

ANNOTATED CHECKLIST OF TREE AND SHRUB DISEASES

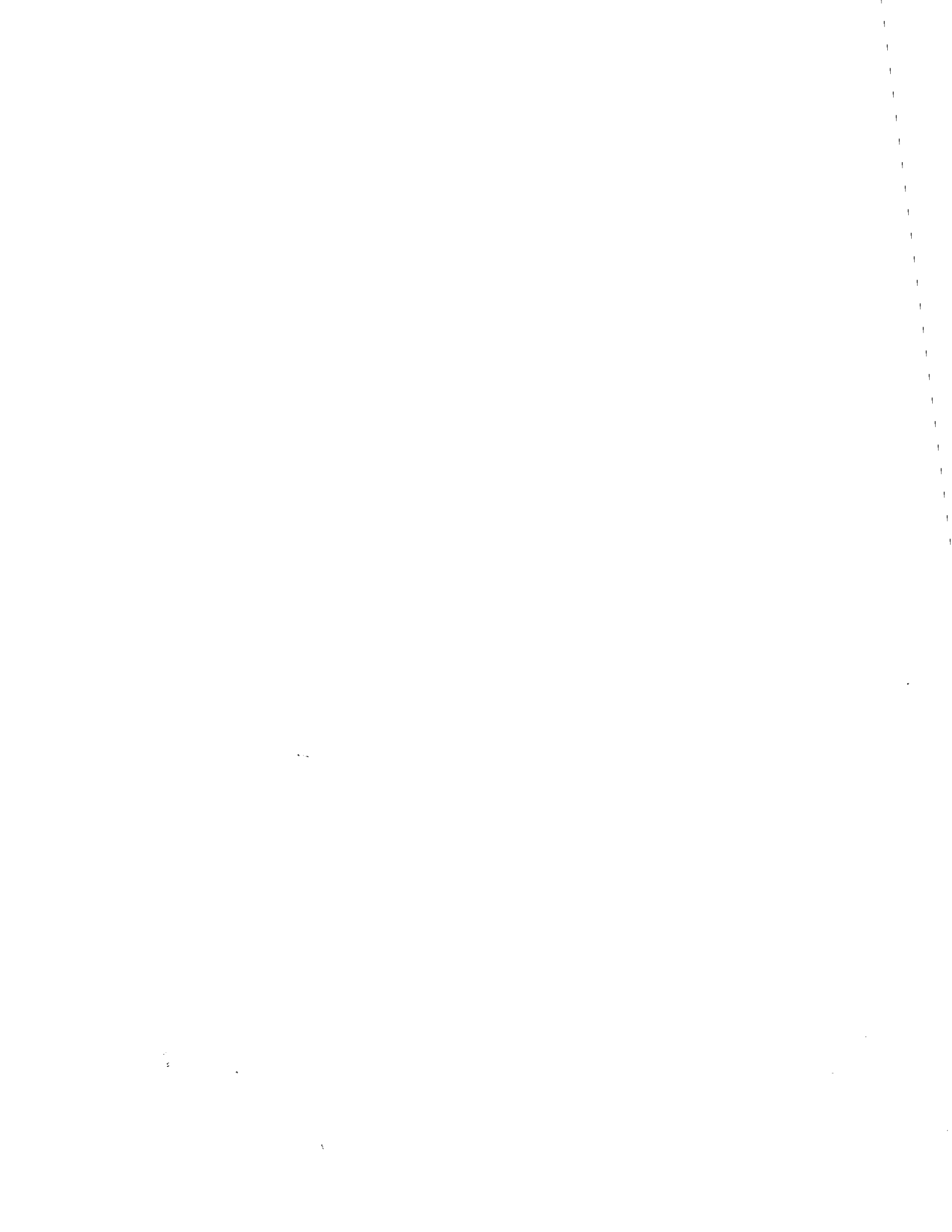
IN THE PRAIRIE PROVINCES

BY

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ABSTRACT

The major pathogens and microorganisms associated with diseases of trees and shrubs in the prairie provinces are listed under host genera and further classified according to the affected part of the tree (leaves, stems, or fruit). Simple identification criteria are presented for most entries.

RESUME

Les principaux microbes pathogènes et microorganismes associés aux maladies des arbres et arbustes dans les provinces des prairies sont énumérés sous les noms de leurs hôtes. Ils sont ensuite classés selon la partie de l'arbre qu'ils atteignent (feuilles, branches ou fruits). On donne, pour la plupart des microbes, des critères d'identification simples.

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INTRODUCTION

In this checklist the major pathogens and microorganisms associated with diseases of trees and shrubs in the prairie provinces are listed under host genera, and further classified according to the affected part of the tree (leaves, stems, or fruit). Root rot and decay are listed separately. Most entries give (1) the accepted common name(s) of the disease or organism, enclosed in quotation marks ("silver leaf," "yellow witches' broom rusts," "coral spot"), (2) common categories of diseases caused by the organism (leaf spot, canker, leaf rust), and (3) simple identification criteria.

Most of the information has been obtained from data and samples accumulated during many years of forest disease surveys carried out by the Northern Forest Research Centre, but some has been compiled from published sources. The taxonomy and nomenclature of several groups of fungi, including tree pathogens, have been revised or are in the process of major change, but no attempt has been made here to include the most current revisions. I intend to revise and enlarge this checklist with the most up-to-date information in a few years. In the interim, this should be useful because there is nothing comparable dealing with tree and shrub diseases of the prairie provinces.

At the end of the checklist are a host index for determining scientific names from common names and a list of selected references.

ABIES

A. balsamea (L.) Mill.; balsam fir

A. lasiocarpa (Hook) Nutt.; alpine fir, subalpine fir

On needles:

Epipolaeum abietis (Dearn.) Shoemaker (≡ Dimerosporium abietis Dearn.); snow-blight; perithecia hypophyllous, clustered on a radiating superficial mycelium, ascospore hyaline to light brown, one septate at middle.

Herpotrichia juniperi (Duby) Petr. (= Herpotrichia nigra Hartig); snow mold, brown felt blight; dark brown mat of mycelium develops on foliage under the snow, ascospores four- or five-celled, dark brown, common in high elevations.

Hyalospora aspidiotus (Magn.) Magn.; needle rust (0,I); spermogonia conspicuous, aecia maturing in spring on 2-year-old needles, short, cylindric, aeciospores yellow; II, III on Gymnocarpium dryopteris (L.) Newm. (oak fern).

Isthmiella abietis (Dearn.) Darker, (≡ Bifusella abietis Dearn.); needle cast; pycnidia on the upper surface of the needles and form two lines, eight bifusiform ascospores in an ascus.

Isthmiella quadrispora Ziller; needle cast; pycnidia lacking, four bifusiform ascospores in an ascus.

Lirula abietis-concoloris (Mayr ex Dearn) Darker, (≡ Hypodermella abietis-concoloris Mayr ex Dearn.); needle cast; black hysterothecia nervisequious.

Lirula mirabilis (Darker) Darker, (\equiv Hypodermella mirabilis Darker);

needle cast; dark reddish brown hysterothecia hypophyllous along central vein.

Lirula nervata (Darker) Darker, (\equiv Hypodermella nervata Darker);

needle cast; dark brownish black hysterothecia hypophyllous along central vein.

Lophomerum autumnale (Darker) Magasi (\equiv Lophodermium autumnale Darker);

needle cast, ascospores multiseptate.

Melampsora abieti-capraearum Tub.; needle rust, (0, I); aecia without peridermia; II, III on leaves of Salix spp. (willow), considered as a race of Melampsora epitea.

Melampsorella caryophyllacearum Schroet.; "yellow witches' broom rust" (0, I); II, III on leaves of Cerastium spp. (mouse-ear chickweed), and Stellaria spp. (chickweed).

Nothophacidium abietinellum (Dearn.) Reid & Cain; needle fungus, snow blight.

Phacidium abietis (Dearn.) Reid & Cain; needle fungus, snow blight.

Phaeocryptopus nudus (Pk.) Petr.; small spherical black fruiting bodies on the surface of needles.

Pucciniastrum epilobii Otth, needle rust, (0, I); aeciospores orange, mature in July on current year's needles and finish producing spores by August; II, III on leaves of Epilobium spp. (fireweed).

Puccinastrum goeppertianum (Kuehn) Kleb.; needle rust, (0, I); aeciospores orange; "western form" matures in late summer to fall on the current year's needles, overwinters, and sporulates again in early summer on the second year's needle; III on stem of Vaccinium spp. causes hypertrophy of stem and witches' broom.

Rhizosphaera pini (Cda.) Maubl.; needle blight.

Sarcotrochila balsameae (J.J. Davis) Korf, (\equiv Phacidium balsameae J.J. Davis); snow blight.

Sarcotrochila piniperda (Rehm) Korf; snow blight.

Uredinopsis phegopteridis Arth.; needle rust (0, I); aeciospores hyaline; mature on the current year's needle in summer; II, III on leaves of Gymnocarpium dryopteris (L.) Hewm. (oak fern).

On stems:

Aleurodiscus amorphus (Pers ex Fr.) Schroet; on dead bark and twigs, disc-like fruiting bodies, orange buff to rosaceous buff.

Ascocalyx abietis Naum; associated with dieback of lower branches.

Cenangium ferruginosum Fr. ex Fr., (\equiv Cenangium abietis (Pers.) Rehm.); cup fungus; causes twig blight or on dead stem; brownish apothecia with no hairs.

Lachnellula agassizii (Berk. & Curt.) Dennis, (\equiv Dasyscypha agassizii (Berk. & Curt.) Sacc.); small cup fungus with white peripheral hairs on dead stems; also on other conifers.

Lachnellula arida (Phill.) Dennis, (\equiv Dasyscypha arida (Phill.) Sacc.);

small cup fungus with brown peripheral hairs on dead stems; also on other conifers.

Scleroderris abieticola Zeller & Goodding; dieback, black cup fungus.

Thyronectria balsamea (Cke. & Pk.) Seeler.

(\equiv Scoleconectria balsamea (Cke. & Pk.) Seaver); associated with canker and dieback.

Tympanis truncatula (Pers. ex Fr.) Rehm; small black cup fungus.

Root rot and decay:

Armillariella mellea (Vahl ex Fr.) Karst., (\equiv Armillaria mella (Vahl

ex Fr.) Kummer); "Armillaria root rot", "shoestring root rot"; causes spongy root and butt rot; white mycelial fans present under bark, black shoestringlike rhizomorphs often present, sporophores honey-colored mushrooms, fine brown scales on top, stipes have annulus; "honey mushroom" edible.

