

mm. longa, compressa, pungenti-acuta; semina 2-3 mm. diam., complanata squamis late cuneatis plus minusve laceratis obtecta.

EAST AFRICA. Kenya Colony: Kikemu, near Lake, *D. H. Linder*, no. 2639 (type), April 21, 1927 (1 ft. high; flowers orange). German East Africa: Ermessa, east of Ikorna, *Jaeger & Oehler*, no. 349, Jan. 3, 1907 ("Ranke zwischen Granitblöcken, Bl. fleischrot"); Marienhof, Ukerewe Island in Victoria Nyanza, *P. Conrads*, no. 509, Dec. 18, 1912 ("Staude oder Strauch auf Termitenhügel; viele Stengel; Bl. rot"). Type and paratypes in Bot. Mus. Berlin; isotype in Gray Herb.

This species is nearest to those forms of *Crossandra nilotica* which in Thiselton-Dyer, Fl. Trop. Afr. v. 115 have been called var. *acuminata* Lindau and particularly to the specimens collected by Schweinfurth in Eritrea. These have the bracts almost as narrow but thinner, more leafy, less rigid, glandular-pubescent and with less prominent veins.

Botanisches Museum
Berlin-Dahlem.

NOTES ON FOREST DISEASES IN NOVA SCOTIA

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SOME attention has been given to the insect pests of the forests of Nova Scotia, but almost none to their diseases. Such a large part of the province is adapted solely to productive forest growth that under proper management these lands should yield a handsome perpetual income. The Spruces grow like weeds and tend to overrun areas cleared for agriculture. There are besides these the White Pine, Balsam Fir, Hemlock, Birch, Poplar, Beech, and Hard Maple in abundance, and certain other species of lesser frequency. The province is especially rich in potential pulpwood production. An effective fire protective service is in operation, a public forest conscience is being cultivated, and steps are under way with the end in view of regularized scientific management. It is certain that if this last purpose is to be accomplished most effectively it will be essential to become acquainted with those natural forces that inevitably bring about deterioration in the forest unless intelligently combatted. Standing out prominently among them are the forest diseases.

As a preliminary to their hoped-for study, I was invited by the Department of Lands & Forests to make a pathological reconnaissance. It was possible to devote the latter half of July, 1929, towards this end. I was extremely fortunate to have as companion the Provincial Forester, Mr. Otto Schierbeck, a greater part of the time. Through his unfailing enterprise, abounding energy and intimate knowledge of the forests of Nova Scotia, an opportunity was afforded, otherwise impossible within the limits of such a short period of time, to see representative cross-

sections of most of the larger forest areas of the province and to gain a notion of many of their problems. A few notes are offered on some of the diseases seen, several of which have not heretofore been recorded for Nova Scotia. New records are designated by an asterisk (*).

The more common native diseases of White Pine found elsewhere also occur in Nova Scotia, but there is one introduced disease, the blister rust, that calls for comment. That it had found its way into Nova Scotia has been known for several years, but up to the present had been seen on Currant bushes only. Rusted *Ribes oxycanthoides* (Smooth Gooseberry), *R. prostratum* (Skunk Currant), and *R. nigrum* (Black Currant of gardens) were observed everywhere, but it is important to note that two or three young Pines (eight or ten feet in height), members of a fine, vigorous, even-aged stand near Chester were found in fatal attack.* Blister rust cankers had girdled their stems near the ground. European experience with this rust has been a very unhappy one. It has wiped out or wrecked plantations in many places, and in several countries, as a result, efforts to grow White Pine have been abandoned. (PERLEY SPAULDING, White Pine Blister Rust; A comparison of European with North American conditions. U. S. Dept. of Agriculture, Technical Bull. 87: 1-58. 1929). This rust is now widely spread throughout the 5-needled Pine belts of North America. In some areas it has severely attacked the White Pine, especially the younger growth, and some attempts here and there, said to be economically successful, have been made to control it by eradication of the associated Currants and Gooseberries. Eventually it may be wise to designate what areas in Nova Scotia are to be conserved for the growing of White Pine and to eradicate the *Ribes* (Currants and Gooseberries) from them. But for the immediate future it would seem to be the better part of wisdom to place the rust under careful observation. This could be done easily and inexpensively by establishing various plots suitably located and have them checked up annually. If this is to be done, however, there should be no delay in the undertaking.

There are many native rust diseases of Conifers in Nova Scotia. The life histories of several of them were worked out by Professor W. P. Fraser at Pictou and MacDonald College (Cultures of Heteroecious Rusts in *Mycologia*, 3: 67-74. 1911; Cultures of Heteroecious Rusts in *Mycologia*, 4: 175-193. 1912; Further Cultures of Heteroecious Rusts in *Mycologia* 5: 233-239. 1913; Notes on *Uredinopsis mirabilis* and other Rusts in *Mycologia* 6: 25-28. 1914) and Professor H. P. Bell of Dalhousie University. (Fern Rusts of *Abies*, in *Botanical Gazette* 77: 1-31. 1924.) While they are probably mostly interesting from a mycological point of view some are of pathological significance, and reference should be made to a few of them.

