia fail to renew their growth in the spring following the dormant period of winter. In *Pinus nigra* var. *aus-triaca* soon after the beginning of the second growing season the megagametophyte of abnormal sporangia takes on the form of a hollow sphere very much in appearance like a *Volvox* colony. In the process of disintegration the free cells of this abnormal gametophyte press out toward the margin of the vacuole and there assume the parietal position. These gametophytes never develop archegonia. It is possible that a person limited to material of one season may happen on abnormal ovules with the free nuclei of the gametophyte in a parietal position and later in the season he may obtain normal material with archegonia and gametophyte in a central position. From such a combination of abnormal and normal materials centripetal growth of the gametophyte might be inferred.

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PAUROPODA IN ALASKA

I HAVE been studying small and somewhat obscure arthropods of several widely separate groups, but with a number of features in common. They have no wings, they have no eyes and they live in decaying vegetable material under logs or stones or in humus. In the insect groups I have collected Campodea, Japyx and Protura. Among the centipede-like forms I have searched for Symphyla and Pauropoda.

Members of all these delicate, white, eyeless forms may all occur in one environment, but it is more common to find but one group represented in one place. I have collected from the eastern United States to the western and from Cuba and Mexico to central Alaska. The two insect genera mentioned above and Symphyla are by far the easiest to find. Pauropoda may be obtained by the funnel method or by more direct collecting in the field, but I have never found Protura except with a funnel. I did not use this apparatus in Alaska last summer, and I am not surprised that I did not find any Proturans by the methods used. They may be there; I have not really made a very serious attempt to find them. For the other groups I searched hours in a number of widely separated localities in Alaska, British Columbia and Yukon Territory and found not a single representative of any of the more easily collected animals. The only group obtained in these northern regions was Pauropoda. These were found in but four places. None were collected in southern Alaska. At Skagway

several were obtained with mites, Collembola and some other insects. They were under stones in a dense wood. In comparing these with other previously collected specimens I found their nearest relationships were with some obtained the year before well up towards the timber line on Mt. Hood, Oregon. At Dawson City I was especially successful in obtaining Pauropoda. It was a slightly rainy day, moisture conditions on the ground were just right, and I was able to obtain quite a number of specimens. They were about one half way up the mountain back of Dawson City. Next at Eagle, Alaska, a few specimens were found in the woods about a mile from the Yukon.

During several days I searched in the McKinley National Park, and although mites, small centipedes and Collembola were encountered no Pauropoda were seen at any time. It may have been too damp, as heavy rains came frequently.

At Currie a few more of these minute eighteen-legged forms were found. All but one of the four lots encountered were of the genus *Stylopaupopus*, those from Eagle alone were of the genus *Pauropus*. In fact more than nine tenths of all the specimens collected were of the genus *Stylopaupopus*. In general to the southward *Pauropus* is more often encountered than the other.

So far as I know this record is the first for these arthropods in Alaska and so far as I have been able to learn these must be farther north than those reported from the old world. But not finding these small animals is no sure proof that they may not be present in a region. It is very easy to overlook them, as indeed all the other forms mentioned, but if one is collecting one particular kind of animal he is apt to find those which were not conspicuous. I have now collected these Pauropoda from the eastern United States, from Mexico both north and south and now from Alaska. I did not find any in Cuba, although I searched in many places.

The species found differ but little from each other, rather minor characters separate them into species. Records from others as well as those of my own suggest a world-wide distribution of two genera.

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MORE ABOUT CITATIONS

SOME comments received since the article "A uniform scheme for citations" was printed (*SCIENCE*, April 10, 1931, pp. 390-392) indicate the desirability of a few additional notes.

The U. S. Geological Survey scheme is applicable not only to footnote citations but to bibliographic or