Coniophora puteana (Schum. ex Fr.) Karst.; causes brown cubical rot; decayed

wood becomes uniformly cubical, purplish brown to dark or light brown; sporophores flat and crustlike, olive or light brown in the center and white toward the margins; important slash fungus.

Corticium galactinum (Fr.) Burt; white spongy rot.

Corticium pini-canadensis (Schw.) Jacks. & Rogers.

Echinodontium tinctorium (Ell. & Ev.) Ell. & Ev., (\equiv Fomes tinctorium

Ell. & Ev.); "Indian paint fungus"; brown stringy trunk rot with red streaks throughout sporophores; hoof-shaped, upper surface blackish and cracked, lower surface toothed, context brick red.

Fomes pini (Brot. ex Fr.) Karst.; "red belt fungus"; red ring rot, red scale, pocky rot; sporophores shelving, upper side dark brown, concentrically furrowed; underside yellow-brown, context yellow-brown.

Fomes pinicola (Sw. ex Fr.) Cke.; crumbly rot; sporophores large, perennial, flat to hoof-shaped conks, margin of the sporophores often reddish brown, upper surface smooth, crusty, gray to black, lower surface white with small round pores, context corky, buff colored.

Haematostereum sanguinolentum (Alb. & Schw. ex Fr.) Pouzar, (\equiv Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr.); "bleeding fungus"; red heart rot; sporophores thin, annual, leathery conks, usually less than 5 cm, upper surface silky, olive to gray with concentric bands, lower surface smooth without pores; reddish fluid oozes from lower surface when wounded.

Lenzites saepiaria (Wulf. ex Fr.) Fr.; brown pocket sap rot; sporophores small, annual, shelving, upper surface velvety, yellowish red to dark reddish brown weathering to gray, lower surface yellow brown to dark brown with thick gills having occasional cross connections; similar to Trametes odorata but T. odorata has tubes rather than gills.

Peniophora pithya (Pers.) J. Eriks.

Pholiota alnicola (Fr.) Sing. (\equiv Flammula alnicola (Fr.) Kummer).

Polyporus abietinus Dicks. ex Fr.; white pocket rot, pitted sap-rot; sporophores annual and small, thin and shelving to resupinate, upper surface gray with hairs, lower surface purplish becoming brownish purple to brown when old; "purple conk".

Polyporus balsameus Pk.; brown cubical rot.

Polyporus fibrillosus Karst.; brown spire rot; sporophores shelving, thin brownish red or orange up to 10 cm wide.

Polyporus guttulatus Pk.; causes brown cubical rot.

Polyporus schweinitzii Fr.; brown cubical rot, red-brown butt rot; sporophores with or without central stalk, upper surface velvety, dark reddish brown, concentrically zoned with yellowish margin, lower surface dirty yellow-green when fresh, dark red-brown when bruised and when old, angular large pores.

Serpula himantioides (Fr.) Karst., (≡Merulius himantioides Fr.); brown cubical butt rot.

Stereum chailletii (Pers. ex Fr.) Fr., (≡Amylostereum chailletii (Pers. ex Fr.) Boid.); white stringy rot.

Trametes odorata (Wulf. ex Fr.) Fr.; brown cubical pocket rot; sporophores similar to Lenzites saepiaria except that lower surface of sporophores is composed of tubes rather than gills.

ACER

A. glabrum Torr. var. douglasii (Hook.) Dipp.; Rocky Mountain

maple, Douglas maple.

A. negundo L.; Manitoba maple, box-elder.

A. spicatum Lam.; mountain maple.

On leaves:

Cristulariella pyramidalis Waterman & Marshall; concentric-zoned

bull's-eye spot; conspicuous pyramid-shaped conidiophores

produced on stalks.

Gloeosporium apocryptum Ell. & Ev.; anthracnose, large leaf spot,

hyaline one-celled spores on cushion-shaped acervuli.

Phleospora aceris (Lib.) Sacc. (≡ Septoria aceris (Lib.) Berk. & Br.);

small reddish tan leaf spot; hyaline multicelled filiform

conidia in dark pycnidia.

Phyllosticta minima (Berk. & Curt.) Underw. & Earle; leaf spot;

conidia hyaline, one-celled (5-7 x 2 μ), in black pycnidia.

Phyllosticta negundiris Sacc. & Speg.; leaf spot; conidia hyaline,

one-celled (8-9 x 3-4 μ), on black pycnidia.

Piggotia negundinis Ell. & Dearn.; leaf spot; conidia dark, one-celled,

in flattened pycnidia.

Rhytisma acerinum (Pers.) Fr.; "tar spot"; black shiny stroma.

Rhytisma punctatum (Pers.) Fr.; "speckled tar spot"; black stroma smaller and more scattered than R. acerinum.

Septoria negundinis Ell. & Er.; small discrete reddish tan leaf spot.

Uncinula circinata Cke. & Pk.; powdery mildew.

On stems:

Cytospora annulata Ell. & Ev.; on dead branches.

Cytodiplospora aceris Oud.

Dothidea sambuci Fr.; dieback; black cushionlike stromata with numerous small ascogenous cavities; ascospores light brown, two-celled with the lower cell smaller than the upper.

Hypocrea rufa (Pers.) Fr.; on dead stems; stroma chestnut brown to light reddish brown, convex or cushion-shaped, up to 10 mm in diameter, dotted with ostioles; 16 globose hyaline ascospores in an ascus.

Lophiostoma quadrinucleatum Karst.; pseudothecia flask-shaped, black, immersed with short erumpent necks; ascospores brown, fusiform, several celled, 22-24 x 7-8 μ .

Lophiostoma triseplatum Pk.; ascospores brown, fusiform usually four-celled, 15-22 x 4-7-8 μ .

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on them.

Otthia hypoxylon (Ell. & Er.) Shear; pseudothecia small, black, clustered, with short stout necks; ascospores dark brown, two-celled, elliptical.

Phoma fumosa Ell. & Ev.; conidia hyaline, one-celled, in black pycnidia.

Prosthecium stylosporium (Ell. & Ev.) Wehm.

Schizoxylon compositum Ell. & Ev.; small dark cup fungus; ascospores threadlike, multiseptate.

Sphaeropsis albescens Ell. & Ev.; dieback; conidia dark, ovoid, one-celled, in black pycnidia.

Stigmina negundinis (Berk. & Curt.) M.B. Ellis; twig blight, canker; conidia pale brown, three-celled.

Tubercularia ulmea Carter; on dead twigs.

Root rot and decay:

Daedalea unicolor Fr.; white spongy rot; sporophores thin, shelving, less than 10 cm wide, upper surface gray, very hairy, often greenish because of algae, lower surface whitish with mazelike pores.

Fomes connatus. (Weinm.) Gill.; white spongy rot.

Fomes scutellatus (Schw.) Cke.; on dead branches.

Pholiota albocrenulata (Pk.) Sacc.; brown rot; sporophores white-gilled mushrooms, 2.5-8 cm in diameter, upper surface reddish brown, glutinous, stalk dark brown.

Pleurotus elongatipes Pk.

Pleurotus ulmarius (Bull. ex Fr.) Kummer; white spongy rot; sporophores whitish, tough, up to 12 cm wide, off-centred stalks.

Polyporus elegans Bull. ex Fr.

Polyporus gilvus (Schw.) Fr.

Polyporus tulipiferae (Schw.) Overh.; white spongy rot.

Poria ferruginosa (Schrad. ex Fr.) Karst.; white spongy rot.

Stereum cinerascens (Schw.) Masee (=Lloydella cinerascens (Schw.) Bres.)

Trametes hispida Bagl.; white ring rot; yellowish white rot flecked with tiny black spots; sporophores 15 to 30 cm wide, upper surface rusty or red-brown, very hairy to velvety, lower surface reddish brown, large pores.

ALNUS

A. crispa (Ait.) Pursh; green alder.

A rugosa (Du Roi) Spreng.; speckled alder.

A. tenuifolia Nutt.; mountain alder.

On leaves:

Phyllactinia guttata (Fr.) Lév.; powdery mildew.

Septoria alnifolia Ell. & Ev.; leaf spot; conidia hyaline, several-celled, 40-66 x 2-3 μ

Taphrina occidentalis Ray; leaf blister.

Taphrina robinsoniana Giesenh; catkin blister.

On stems:

Chlorosplenium aeruginosum (Oed. ex S. F. Gray) de Not.

(= Chlorociboria aeruginosa (Oed.) Seaver); small yellowish cup fungus; ascospores hyaline, fusiform, one-celled.

Cryptodiaporthe oxystoma (Rehm) Urban; perithecia black, below the surface of the bark, ascospores hyaline, narrowly fusiform, two-celled.

Cryptospora femoralis (Pk.) Sacc.; perithecia embedded in bark in small clusters; ascospores hyaline, cylindrical.

Daldinia concentrica (Bolt.) de Not.; on dead stems; stroma hemispherical up to 5 cm in diameter, reddish brown to black, dark concentric

zones in cross section of stroma.

Diatrype disciformis (Hoffm. ex Fr.) Fr.; stroma small, round, flat-topped; whitish flesh with black perithecia on the surface; ascospores slightly brown, sausage-shaped.

Didymosphaeria oregonensis Goodding; stem canker; pseudothecia dark, immersed; ascospores brown, two-celled.

Encoelia furfuracea (Roth ex Fr.) Karst.; apothecia erumpent, in small clusters cup-shaped, covered with rusty brown cells, disc up to 1.5 cm in diameter; ascospores hyaline, one-celled cylindrical.

Exidia glandulosa Fr.; "witches butter"; fruiting body gelatinous olive-brown, thin, dotted with brown dots; a jelly fungus.

Hypoxyton fuscum (Pers.) Fr.; on dead branches, stroma hemispherical or depressed, 2-3 mm in diameter sometimes confluent, brownish purple or light purple-gray; ascospores pale, 12-15 x 5-8 μ .

Hypoxyton mammatum (Wahl.) J.H. Miller (= Hypoxyton pruinaum (Klotz.) Cke.); "hypoxyton canker"; stroma discrete, 2-5 mm in diameter, usually effused to form larger clusters; surface first white, later blackish; ascospores dark brown, 20-33 x 9-12 μ ; black hyphal pegs (imperfect state) characteristic.

Hypoxyton rubiginosum (Pers ex Fr.) Fr.; stroma flattened, bright

brick-red to purplish brown; ascospores light to dark brown, 9-13 x 4-6 μ .

Melanconis alni Tul. var. marginalis (Pk.) Wehm.; on dead branches; black perithecia in stromatic discs; ascospores hyaline, two-celled, 13-22 x 3.5-7 μ with or without minute appendages.