The destructive cone rust of the Red, Black and White Spruces was found to be abundant in many places. On one small Black Spruce,

observed near Lawrencetown, 279 out of its 500 cones were completely destroyed by the rust. Obviously in harvesting Spruce cones for seed care should be taken not to include the rust-blasted ones and not to gather cones from the smaller trees. An unexpected find, quite frequent on Red and Black Spruces (Beaver Bank, Chester, Lawrencetown, etc.) was the broom rust caused by **Peridermium coloradense*. This broom-forming rust is widespread in North America. "It not only attacks and stunts the twigs and branches of young trees, but also brooms and dwarfs saplings and older trees."

Interesting as a new record in America was the finding of the *Vaccinium* rust of Hemlocks (**Thecopsora Vacciniorum*) on **Vaccinium Vitis-Idaea* var. *minus* at St. Peter's, Cape Breton.

Of the many Rusts of Balsam Fir those caused by **Milesina Kriegeriana* and **M. polypodophila* may be mentioned as new records for Nova Scotia. The former was found in a very heavy infestation in Guysboro Co., and one unusual feature it manifested was the adherence of the whitened needles of 1928 en masse, killed by it last year. The latter Rust is characterized by its habit of causing malformed, loosely-broomed trees. Another Fern Rust of Balsam found was that caused by **Hyalop-sora Aspidiotus*. Two others found in surprisingly large amounts were the Broom-rust of Balsam Fir due to *Melampsorella Caryophyllacearum*, and the Blueberry Rust due to *Calypsotheca Goeppertiana*. Stunted trees with hundreds of brooms were seen in Cape Breton, and the latter rust approached economic importance in parts of Guysboro Co.

Turning to other crown diseases of Conifers attention should be called to several. These included various needle cast diseases caused by species of *Lophodermium* and its allies. They have been turned over to Mr. G. D. Darker for identification. A curious *yellowing of the foliage of White Spruce and *Balsam Fir, a chlorosis of unknown cause but of curious interest, was encountered more than once in the western part of the province. A needle blight of Balsam caused by **Acanthostigma parasiticum* was abundant at Beaver Bank. "Red branch" of Balsam is common in places, very striking because of the totally red branches on otherwise green trees. This is generally caused by winter frost following the gnawing of bark by beetles (*Monohamus*), but a great deal proves to result from a girdling fungus, **Valsa Friesii*. Brooms caused by the dwarf Mistletoe, *Arceuthobium pusillum* are not uncommon on Black and *Red Spruces.

Standing out as perhaps most interesting of all is a widespread condition of Balsam Fir, involving practically all of the trees of entire stands, what I would designate for want of a better term as *"Gout." The trees are stunted, the trunks taper rapidly and never reach normal height, the joints are very much swollen and the twigs in general are thickened and tend to be deflexed. My attention was called to it par-

ticularly by Mr. Schierbeck who has been observing it for several years past.

The trunk diseases of Balsam Fir and the Spruces have an important bearing on questions of fire protection, cutting cycles, sanitation, and utilization. Balsam was found to be affected with **Poria subacida*, **Polyporus balsameus*, **Polyporus Schweinitzii*, and **Stereum sanguinolentum*, and Spruce by **Stereum sanguinolentum*, *Trametes Pini*, and others not determined. That a much greater use could be made of the large quantities of wood affected with pecky heart rot (caused by *Trametes Pini*), and red rot (caused by *Stereum sanguinolentum*) is reasonably certain. These and other trunk diseases will also be more and more brought under control with improved methods of management.

Coniferous seedlings in the Provincial Forest Nursery have suffered severely from "heaving" and damping-off. Both of these troubles are amenable to correction, and doubtless steps will be taken to overcome them.

As for the diseases of the hardwoods perhaps the two outstanding ones are the Willow blight, and the bark disease of Beech. An examination of the latter has already been made by the Federal Entomological Branch, and the latter by Drs. G. P. Clinton and F. A. McCormick of the Connecticut Agricultural Experiment Station at New Haven. Dr. Clinton and his associate report that the cause is a fungus, *Fusicladium saliciperdum*, and that it can be effectively controlled by repeated spraying in the spring, four or five times from the period of bud swelling to the final expanding of the leaves, with Bordeaux mixture. They are continuing their investigations, the results of which are awaited with interest.

As a feature apparently not so far noticed is the fact that the **White Poplar* (*Populus alba*) seems to be susceptible to the same disease. I saw repeated instances of it in various parts of the province. A similar disease was also noted on **Carolina poplar*, but this appears to result from the attacks of an allied species of fungus.

Finally, a yellow spotting of Birch leaves (*Betula populifolia*), by **Exoascus flavus* and a bark canker of the Aspen (*Populus tremuloides*) caused by **Hypoxylon pruinaum* constitute new records. The latter was first noted in some improvement thinnings where it was killing trees outright, but it was subsequently found several times elsewhere. It is important that acquaintance should be made with this disease of the Aspen and the Broad-toothed Poplar, and that care be taken to remove and burn affected trees from areas devoted to improvement operations. "Hypoxylon canker" is an insidious disease, easily overlooked, that works quickly and fatally in trees of all ages. Stands are known in which the mortality from this disease has been as great as seventy per centum.



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