similar species of birds were observed feeding upon the seed, but here no specimens were collected.

It is to be remarked that close examination of the intestines of the Jutiapa birds showed that digestion of the seed was complete in every instance and that therefore it is unlikely that these birds are a factor in the distribution of teosinte.

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MULL SOIL UNDER SPRUCE

THE development of the mull type of soil in spruce (-fir) woodlands has always been regarded as an unusual phenomenon. As earthworms are regarded as predominant formers of mull soil, and as earthworms prefer a limy soil, the logical place to look for mull soil under spruce would be over limestone deposits. As these occur extensively in Vermont, spruce tracts over limestones were examined in northeastern Vermont, using the *State Geologist Reports* to locate the limestone beds. A handy indicator of such deposits is the white cedar (*Thuya*). In glaciated country the mineral soil of limestone areas is so impregnated with ground limestone that the original deposits do not have to be close to the surface to influence the fauna and flora dependent on or partial to limy soil.

Throughout the region investigated, many spruce stands occur on former pastures, meadows and fields which have been subsequently abandoned and overgrown with spruce. Such agricultural land over limestone usually harbors earthworms, and these may persist in the soil for at least twenty to thirty years after the spruces have occupied the site. Such stands were not included in the investigation, which was limited to such sites as were so extreme as to have been impossible for agriculture. The following two types of sites fall under this head: (1) land too wet for plowing or pasturage, as swamps and seepage areas, (2) land too steep, as ravine sides. Such sites were invariably found to have mull soil (over limestone) except that the mull soil of the swamps was confined to a narrow strip about the edge of the swamp where the land rises from the dead level characteristic of muck swamps formed by lake filling, etc. Earthworm castings and middens were not always visible on the spruce litter, though perforations usually occurred.

The most favorable areas in Vermont were in the counties of Orleans, Caledonia, Washington and Orange. An area in northern New Hampshire (Coos County) was also found to have mull soil in similar favorable sites. Some of these sites were under large spruces and there were large tree stumps about, showing the land had been under woodland for a long period of time.

Thus it is evident that mull soil under spruce stands is not rare if sought for in situations favorable to earthworms.

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GRAPTOLITES FROM HIGHGATE, VERMONT

To one who has some acquaintance with the area lying east of Lake Champlain and comprising the northwestern corner of Vermont and adjacent parts of Canada, it is not surprising to note the interest shown in this region by various geologists and advanced students. Welcome progress has been made in the interpretation of the difficult geology involved.

In view of announcements within the last three or four years of the occurrence of graptolites in certain rocks in Highgate Township, Vermont, it seems pertinent, for purpose of record, to call attention to the previous discovery and report of such fossils in Highgate.

In the summer of 1921 the writer found definite graptolite remains in slate beds in the north wall of the gorge of the Missisquoi River at Highgate Falls. Although graptolites are not infrequent in the Ordovician slates along the lake shore in Highgate, such fossils had not been reported prior to 1921 from the belt of dislocated rocks which makes up most of Highgate Township and which lies between the overthrusted younger Trenton and associated beds near the lake, and older rocks at the east in Franklin Township.

Two of the graptolites found at Highgate Falls were tentatively identified by the writer as *Dictyonema,* probably *flabelliforme,* and *Staurograptus dichotomus,* Emmons. These specimens with others were submitted to Dr. R. Ruedemann without reference to the locality at which they were found. Dr. Ruedemann thought that the specimen referred by the writer to *Dictyonema* probably belonged to that genus; but regarded the one compared with *Staurograptus* as probably a young *Dictyonema,* "flattened out in a vertical instead of a lateral direction."[1] At the time these graptolites were reported their probable significance was not appreciated.

Several years later graptolite fragments were found in the same general belt of rocks in Highgate, "about one mile northwest of Highgate Center, Vt." These fragments were referred to Dr. Ruedemann, who described them as belonging to a new species of *Dictyonema,* which he called *Dictyonema schucherti.*[2] A

[1] Dr. Jacot died on March 24.

[1] Vermont State Geologist, Thirteenth Report, 1921–22, p. 188.

[2] "The Cambrian of the Upper Mississippi Valley," Part 3, *Bull. Pub. Mus. Milwaukee,* Vol. 12, 1933.