Melanconis thelebola (Fr.) Sacc.; on dead branches; black perithecia in stromatic discs; ascospores hyaline, two-celled, 24-42 x 8-10 μ with long slender appendages at each end.

Nectria cinnabarina (Tode ex Fr.) Fr., (stat. consid. Tubercularia vulgaris Tode); "coral spot"; conspicuous pink to orange-red cushions (imperfect state).

Phragmotrichum karstenii Sutton & Pirozynski; on twigs; enclosed or open black fruiting bodies; conidia dark, muriform, 17-32 x 5.5-8 μ .

Tympanis alnea (Pers.) Fr.; on dead branches; black cup fungus; apothecia in dense clusters.

Valsa leucostoma (Pers. ex Fr.) Fr. (stat. conid. Cytospora leucostoma (Pers.) Sacc.); "Cytospora canker".

Valsella furva (Karst.) Sacc.; on dead branches; black apothecia embedded in cushion-shaped, light brown stroma; ascospores hyaline, one-celled, numerous in ascus.

Root rot and decay:

Coniophora puteana (Schum. ex Fr.) Karst.; brown cubical rot; occasional on this host.

Corticium ochraceum Fr.

Daedalea unicolor Bull. ex Fr.; white spongy rot; "small mottled rot"; sporophores thin, shelving, less than 10 cm wide, upper surface gray, very hairy, often greenish because of algae, lower surface whitish, mazelike pores.

Favolus alveolaris (DC. ex Fr.) Quélet.; on dead branches; sporophores reniform, more or less stipitate up to 10 cm in width, upper surface reddish yellow to pale brick red, lower surface white to yellowish, pores angular, hexagonal, usually in radiating lines.

Fomes igniarius (L. ex Fr.) Kickx, white trunk rot; "false tinder fungus"; decay zones usually surrounded by fine black lines; sporophores more or less hoof-shaped, upper surface blackish and later cracked and cinderlike; interior of conk dark brown, lower surface dirty white to brownish, small mouths of circular tubes give velvety appearance; one of the principal causes of decay losses in hardwoods.

Lenzites saepiaria (Wulf. ex Fr.) Fr.; brown pocket sap rot; sporophores small, annual, shelving; upper surface velvety, yellowish red to dark reddish brown weathering to gray; lower surface yellow brown to dark brown with thick gills having occasional cross connections.

Peniophora aurantiaca(Bres.) Höhn. & Litsch.

Peniophora erikssonii Boid.

Plicatura nivea (Fr.) Karst.

(= Merulius niveus Fr.).

Polyporus cinnabarius Jacq. ex Fr.

Polyporus elegans Bull. ex Fr.

Polyporus picipes Fr.; white stringy rot; sporophores up to 20 cm wide, stipitate, thin, circular, upper surface chestnut brown becoming dark with age, lower surface white with tiny pores.

Polyporus pubescens Schum. ex Fr.

Polyporus tulipiferae (Schw.) Overh., white spongy rot.

Polyporus varius Fr.

Poria versipora (Pers.) Rom.

Schizophyllum commune Fr.; white rot; "superficial sap rot"; sporophores fan-shaped, 1.5 to 5 cm wide, thin, upper surface downy to gray, hairy, lower surface grayish brown with forked gills, gills split along the ridges.

Trametes odora (Sommerf. ex Fr.) Fr.

Troglia crispa Fr.; white rot; sporophores small, 1-2 cm wide, tan or brown, tough shelving, often oyster shaped, gills crisped, irregularly veinlike.

AMELANCHIER

A. alnifolia (Nutt.) Nutt.; saskatoon, western serviceberry.

On leaves:

Apiosporina collinsii (Schw.) Hoehn.; conspicuous black fungal growth covers the lower surface of the leaves and also causes slight witches' broom; infected leaves stay longer in the fall than normal leaves.

Erysiphe polygoni DC. ex Mérat; powdery mildew.

Fabraea maculata Atk. (stat. conid. Entomosporium maculatum Lév.); leaf spot; conidia produced on cushionlike acervuli, four-celled arranged in cross shape, three cells with one slender bristle on each cell.

Gymnosporangium clavariiforme (Pers.) DC.; "clavariiform juniper rust"; 0, I on leaves, fruit and petioles; causes hypertrophy of vascular tissue, mature by mid-July; I spores light brown, III on stem of Juniperus communis producing fusiform swellings, brownish-yellow.

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk.; "quince rust"; 0, I. mostly on fruit but also on leaves, petioles and stems, mature by mid-July; I spores bright orange, III on Juniperus communis, cause fusiform swellings, orange brown to brick-red.

Gymnosporangium nelsonii Arth.; 0, I mostly on leaves, mature late July to August; I spores brown, III on Juniperus horizontalis and J. scopulorum, producing small globose galls, up to 2.5 cm in diameter, dark brown.

Lophodermium hysterioides (Pers.) Sacc.

Lophodermium tumidum (Fr.) Rehm.

Monilinia amelanchieris Honey (stat. conid. Monilia amelanchieris Reade); blossom blight and fruit rot.

Phyllosticta innumerabilis Pk.; brown leaf spot; black pycnidia covers underside of spots, conidia hyaline, one-celled
6-8 x 1.5-2 μ

On stems:

Conoplea sphaerica (Pers.) Pers.

Dermea bicolor (Ell.) Groves; black cup fungus.

Massaria conspurcata (Wallr.) Sacc.; large pseudothecia immersed in bark, ascospores brown, four-celled, large, 70-85 x 14-18, surrounded by thick gelatinous coat.

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on stem.

Sphaeronaema pruinsum Pk.; black pycnidia with long beaks, conidia hyaline, ovoid.

Root rot and decay:

Daedalea unicolor Fr.; white spongy rot; sporophores thin, shelving, less than 10 cm wide; upper surface gray, very hairy, often greenish because of algae; underside whitish with mazelike pores.

Fomes scutellatus (Schw.) Cke.; sporophores small, up to 2.5 cm wide, typically attached by the vertex and pendant, first whitish, soon entirely dark brown to black; pore surface whitish.

BETULA

- B. glandulosa Michx.; dwarf birch.
B. neoalaskana Sarg.; Alaska birch.
B. occidentalis Hook.; water birch.
B. papyrifera Marsh.; white birch, paper birch.

On leaves:

Atopospora betulina (Fr.) Petr.

(≡Euryachora betulina (Fr.) Schroet.); leaf spot; small black shiny stroma scattered on the surface of leaves; conidia hyaline, two-celled.

Leptothyrium medium Cke.

Melampsoridium betulinum Kleb.; leaf rust (II, III); 0,I on needles of Larix in Europe but has not been found in North America.

Phyllactinia guttata (Fr.) Lév.; powdery mildew.

Septoria betulae (Lib.) West; leaf spot.

Taphrina alnea (Pers.) Fr.

Taphrina nana Johans.; leaf blister; causes conspicuous witches' broom.

On stems:

Asterosporium hoffmannii Kunze

Cryptospora alnicola Hoehn.

Cryptosporium betulinum Jaap.

Daldinia concentrica (Bolt. ex Fr.) Ces. & de Not.; on dead stems;
stroma hemispherical, up to 5 cm in diameter, reddish black
to black, dark concentric zones in cross section of stroma.

Diaporthe beckhausii de Not.

Eutypella angulosa (Nits.) Sacc.

Godronia seriata (Fr.) Seaver; small black cup fungus.

Hemimyriangium betulae Reid & Priozynski.

Hypoxyton mammatum (Wahl.) Miller (=H. pruinatum (Klotsch) Cke.;
"Hypoxyton canker").

Libertella betulina Desm.

Melanconis stilbostoma (Fr.) Tul.; circular clusters of black
perithecia on whitish stromatic disc; ascospores hyaline,
two-celled, constricted at the septum, 12-20 x 5-8 μ .

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris
Tode); "coral spot"; canker and dieback; conspicuous
pink to orange-red cushions (imperfect state) on stem.

Steganosporium muricatum Bon.; acervuli dark, cushion-shaped; conidia
dark muriform.

Tympanis alnea (Pers.) Fr.

Root rot and decay:

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum purpureum
(Pers. ex Fr.) Fr.; "silver leaf".

Corticium centrifugum sensu Bres.

Daedalea unicolor Bull. ex Fr.; white spongy rot; sporophores thin,
shelving, less than 10 cm wide, upper surface gray, very hairy,
often greenish because of algae; lower surface whitish with
mazelike pores.

Fomes fomentarius (L. ex Fr.) Kickx; "tinder conk", white mottled
rot, sporophores similar to those of F. igniarius especially when
young, but upper surface is usually gray rather than becoming
black and cracked; inside of sporophore dark brown.

Fomes igniarius (L. ex Fr.) Kickx; "false tinder fungus"; white trunk
rot; decay zones usually surrounded by fine black lines, sporophores
more or less hoof-shaped, upper surface blackish and later
cracked and cinderlike; interior of conk dark brown, lower
surface dirty white to brownish; principal cause of decay losses
in hardwoods.

Fomes pinicola (Sw. ex Fr.) Cke.; "red belt fungus"; crumbly rot;
large hoof-shaped conks, margin of the sporophores often
reddish brown.

Ganoderma applanatum (Pers. ex Wallr.) Pat. (\equiv Fomes applanatus
(Pers. ex Wallr.) Gill.); white mottled rot, white spongy rot;
sporophores perennial, hard, woody, shelflike, up to 70 cm in
width; upper surface smooth, zoned, gray or grayish brown;

underside white when fresh, brown when bruised, and yellow-brown when old.

Hericiium laciniatum Leers ex Banker.

Inonotus obliquus (Pers. ex Fr.) Pilat.

Lenzites betulina (L. ex Fr.) Fr.

Polyporus betulina Bull. ex Fr.; brown rot of sapwood and heartwood; cubically cracked sporophores, shelving, thick, soft, with a short lateral stalk, upper surface dirty white to gray; lower surface white, becoming brownish with age.

Polyporus elegans Bull. ex Fr., white rot.

Polyporus hirsutus Wulf. ex Fr.; "hairy conk"; soft white spongy rot; sporophores similar to those of P. versicolor but without multicolored bands.

Polyporus pargamenus Fr.; pitted sap-rot; sporophores thin, shelving, less than 4 cm wide; upper surface whitish, underside deep purple.

Polyporus pubescens Fr.

Polyporus tulipiferae (Schw.) Overh.; white spongy rot.

Polyporus velutinus Fr.

Polyporus versicolor L. ex Fr.; "rainbow conk"; soft white spongy sap rot; sporophores thin, lathery, shelving, up to 6 cm wide, surface velvety with multicolored bands.

Poria obliqua (Pers. ex Fr.) Karst.; "cinder conk"; white trunk rot; sporophores black, cinderlike sterile conks. Fomes igniarius conks can be confused with this species.

Schizophyllum commune Fr.; white rot; sporophores fan-shaped, 1.5 to 5 cm wide, thin, upper surface hairy, lower surface grayish brown with forked gills with splits along the ridges.

Stereum complicatum (Fr.) Fr.

Stereum hirsutum (Willd. ex Fr.) S. Fr. Gray; white slash rot, mostly on dead wood; sporophores small, shelving; upper surface rusty brown, hairy; lower surface light brown, smooth.

Trametes hispida Bagl.; specked yellow rot; sporophores up to 40 cm wide, thick, rusty or reddish brown, upper surface very hairy or velvety, lower surface with large pores, red brown.

Trametes mollis (Sommerf.) Fr.

Trametes serialis Fr.; brown cubical rot, carbonaceous rot; sporophores mostly flat, white, mainly on conifers.

Trogia crispa Fr.; white rot; sporophores small, 1-2 cm wide, tan or brown, tough, shelving, often oyster-shaped, gills crisped, irregularly veinlike.

GANNA

C. arborescens Lamb.; caragana, Siberian pea-tree, introduced shelter belt species, native to Siberia and Manchuria.

leaves:

Fusarium solani (Mart.) App. & Wr.; crown rot or wilt.

Phyllosticta glarum Thum.; leaf spot; conidia hyaline, one-celled, ovoid, in small black pycnidia.

Septoria caraganae (Jacz.) Died.; leaf spot; conidia hyaline, filiform, several-celled, in black pycnidia, sometimes severe enough to cause significant damage.

On stems:

Camarosporium caraganae Karst.; dieback; conidia dark, muriform.

Cucurbitaria caraganae Karst.; dieback associated with Camarosporium caraganae.

Nectria cinnabarina (Tode & Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (Imperfect state) on dead stems.

Stictis pupula Fr. (= S. mollis Pers.); on branches; small cup fungus with broad white sterile margin, ascospores multicelled, elongated.

Root rot and decay:

Coniophora puteana (Schum. ex Fr.) Karst.; brown cubical rot; occasional
on this host.

Polyporus tulipiferae (Schw.) Overh.; white spongy rot.

CORNUS

C. alternifolia L. f.; alternate-leaved dogwood.

C. rugosa Lamb.; round-leaved, dogwood.

C. stolonifera Michx.; red osier.

On leaves:

Phyllactinia guttata (Fr.) Lév.; powdery mildew.

Ramularia stolonifera Ell.; leaf spot; conidia hyaline, two-celled, cylindrical, on simple conidiophores.

Septoria cornicola Desm.; leaf spot.

On stems:

Diaporthe eres Nits.

Didymosphaeria deplospora (Cke.) Rehm.

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on dead stems.

Myxosporium nitidum Berk. & Curt; dieback.

Myxosporium roumegueri (Sacc.) Sacc.; dieback.

Ostropa cinerea (Pers.) Fr.

Pestalotia corni Allesch.

Pezicula corni Petr. (stat. conid. Cryptosporiopsis cornina (Pk.) Petr. & Syd.

Pleospora laricina Rehm.

Valsa ambiens (Pers. ex Fr.) Fr. (stat. conid. Cytospora ambiens Sacc.); ascospores hyaline, 15-20 x 3-4 μ in flask-shaped perithecia.

Valsa cornina Pk.; ascospores hyaline, 14-19 x 3-4.

Valsa coronata (Hoffm. ex Fr.) Duby; ascospores hyaline, 6-8 x 1-1.5 μ .

CORYLUS

C. americana Walt.; American hazelnut.

C. cornuta Marsh. (C. rostrata Ait.); beaked hazelnut.

On leaves:

Gnomoniella coryli (Batsch ex Fr.) Sacc.; leaf spot.

Phyllactinia guttata (Fr.) Lév.; powdery mildew.

Septoria corylina Pk.; leaf spot.

On stems:

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on dead stems.

Valsa ambiens (Pers. ex Fr.) Fr. (stat. conid. Cytospora ambiens Sacc.)

COTONEASTER

C. acutifolia Turcz.; cotoneaster, introduced.

C. pyracantha (L.) Spach; firethorn, introduced.

On leaves:

Phyllosticta sanguinea Sacc.; leaf spot.

On stems:

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on dead stems.

On fruits:

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk.; "quince rust";
0, I on fruits, aeciospores bright orange-yellow; III on
Juniperus communis.

Root rot and decay:

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum purpureum
(Pers. ex Fr.) Fr.); causes "silver leaf"; superficial rot.

Polyporus tulipiferae (Schw.) Overh.; white spongy rot, associated with dieback.

CRATAEGUS

C. chrysoarpa Ashe; golden-fruited hawthorn.

C. douglasii Lindl.; black hawthorn

On leaves:

Gymnosporangium bethelii Kern; "Bethel's juniper rust"; 0,I mainly on leaves, also on petioles and fruit; causes orange-yellow spots; aeciospores chestnut-brown; III on Juniperus horizontalis and J. scopulorum.

Gymnosporangium clavariiforme (Pers.) DC.; "clavariform juniper rust"; 0,I mainly on fruits and stems and causes mummification of fruits; mature from mid-June to mid-July; aeciospores cinnamon-brown; III on Juniperus communis.

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk.; "quince rust"; 0,I mainly on fruit but also on leaves, petioles, and stems; mature by mid-July; aeciospores bright orange; III on Juniperus communis.

Podosphaera clandestina (Wallr. ex Fr.) Lév.; powdery mildew.

On stems:

Diatrype stigma (Hoffm. ex Fr.) Fr.; on dead stem, stroma cushion-shaped, purple-brown to black; ascospores pale brown, sausage-shaped, 6-10 x 2 μ .

Diatrypella quercina (Pers.) Nits.; on dead stems; stroma dark brown to black, cushion-shaped, ascospores pale brown, sausage-shaped, strongly curved, 8-13 x 2.5-3 μ .

Dictydiaethalium plumbeum (Schum.) Rost.; a myxomycetes
(slime mold).

Erwinia amylovora (Burr.) Winsl. et al.; "fire blight"; a bacterial
disease.

Fenestella phaeospora Sacc.; stroma cushion-like, blackish-brown,
immersed in bark; ascospores brown, composed of many small
irregular cells, cylindric, constricted in the middle,
30-60 x 11-28 μ , with a pointed hyaline cell protruding at each
end.

Schizoxylon compositum Ell. & Ev.; small dark cup fungus,
with broad sterile light margin; ascospores threadlike,
multiseptate.

Valsa ambiens (Pers. ex Fr.) Fr. (stat. conid. Cytospora ambiens
Sacc.); ascospores hyaline, 15-20 x 3-4 μ .

Valsa leucostoma (Pers.) Fr. (stat. conid. Cytospora leucostoma
(Pers.) Sacc.); "Cytospora canker".

Root rot and decay:

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum purpureum
(Pers. ex Fr.) Fr.), superficial rot, causes "silver leaf".

ELAEAGNUS

E. angustifolia L.; Russian olive, oleaster, introduced
species widely used for shelterbelts.

E. commutata Bernh.; wolf willow, silver-berry, silver buffalo
berry.

On leaves:

Cercospora manitobana J.J. Davis; leaf spot; conidiophores dark,
simple; conidia several-celled, 46-80 x 5-7 μ .

Phyllosticta argyrea Speg.; leaf spot; black pycnidia, conidia hyaline,
ovoid, one-celled.

Pseudomonas sp.; bacterial leaf spot.

Puccinia caricis-shepherdiae J.J. Davis; leaf rust, (0,I); II, III on
Carex spp. (sedges).

Puccinia coronata Cda.; leaf rust (0,I); II, III on grasses, including
wheat and barley.

Septoria elaeagni (Chev.) Desm.; leaf spot; pycnidia dark, conidia
hyaline, elongate, several-celled.

On stems:

Camarosporium elaeagnellum Fairm.; dieback; pycnidia black, erumpent,
conidia dark, ovoid, with several cross walls and a few longitudinal
oblique walls.

Cucurbitaria elongata (Fr.) Grev.; pseudothecia black, small,
clustered on a basal stroma; ascospores brown, cylindrical,
with transverse and longitudinal septa.

Tubercularia ulmea Carter.

Valsa sordida Nits. (stat. conid. Cytospora chrysosperma (Pers.) Fr.)

Root rot and decay:

Peniophora crenea (Bres.) Sacc. and Syd.

FRAXINUS

F. mandschurica Rupr., Manchurian ash, introduced.

F. nigra Marsh, black ash.

F. pennsylvanica Marsh. var. subintegerrima (Vahl.) Fern., green ash.

On leaves:

Apiognomonia errabunda (Rob.) Hoehn. (stat. conid. Gloeosporium); leaf spot; anthracnose.

Gloeosporium aridum Ell. & Holw.; anthracnose.

Mycosphaerella effigurata (Schw.) House (stat. conid. Cylindrosporium fraxini (Ell. & Kell.) Ell. & Ev.; Marssonina fraxini Ell. & Davis; Septoria besseyi Pk, stat. sperm. Piggotia fraxini Berk. & Curt.); leaf spot.

Mycosphaerella fraxinicola (Schw.) House (stat. conid. Phyllosticta viridis Ell. & Kell.); leaf spot.

Phyllactinia guttata (Fr.) Lév.; powdery mildew.

Puccinia sparganioides Ell. & Barth. (= P. peridermiospora Arth.);

0, I on leaves and stems, causes malformation of leaves, petioles and twigs; aeciospores orange-yellow, sometimes cause serious damage; II, III on cordgrass (Spartina spp.); not reported in Prairie provinces.

On stems:

Cytospora pruinosa Sacc.

Diplodia fraxini Fr.

Hendersonia fraxini Ell. & Barth.

Hysterographium fraxini (Pers. ex Fr.) de Not.

Lophiostoma triseptatum Pk.

Sphaeropsis fertilis Pk.

Sphaeropsis nubilosa Ell. & Barth.

Sporidesmium compositum Berk & Curt.

Valsa ambiens (Pers ex Fr.) Fr., (stat. conid. Cytospora ambiens Sacc.)

Valsa fraxinina Pk.

Valsa leucostoma (Pers.) Fr., (stat. conid. Cytospora leucostoma
(Pers.) Sacc.)

Valsa sordida Nits., (stat. conid. Cytospora chrysosperma Pers.
ex Fr.)

JUNIPERUS

J. communis L.; common juniper.

J. horizontalis Moench; creeping juniper.

J. scopulorum Sarg.; western juniper.

On needles:

Chloroscypha juniperina (Ell.) & (Seaver) (= Kriegerina juniperina (Ell.) Seaver); small grayish black cup fungus on dead needles.

Gymnosporangium cornutum Arth. ex Kern; "mountain ash-juniper rust"; (III), inconspicuous rust on needles of J. communis teliospores chocolate brown; 0, I on leaves of Sorbus spp. (mountain ash).

Gymnosporangium gaeumannii Zogg; "Gaeumann's juniper rust" (II, III); inconspicuous rust occurring only in high elevations in Jasper and Banff National Parks on needles of J. communis; 0, I unknown; superficially resembles G. cornutum but G. gaeumannii produces mostly urediniospores and few teliospores whereas only teliospores are produced by G. cornutum.

Herpotrichia juniperi (Duby) Petr. (= Herpotrichia nigra Hartig); snow mold; mat of interwoven brown hyphae covers affected branch, on all conifers.

Lophodermium juniperinum (Fr.) de Not; needle cast; shiny black elliptical hysterothecia on needles, about 1 mm long and 0.4 mm wide; ascospores one-celled, filliform.

Seynesiella juniperi (Desm.) Arn. (= Stigmatea juniperi (Desm.) Wint.); needle fungus; fruiting bodies broadly conical, shiny black and opaque 0.25 mm in diameter; ascospores clavate, two-celled.

Stigmina glomerulosa (Sacc.) Highes; needle fungus; stroma superficial, dark brown; conidia, yellow brown, 6-7 septate, cylindrical.

On stems:

Gymnosporangium bethelii Kern; "Bethel's juniper rust" (III); causes gall-like knots on stems, telia chestnut brown, tongue or wedge-shaped, on J. horizontalis and J. scopulorum; 0, I on leaves, petioles, and fruit of Crataegus spp. (hawthorn); aeciospores chestnut brown.

Gymnosporangium clavariiforme (Pers.) DC.; "clavariform juniper rust" (III); causes fusiform swellings on branches and occasionally witches' brooms but no symptoms from young infection; telia brownish yellow and cylindrical, on J. communis; 0, I on fruit and rarely stems and leaves of Amelanchier spp. (saskatoon), Crataegus spp. (hawthorn); aeciospores cinnamon brown.

Gymnosporangium clavipes (Cke. & Pk.) Cke. & Pk.; "quince rust" (III); causes fusiform swellings of twigs and branches; telia orange-brown to brick-red, cushion-shaped to hemispheric, on J. communis; 0, I on fruit and twigs of Amelanchier alnifolia (saskatoon), Crataegus spp. (hawthorn), Cotoneaster spp., and Malus spp. (apple), causing mummification of fruit and swelling of stems; aeciospores orange-yellow.

Gymnosporangium nelsonii Arth.; "Nelson's juniper rust". (III); causes woody globoid galls on branches of J. horizontalis and J. scopulorum, telia wedge- or tongue-shaped, dark brown; 0, I on leaves of Amelanchier alnifolia (saskatoon), causing yellow leaf spots;

aeciospores brown.

Gymnosporangium nidus-avis Thaxt.; "juniper broom rust" (III); causes witches' brooms on branches of J. horizontalis and J. scopulorum, telia cushion shaped to hemispheric, cinnamon to yellowish brown; 0, I mostly on leaves and sometimes fruit and twigs of Amelanchier alnifolia; aeciospores brown.

Gymnosporangium tremelloides Hartig; "common juniper gall rust" (III); causes woody globoid knots or galls on J. communis, telia chocolate-brown, flattened; 0, I on leaves of Sorbus spp. (mountain ash) causing orange-yellow leaf spots; aeciospores dark brown.

LARIX

L. laricina (Du Roi) K. Koch; tamarack.

L. lyallii Parl.; alpine larch, subalpine larch.

L. occidentalis Nutt.; western larch, western tamarack.

L. sibirica Ledeb.; Siberian larch

On needles:

Hypodermella laricis Tub.; needle cast; hysterothecia dull black, oblong to elliptical, epiphyllous; ascospores hyaline, one-celled, clavate.

Lophodermium laricinum Duby; needle cast; hysterothecia elliptical, shiny, black, scattered, amphigenous; ascospores filiform.

Melampsora medusae Thuem.; needle rust (0, I); aeciospores 16-21 x 19-26 μ with bilateral thickening of spore walls; II, III on leaves of Populus spp.

Melampsora occidentalis Jacks.; needle rust; (0, I) known only from inoculation experiments, main natural host is Pseudotsuga menziesii (Douglas fir); aeciospores 22-27 x 26-35 μ with bilateral thickening of spore walls; II, III on leaves of Populus spp.

Melampsora paradoxa Diet. & Holw. (= Melampsora bigelowii Thüm.); needle rust (0, I); aeciospores 15-22 x 18-27 μ , no bilateral thickening of spore walls; II, III on Salix spp., sometimes treated as a race of Melampsora epitea.

On stems:

Cytospora abietis Sacc.; stem fungus; on dead branches.

Dasyscyphus calycinus (Schum.) Fckl.; associated with dieback.

Lachnellula arida (Phill.) Dennis, (≡Dasyscypha arida (Phill.) Sacc.);
cup fungus; brown peripheral hairs and orange hymenical layers;
mostly on dead branches.

Retinocyclus abietis (Crouan) Groves & Wells; leader dieback, black
cup fungus.

Tympanis laricina (Fckl.) Sacc.; stem fungus, black cup fungus.

Root rot and decay:

Armillariella mellea (Vahl ex Fr.) Karst. (≡Armillaria mellea (Vahl
ex Fr.) Kummer); "Armillaria root rot", "shoestring root rot";
cause spongy root and butt rot; white mycelial fans present
between the bark and wood, black shoestringlike rhizomorphs often
present; sporophores honey-colored edible mushrooms, fine brown
scales on top, stipes have annulus, "honey mushroom".

Fomes officinalis (Vill. ex Fr.) Neuman (≡Fomes laricis Jacq. ex Murr.);
dark brown cubical rot; sporophores large (up to 60 cm wide),
hoof-shaped or pendulous, whitish; bitter taste, "quinine conk".

Fomes pini (Brot. ex Fr.) Karst.; "red belt fungus"; red ring rot,
red scale, pocky rot; sporophores shelving, upper surface dark brown
concentrically furrowed, lower surface yellow-brown, context yellow-
brown.

Haematostereum sanguinolentum (Alb. & Schw. ex Fr.) Pouzar, (≡Stereum
sanguinolentum (Alb. & Schw. ex Fr.) Fr.); "bleeding fungus";
red heart rot; sporophores thin, annual, leathery conks, usually less

than 5 cm; upper surface silky olive to gray with concentric bands, lower surface smooth without pores; reddish fluid oozes from lower surface when wounded.

Lenzites saepiaria (Wulf. ex Fr.) Fr.; brown pocket sap rot;

sporophores small, annual shelving conks, upper surface velvety, yellowish red to dark reddish brown weathering to gray, lower surface yellow brown to dark brown with thick gills having occasional cross connections.

Polyporus abietinus Dicks. ex Fr.; white pocket rot, pitted sap rot;

sporophores annual and small, thin and shelving to resupinate, upper surface gray with hairs, lower surface purplish with flesh becoming brownish purple to brown with age; "purple conk".

LEDUM

L. glandulosum Nutt.; glandular Labrador tea.

L. groenlandicum Oeder; common Labrador tea.

L. palustre L. var decumbens Ait.; northern Labrador tea.

On leaves:

Chrysomyxa ledi dBy., leaf rust; II, III on upper side of leaf;
several varieties are recognized according to hosts
and minor morphological variations; aeciospores 13.5-25.0 x 18-32 μ ;
0, I, needle rust on Picea spp.

Chrysomyxa ledicola Lagerh.; leaf rust; II, III on underside of leaf;
aeciospores 22-34 x 27-46 μ .; 0, I, needle rust on Picea spp.

Chrysomyxa woroninii Tranz.; leaf rust; causes witches' broom; 0, I
on Picea spp. (spruce shoot rust).

Exobasidium vaccinii Wor.; swollen pustules on leaves.

Lophodermium sphaerioides (Fr.) Duby; on older leaves, shiny black
hysterothecia on whitish discolored zones.

LONICERA

L. dioica L. var. glaucescens (Rydb.) Butters; twining honeysuckle.

L. hirsuta Eaton; hairy honeysuckle.

L. involucrata (Richards.) Banks; bracted honeysuckle

L. oblongifolia (Goldie) Hook; swamp-fly honeysuckle.

L. tartarica L.; Tartarian honeysuckle.

L. utahensis S. Wats.; red twin-berry.

L. villosa (Michx.) R. & S.; fly honeysuckle.

On leaves:

Cercospora antipus Ell. & Holw.; leaf spot.

Herpobasidium deformans Gould. (stat. conid. Glomerularia
lonicerae (Pk.) Dearn. & House).

Microsphaera penicillata (Wallr. ex Fr.) Lév. var. lonicerae (Fr.)
W.B. Cke.; powdery mildew.

On stems:

Ceriospora manitobiensis Dearn. & Bisby

Diplodina tatarica Allesch.; twig blight.

Sphaeropsis zonata Pers.

MALUS

X M. adstringens Zobel; crabapple.

M. ioensis (Wood) Britt.; prairie crabapple.

M. pumila Mill.; apple.

On leaves:

Alternaria mali Roberts.; leaf spot.

Phyllosticta limitata Pk.; leaf spot.

Podosphaera clandestina (Wallr. ex Fr.) Lév.; powdery mildew.

On fruits:

Botrytis cinerea Pers.; gray mold.

Penicillium expansum Lk; blue-mold rot.

Sclerotinia fructicola (Wint.) Rehm. (= Monilinia fructicola (Wint.) Honey);
causes brown rot of fruits and blossoms, and twig blight.

On stems:

Botryosphaeria obtusa (Schw.) Shoem. (stat. conid. Sphaeropsis malorum
Berk. ex Pk.); black rot; common after winter injury.

Erwinia amylovora (Burr.) Winsl. et al.; fire blight.

Hypoxyton mammatum (Wahl.) Miller; "Hypoxyton canker"; canker.

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on dead stems.

Valsa sordida Nits. (stat. conid. Cytospora chrysosperma Pers. ex Fr.).

Root rot and decay:

Agrobacterium tumefaciens (Sm & Towns.) Conn.; "crown gall"; warty tumorous root galls typically at the root collar.

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum purpureum (Pers. ex Fr.) Fr.); superficial rot; causes "silver leaf".

Schizophyllum commune Fr.; "superficial sap rot", white rot; sporophorus fan-shaped, 1.5 to 5 cm wide, thin; upper surface downy to gray, hairy, lower surface grayish brown with forked gills, gills split along the ridges.

OSTRYA

O. virginiana (Mill.) K. Koch; hop-hornbeam, ironwood.

On leaves:

Cylindrosporium dearnessii Ell. & Ev.; leaf spot.

PICEA

P. abies (L.) Karst.; Norway spruce, native to Europe, introduced.

P. engelmannii Parry; mountain spruce, engelmann spruce.

P. glauca (Moench) Voss; white spruce.

P. mariana (Mill.) B.S.P.; black spruce.

P. pungens Engelm.; Colorado spruce, introduced.

On needles:

Chrysomyxa arctostaphyli Diet., "yellow witches' broom rust" (0, I); witches' brooms are yellowish green and can be recognized from a distance; III on leaves of Arctostaphylos uva-ursi (L.) Spreng. (kinnikinnick, bearberry).

Chrysomyxa empetri Schroet. ex Cummins; needle rust (0, I); difficult to distinguish from Chrysomyxa ledicola on spruce, not common; II, III on leaves of Empetrum nigrum L. (crowberry).

Chrysomyxa ledi dBy.; needle rust (0, I); aeciospores much smaller (13.5-25.0 x 18-32 μ) than those of C. ledicola (22-34 x 27-46 μ); II, III on the under surfaces of the leaves of Ledum spp. (Labrador-tea), Chamaedaphne calyculata (L.) Moench (cassandra), Rhododendron spp. (rhododendron); several varieties are distinguished mainly by the differences in their telial hosts.

Chrysomyxa ledicola Lagh.; needle rust (0, I); aeciospores much larger than C. ledi (see C. ledi), most common needle rust of spruce;

II, III on the upper surfaces of the leaves of Ledum spp.
(Labrador-tea).

Chrysomyxa weirii Jackson; needle rust (III); tonguelike telia
produced on the discolored band on needles; autoecious rust.

Chrysomyxa woroninii Tranz.; bud rust (0, I); produces small conelike
stunted needle buds; III on Ledum spp. (Labrador-tea) causing
witches' broom; northern distribution.

Dichomera gemmicola Funk & Sutton; causes necrosis of buds, diseased
buds are typically bent or curved, covered by dense clusters of
pycnidial-like locules in black stroma, conidia cylindrical, up
to 17 transverse septa and occasional longitudinal septa,
70-85 x 12-17 μ . Also on Pseudotsuga menziesii.

Herpotrichia juniperi (Duby) Petr. (= Herpotrichia nigra Hartig);
snow mold, brown felt blight; dark brown mat of mycelium develops
on foliage under the snow; ascospores dark brown, 4- to 5-celled.

Isthmiella crepidiformis (Darker) Darker, (= Bifusella crepidiformis
Darker); needle cast; ascospores bifusiform.

Lirula macrospora (Hartig) Darker, (= Lophodermium macrosporum
(Hartig) Rehm); needle cast; Darker (1967) included Lophodermium
filiforme Darker in this species but they may be two distinct
species; ascospores filiform.

Pucciniastrum americanum (Farl.) Arth.; needle rust (0,I); I spores develop
earlier than Chrysomyxa, and yellowish color; II, III on Rubus spp.

Pucciniastrum arcticum Tranz.; needle rust (0, I); II, III on Rubus spp., similar to P. americanum, probably conspecific.

Pucciniastrum sparsum (Wint.) E. Fisch.; needle rust (0, I); II, III on Arctostaphylos rubra (Rehd. & Wils.) Fern. (alpine bearberry), northern and alpine distribution.

Sarcotrochila piniperda (Rehm) Korf; snow blight.

Sclerophoma pithyophila (Cda.) Hoehn.; needle cast.

On cones:

Chrysomyxa pirolata Wint.; "inland spruce cone rust" (0, I); infection systemic, infected cones do not produce seeds, up to 20% of cone crops are affected by the rust; II, III on leaves of Pyrola spp. (wintergreen), uredinia open sorus rather than cone-shaped uredinia of Pucciniastrum pyrolae.

On stems:

Arceuthobium americanum Nutt. ex Engelm.; "lodgepole-pine dwarf mistletoe"; infection on Picea spp. usually occurs on understory trees under heavily infected lodgepole or jack pine, species seemingly unable to establish itself permanently in pure spruce stands; of minor importance on spruce.

Arceuthobium pusillum Pk.; "eastern dwarf mistletoe"; causes witches' broom mainly on Picea mariana (black spruce) in eastern North America but extends westward to Saskatchewan-Manitoba border.

Chrysomyxa arctostaphyli Diet.; "Yellow witches' broom"; see under "On needles".

Cytospora kunzei Sacc.; canker.

Lachnellula agassizii (Berk. & Curt.) Dennis (≡Dasyseypa agassigii (Berk. & Curt.) Sacc.; cup fungus; peripheral hairs of apothecia white; usually on dead twigs.

Lachnellula arida (Phill.) Dennis (≡Dasyscypha arida (Phill.) Sacc.); peripheral pairs of apothecia brown, usually on dead twigs.

Mytilidion karstenii Sacc.; black fruiting bodies with slit along the upper edge.

Retinocyclus abietis (Crouan) Groves & Wells; leader dieback

Tympanis pinastri Tul.; black cup fungus, on dead stems.

Zythia resiniae (Ehr.) Karst.; mostly on resin-soaked wood.

Root rot and decay:

Armillariella mellea (Vahl ex Fr.) Karst. (Armillaria mellea (Vahl ex Fr.) Kummer); "Armillaria root rot", "shoestring root rot"; spongy root and butt rot; white mycelial fans are present between bark and wood, black shoestringlike rhizomorphs often present, sporophores honey-colored mushrooms, fine brown scales on top, stipes have annulus; "honey mushrooms", edible.

Coniophora puteana (Schum. ex Fr.) Karst.; brown cubical rot; decayed wood becomes uniformly cubical, purplish brown to dark or light brown, sporophores flat, crustlike, olive or light brown in the center and white toward the margins; also an important slash fungus.

Coriolellus heteromorphus (Fr.) Bond. & Sing., (= Trametes

heteromorpha (Fr.) Bres.); brown cubical rot of sapwood; sporophores resupinate or shelving, white to yellowish throughout, pores large (1-3 mm), irregular, angular, and brainlike.

Coriolellus serialis (Fr.) Murr., (≡ Trametes serialis Fr.); brown

cubical rot; very common on wood in storage or use; sporophores mostly flat, annual, white and leathery, pores small and deep.

Corticium galactinum (Fr.) Burt.; white or yellow stringy root

and butt rot; sporophores very thin, flat, crustlike, whitish without pores.

Coryne sarcoides (Jacq.) Tul.; on dead wood, some strains are

known to inhibit growth of Coniophora puteana and Polyporus tomentosus.

Echinodontium tinctorium (Ell. & Ev.) Ell. & Ev. (≡ Fomes tinctorius

Ell. & Ev.); "Indian paint fungus"; brown stringy trunk rot with red streaks throughout, sporophores hoof-shaped, upper surface blackish and cracked, lower surface toothed, context brick red.

Fomes cajandri Karst. (= Fomes subroseus (Weir) Overh.); light

brown cubical rot; sporophores annual, up to 10 cm wide, irregular shape, both upper and lower surfaces pinkish to rose-colored.

Fomes officinalis (Vill. ex Fr.) Neuman (= Fomes laricis Jacq. ex

Murr.); dark brown cubical rot; sporophores large (up to 60 cm), hoof-shaped or pendulous, whitish; bitter taste, "quinine conk".

Fomes pini (Brot. ex Fr.) Karst.; "red belt fungus"; red ring rot, red scale, pocky rot; sporophores shelving, upper surface dark brown, concentrically furrowed; under surface yellow-brown, context yellow-brown. One of the most important decay fungus on spruce.

Fomes pinicola (Sw. ex Fr.) Cke.; "red belt fungus"; crumbly rot; decayed wood is reddish or yellowish brown, crumbly, and cubically cracked; sporophores large, perennial, flat to hoof-shaped conks, margin of the sporophores often reddish brown, upper surface smooth, crusty, gray to black, lower surface white with small round pores, context corky, buff-colored.

Haematostereum sanguinolentum (Alb. & Schw. ex Fr.) Pouzar, (Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr.), "bleeding fungus"; red heart rot; sporophores thin, annual, leathery conks, usually less than 5 cm, upper surface silky olive to gray with concentric bands, lower surface smooth without pores, reddish fluid oozes from lower surface when wounded.

Lenzites saepiaria (Wulf. ex Fr.) Fr.; brown pocket sap rot; sporophores small, annual shelving conks, upper surface velvety, yellowish red to dark reddish brown weathering to gray, lower surface yellow brown to dark brown with thick gills having occasional cross connections; similar to Trametes odorata but T. odorata has tubes rather than gills.

Meruliopsis ambiguus (Berk.) Ginns (~~≡~~Merulius ambiguus Berk.).

Merulius himantioides Fr.; brown cubical rot.

Odontia bicolor (Alb. & Schw. ex Fr.) Quél.; white stringy rot.

Peniophora septentrionalis Laurila; red heart rot.

Pholiota alnicola (Fr.) Sing. (~~≡~~Flammula alnicola (Fr.) Kummer).

Pleurotus ostreatus (Jacq. ex Fr.) Kummer; white spongy rot; sporophores white to gray, edible mushrooms; "oyster mushroom".

Polyporus abietinus Diks. ex Fr.; white pocket rot, pitted sap-rot; sporophores annual and small, thin and shelving to resupinate, upper surface gray with hairs, lower surface purplish becoming brownish purple to brown when old; "purple conk".

Polyporus balsameus Pk.; brown cubical rot.

Polyporus guttulatus Pk.; brown cubical rot.

Polyporus schweinitzii Fr.; brown cubical rot, red-brown butt rot; sporophores with or without central stalk, upper surface velvety, dark reddish brown, concentrically zoned with yellowish margin, lower surface dirty yellow green when fresh, dark red-brown when bruised and when old, angular large pores; "velvety-top fungus".

Polyporus tomentosus Fr., red-brown root and butt rot; log ends of decayed wood appear honeycombed in a radial pattern, reddish

brown discoloration; sporophores with or without stipe, upper surface brown to yellow brown, velvetlike, lower surface paler, with small pores; considered responsible for circular stand openings of spruce.

Poria subacida (Pk.) Sacc.; white stringy butt rot; sporophores whitish, crustlike conks; "white root conk".

Trametes odorata (Wulf. ex Fr.) Fr.; brown cubical pocket rot; sporophores similar to Lenzites saepiaria except that the lower surfaces of the sporophores have tubes rather than gills.

PINUS (soft pines)

P. albicaulis Engelm.; whitebark pine.

P. flexilis James; limber pine.

P. strobus L.; eastern white pine.

On needles:

Bifusella linearis (Pk.) Hoehn. (\equiv Hypoderma lineare (Pk.) Thuem.);
needle cast; shiny black hysterothecia of variable lengths.

Herpotrichia coulteri (Pk.) Bose, (\equiv Neopeckia coulteri (Pk.) Sacc.); "snow
mold", "brown felt blight"; dark brown mat of mycelium developed
on foliage under the snow.

Lophodermium nitens Darker; needle cast; black oval hysterothecia
subcuticular.

Lophodermium pinastri (Schrad. ex Hook.) Chev.; needle cast; black oval
hysterothecia subepidermal.

Naemacyclus niveus (Pers. ex Fr.) Sacc.; needle cast; waxy brown to straw-colored
apothecia under open ridges of epidermis.

On stems:

Cronartium ribicola J.C. Fisch.; "white pine blister rust" (0, I);
II, III on leaves of Ribes spp.; the most important disease on
five-needle pines.

Cucurbitodhis pithyophila (Fr.) Petr. (\equiv Cucurbitaria pithyophila (Fr.)
Ces. & de N.); small black pseudothecia in clusters on dead
twigs.

Lachnellula pini (Brunch.) Dennis (\equiv Dasyscypha pini (Brunch.) Hahn & Ayers; small cup fungus, canker, and dieback.

Root rot and decay:

Armillariella mellea (Vahl. ex. Fr.) Karst., (\equiv Armillaria mellea (Vahl ex. Fr.) Kummer; "Armillaria root rot", "shoestring root rot"; spongy root and butt rot; white mycelial fans are present between bark and wood, black shoestringlike rhizomorphs often present, sporophores honey-colored edible mushrooms, fine scales on top, stipes with annulus; "honey mushroom".

Fomes pini (Brot. ex Pers.) Karst.; "red belt fungus"; red ring rot, red scale, pocky rot; sporophores shelving, upper surface dark brown, concentrically furrowed; lower surface yellow-brown, context yellow-brown.

PINUS (hard pines)

P. banksiana Lamb.; jack pine

P. contorta Dougl. var. latifolia Englem.;
lodgepole pine.

P. mugo Turra; mugo pine.

P. resinosa Ait.; red pine.

On needles

Colesporium asterum (Diet.) Syd. (=C. solidaginis Thuem.); needle rust
(0, I); II, III on Aster spp. and Solidago spp.

Coleosporium viburni Arth.; needle rust (0, I); not reported
from Prairie Provinces on pine, but II, III states on Viburnum
lentage L. (nanny berry) are known from Manitoba.

Davisomycella ampla (Davis) Darker (≡Hypodermella ampla (Davis) Dearn.);
needle cast; scattered black hysterothecia on pale sordid areas
of living or dead needles.

Davisomycella medusa (Dearn.) Darker (≡Hypodermella medusa Dearn.);
needle cast; hysterothecia black, scattered, on browned needles.

Davisomycella montana (Darker) Darker (≡Hypodermella montana Darker);
needle cast; hysterothecia black, elliptical, scattered on
sordid area of living needles with narrow orange-brown zone
between green and sordid area.

Elytroderma deformans (Weir) Darker; needle cast; black elongated hysterothecia developed on sordid needles of previous year's infection; systemic, produces light witches' broom.

Gloeocoryneum cinereum (Dearn.) Weindlmayr, (\equiv Coryneum cinereum Dearn.); conidia greenish brown, multicelled; mostly on dead needles.

Hendersonia pinicola Wehm.; needle fungus; usually associated with Lophodermium concolor infection.

Herpotrichia coulteri (Pk.) Bose (\equiv Neopeckia coulteri (Pk.) Sacc.); "snow mold"; mat of dark brown hyphae covering affected branch; ascospores dark brown, 2-celled.

Lophodermella concolor (Dearn.) Darker (\equiv Hypodermella concolor (Dearn.) Darker; needle cast; hysterothecia buff-colored, elongated, on tawny to pale buff needles.

Lophodermella montivaga Petr. (\equiv Hypodermella montivaga (Petr.) Dearn.); needle cast.

Lophodermium pinastri (Schrad. ex Hook.) Chev.; needle cast; black oval hysterothecia on dead needles, subepidermal. Closely related L. nitens is subcuticular.

Phaeoseptoria contortae Parmelee & Y. Hiratsuka; needle fungus; conidia pale brown, multicelled, elongated, usually associated with a needle cast, Davisomycella ampla.

Systemma acicola (Dearn.) Wolf. & Barbour; brown spot needle blight.

Thyriopsis halenpensis (Cke.) Th. & Syd.; needle fungus; small black fruiting bodies on circular whitish pale spot.

On stems:

Arecuthobium americanum Nutt. ex Engelm.; "lodgepole pine dwarf mistletoe"; higher plant belonging to the family Loranthaceae, causes witches' broom and swelling of branches; most serious disease of lodgepole pine and jack pine.

Atropellis piniphila (Weir) Lohm. & Cash; "Atropellis canker"; causes elongated main stem canker associated with excessive resin exudation; apothecia black, disclike.

Cenangium ferruginosum Fr. ex Fr.; stem fungus, small brown cup fungus; no peripheral hairs.

Cronartium coleosporiodes Arth., (= Peridermium stalactiforme Arth. & Kern); "stalactiform blister rust" (0, I); II, III on leaves of Castilleja spp. (Indian paint brush), Melampyrum lineare (cow-wheat), Pedicularis bracteosa (lousewort), Orthocarpus luteus (yellow owl's Clover), Rhinanthus crista-galli L. (yellow-rattle).

Cronartium comandrae Pk.; "Comandra blister rust" (0, I); II, III on leaves of Geocaulon lividum (= Comandra livida (northern bastard toadflax), Comandra umbellata ssp. umbellata (C. umbellata) (comandra, bastard toadflax), Comandra umbellata ssp. pallida (= C. pallida) (comandra, bastard toadflax).

Cronarium comptoniense Arth.; "sweet-fern blister rust" (0, I); II, III
on leaves of Myrica gale L. (sweetgale).

Endronartium harknessii (J.P. Moore) Y. Hirat. (= Peridermium
harknessii J.P. Moore); "western gall rust"; autoecious species (no alter-
nate host); can cause serious damage in nurseries and plantations.

Gremmeniella abietina (Lagerb.) Morelet (= Scleroderris largerbergii
Gremmen); "Scleroderris canker"; flagging and dieback; considered
one of the most important nursery and plantation diseases
in eastern North America, Europe, and Asia. This disease was
found for the first time in the western Canada (Jasper National
Park) in 1974 and subsequently found in two locations in British
Columbia.

Lachnellula agassizii (Berk. & Curt.) Dennis (≡ Dasyscypha agassizii
(Berk. & Curt.) Sacc.; small cup fungus on stem; peripheral hairs
white.

Lachnellula arida (Phill.) Dennis (≡ Dasyscypha arida (Phill.) Sacc.;
small cup fungus on stem; peripheral hairs brown.

Lophium mytilinum (Pers. ex Fr.) Fr.; hysterothecia black, shiny,
small, like minute mussel shells standing on edge.

Mytilidion gemmigenum Fckl.; hysterothecia black, small, like minute
mussel shells standing on edge.

Root rot and decay:

Armillariella mellea (Vahl ex Fr.) Karst., (≡ Armillaria mellea (Vahl ex Fr.) Kummer); "Armillaria root rot", "shoestring root rot"; spongy root and butt rot, white mycelial fans present between the bark and wood, black shoestringlike rhizomorphs often present; sporophores honey-colored mushrooms, fine brown scales on top, stipes have annulus; "honey mushroom".

Coniophora puteana (Schum. ex Fr.) Karst.; brown cubical rot; decayed wood becomes uniformly cubical, purplish brown to dark or light brown; sporophores flat, crustlike, olive or light brown in the center and white toward the margins; also an important slash fungus.

Coriolellus heteromorphus (Fr.) Bond. & Sing., (≡ Trametes heteromorpha (Fr.) Bres.); brown cubical rot of sapwood; sporophores resubinate, shelving, white to yellowish throughout, pores large (1-3 mm), irregular, angular, and brainlike.

Fomes cajandri Karst. (= Fomes subroseus (Weir Overh.)); light brown cubical rot; sporophores annual, up to 10 cm wide, irregular shape, both upper and lower surfaces pinkish to rose-coloured.

Fomes officinalis (Vill. ex Fr.) Neuman (= Fomes laricis Jacq. ex Murr.); dark brown cubical rot; sporophores large (up to 60 cm wide) hoof-shaped or pendulous, whitish; bitter taste; "quinine conk".

Fomes pini (Brot. ex Fr.) Karst.; "red belt fungus"; causes red ring rot, red scale, pocky rot; sporophores shelving, upper surface dark brown, concentrically furrowed; lower surface yellow-brown context yellow-brown.

Fomes pinicola (Sw. ex Fr.) Cke.; "red belt fungus"; causes crumbly rot; sporophores large, perennial, flat to hoof-shaped conks, margin of the sporophores often reddish brown, upper surface smooth, crusty, gray to black, lower surface white with small round pores, context corky, buff-colored.

Haematostereum sanguinolentum (Alb. & Schw. ex Fr.) Pouzar, (≡Sterium sanguinolentum (Alb. & Schw. ex Fr.) Fr.), "bleeding fungus"; causes red heart rot; sporophores thin, annual, leathery conks, usually less than 5 cm, upper surface silky olive to gray with concentric bands, lower surface smooth without pores, reddish fluid oozes from lower surface when wounded.

Lenzites saepiaria (Wulf. ex Fr.) Fr.; brown pocket sap rot; sporophores small, annual, shelving, upper surface velvety, yellowish red to dark reddish brown weathering to gray, lower surface yellow brown to dark brown with thick gills having occasional connections; similar to Trametes odorata but T. odorata has tubes rather than gills.

Peniophora gigantea (Fr.) Masee; white sap rot.

Peniophora pseudo-pini Were. & Gibson; pink to red stain along wood rays and heartwood; sporophores small, rosy-brown to brownish-purple velvety crusts.

Pholiota alnicola (Fr.) Sing. (≡Flammula alnicola (Fr.) Kummer) .

Polyporus tomentosum Fr.; red butt rot; log ends of decayed wood appear honeycombed in a radial pattern, reddish brown discoloration; sporophores with or without stipes, upper surface brown to yellow brown, velvety, lower surface paler with small pores.

Trametes odorata (Wulf. ex Fr.) Fr.; brown cubical pocket rot; sporophores similar to Lentzites saepiaria except that lower surfaces of sporophores are composed of tubes rather than gills.

Trametes variiformis Pk. (≡Coriolellus variiformis (Pk.) Sarkar); light brown cubical rot.

Tympanis hypopodia Nyl.; often isolated from red heartwood stain and decay, an ascomycete.

POPULUS

P. *accuminata* Rydb.; lanceleaf cottonwood.

P. *angustifolia* James; yellow cottonwood.

P. *balsamifera* L. (= P. *tacamahaca* Mill);
balsam poplar, tacamahac.

P. *deltoides* Bartr., eastern cottonwood.

P. *grandidentata* Michx.; largetooth aspen.

P. *sargentii* Dode; cottonwood.

P. *tremuloides* Michx.; trembling aspen.

P. *trichocarpa* Torr. & Gray; black cottonwood.

On leaves:

Ciborinia pseudobifrons Whetz. ex Groves &

Bowerman; leaf spot; sclerotia black, elongated, mostly
along veins, similar to *Ciborinia whetzellii*.

Ciborinia whetzellii (Seav.) Seav.; "aspen ink spot"; sclerotia black,
elliptical, up to 0.8 cm in diameter, drop during summer
leaving shot-holes.

Cladosporium subsessile Ell. & Barth.; leaf spot.

Linospora tetraspora G.E. Thompson; leaf blight of P. balsamifera;
large brownish gray to whitish discolored area, scattered
black stroma on upper surface.

Marssonina populi (Lib.) Magn.; acervuli on upper surface, brownish
spots, conidia hyaline, 2-celled, unequally divided, larger
upper cell round, 19.0-23.5 x 6.5-8 μ ; mainly on P. balsamifera
and P. deltoides. Perfect state not found in North America but
probably Drepanopeziza populorum (Desm.) Höhn.

Marssonina tremuloides Kleb., (= Marssonina brunnea (Ell. & Ev.) Magn.);
acervuli on underside of leaf, brownish angular spots, conidia
hyaline, 2-celled, unequally divided, 12.0-13.0 x 4.0-6.0 μ ; on
P. tremuloides. Perfect state not recorded in North America
but probably Drepanopeziza tremulae Rimpau or D. punctiformis Gremmen.

Melampsora medusae Thüm. (= Melampsora albertensis Arth.); leaf rust
(II, III); urediniospores 15-23 x 23-35 μ ; mainly on P. tremuloides
and P. deltoides; 0, I on conifers.

Melampsora occidentalis Jacks., leaf rust (II, III); urediniospores
16-29 x 32-48 μ ; mainly on P. balsamifera and P. trichocarpa.

Mycosphaellera populicola G.E. Thompson (stat. conid. Septoria
populicola Pk.); leaf spot.

Mycosphaellera populorum G.E. Thompson (stat. conid. Septoria musiva
Pk.); leaf spot; also canker on stem, "Septoria canker".

Septgloeum rhopaloideum Dearn & Bisby (stat. perfect. Guinardia populi G.E. Thompson); leaf spot of P. tremuloides.

Uncinula salicis (D.C. ex Mérat) Wint.; powdery mildew.

Venturia macularis (Fr.) Müll. & Arx (= Phaeosphaerella macularis (Fr.) Trav., stat. conid. Pollaccia radiosa (Lib.) Bald. & Cif.); shoot blight and leaf spot of P. tremuloides; "shepherd's crook".

Venturia populina (Vuill.) Fabric. (stat. conid. Pollaccia elegans Serv.); shoot blight and leaf spot on P. balsamifera.

On stems:

Caliciopsis calicioides (Ell. & Ev.) Fitzp.; bark fungus; black thin columns.

Camarosporium quaternatum (Hazsl.) Sacc.; canker.

Cenangium singulare (Rehm ex Stab.) Davidson & Cash; sooty bark canker.

Ceratocystis fimbriata (Ell. & Halst.) Davidson; "target canker", "black canker".

Cucurbitaria staphula Dearn. ex Arnold & Russell; associated with Diplodia tumefaciens galls, may be secondary parasite.

Diplodia tumefaciens (Shear) Zalasky (\equiv Macrophoma tumefaciens

Shear); causes stem and branch gall.

Dothiorella populnea Thüm; canker.

Eutypa acharii Tul.; dieback.

Hypoxylon fuscum Pers. ex Fr.; on dead branches; stroma hemispherical or depressed, 2-3 mm in diameter, sometimes confluent, brownish purple or light purple-gray; ascospores pale-colored, 12-15 x 5-8 μ .

Hypoxylon mammatum (Wahl.) Miller (= H. purinatum (Klotsch) Cke.);

"Hypoxylon canker"; stroma discrete, 2-5 mm in diameter, usually effused to form larger clusters, surface first white, later blackish; ascospores dark brown, 20-33 x 9-12 μ , black hyphal pegs (imperfect state) characteristic.

Hypoxylon subiginosum Pers. ex Fr.; stroma flattened, bright brick red

to purplish brown; ascospores light to dark brown 9-13 x 4-6 μ .

Lophiostoma triseptatum Pk.

Mycosphaerella populorum G.E. Thompson (stat. conid. Septoria musiva Pk.);

"Septoria canker"; also causes leaf spot.

Pezicula ocellata (Pers.) Seaver.

Rhytidiella moriformis Zalasky; causes "rough-bark" of P. balsamifera.

Sporidesmium deightonii M.B. Ellis; on dead stems.

Tympanis spermatispora (Nyl.) Nyl.; small black cup fungus.

Valsa nivea (Hoffm.) Fr.

Valsa sordida Nit. (stat. conid. Cytospora chrysosperma (Pers.) Fr.)

Root rot and decay:

Armillariella mellea (Vahl ex. Fr.) Karst. (Armillaria mellea (Vahl ex Fr.)

Kummer); "Armillaria root rot", "shoestring root rot"; spongy root and butt rot; white mycelial fans present between bark and wood, black shoestringlike rhizomorphs often present; sporophores honey colored edible mushrooms; "honey mushroom".

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum purpureum

(Pers. ex Fr.) Fr.; superficial sap rot; causes "silver leaf".

Daedalea unicolor Bull. ex Fr.; white spongy rot; sporophores thin,

shelving, less than 10 cm wide, upper surface gray, very hairy, often greenish because of algae, lower surface whitish with maze-like pores.

Fomes fomentarius (L. ex Fr.) Kichx ; "tinder conk"; white mottled rot;

sporophores similar to those of F. igniarius especially when young, but upper surface is usually lighter gray, then becoming black and cracked; inside of sporophore dark brown.

Fomes igniarius (L. ex Fr.) Kickx ; "false tinder fungus"; white

trunk rot; decay zones usually surrounded by fine black lines, sporophores more or less hoof-shaped, upper surface blackish

and later cracked and cinderlike; inside of conk dark brown. Principal cause of losses in hard wood.

Fomes pinicola (Sw. ex Fr.) Cke.; "red belt fungus"; crumbly rot; sporophores large hoof-shaped conks, margin of the sporophores often reddish brown.

Ganoderma applanatum (Pers. ex Wallr.) Pat. (≡Fomes applanatus (Pers. ex Wallr.) Gill.); white mottled rot, white spongy rot; sporophores perennial, hard, woody, shelf-like, up to 70 cm in width, upper surface smooth, zoned, gray or grayish brown, lower surface white when fresh, brown when bruised, yellow-brown with age.

Lenzites saepiaria (Wulf. ex Fr.) Fr.; brown pocket sap rot; sporophores small, annual, shelving, upper surface velvety, yellowish red to dark reddish brown weathering to gray, lower surface yellow-brown to dark brown with thick gills having occasional cross connections.

Peniophora polygonia (Pers. ex Fr.) Bourd. & Galz. (≡Corticium polygonium Pers. ex Fr.).

Peniophora rufa (Fr.) Boid. (≡Stereum rufum Fr.).

Phlebia strigoso-zonata (Schw.) Lloyd, (≡Phaeophleba strigoso-zonata (Schw.) W.B. Cooke); white spongy rot.

Pholiota aurivella (Batsch ex Fr.) Kummer; brown mottled rot.

Pholiota destruens (Brond.) Qué1.; yellow laminated butt rot.

Pholiota spectabilis (Weinm. ex Fr.) Qué1.; brown mottled rot.

Pholiota squarrosa (Pers. ex Fr.) Kummer; brown mottled rot.

Pleurotus ostreatus (Jacq. ex Fr.) Kummer; white spongy rot; sporophores white to gray, edible mushrooms; "oyster mushroom".

Polyporus adustus Willd. ex Fr.; white mottled rot.

Polyporus hirsutus Wulf. ex Fr.; "hairy conk"; soft white spongy rot; sporophores similar to those of P. versicolor but without multicolored bands.

Polyporus paragamenus Fr.; pitted sap rot; sporophores thin, shelving, less than 4 cm wide, upper surface whitish, lower surface deep purple.

Polyporus velutinus Fr. (Polyporus zonatus Nees ex Fr.); white spongy rot.

Radulum casearum (Morgan) Lloyd.

Schizophyllum commune Fr.; white rot, superficial sap rot; sporophores fan-shaped, 1.5 to 5 cm wide, thin, upper surface downy to gray, hairy, lower surface grayish brown with forked gills, gills split along the ridges.

Trametes hispida Bagl., specked yellow-rot; sporophores up to 40 cm wide, thick, rusty or reddish brown, upper surface very hairy or velvety, lower surface with large pores, red brown.

Trametes suaveolens (L. ex Fr.) Fr.

Trametes trogii Berk.

Trechispora raduloides (Karst.) Rogers.

PRUNUS

P. americana Marsh; wild plum.

P. padus L. var. commutata Dipp.; May-day tree

P. pensylvanica L.f.; pin cherry

P. virginiana L.; choke cherry.

On leaves:

Cercospora circumscissa Sacc.; shot hole leaf spot.

Coccomyces hiemalis Higgins (stat. conid. Cylindrosporium hiemale Higgins);
"shot hole"; leaf spot.

Coccomyces lutescens Higgins; "shot hole"; leaf spot.

Coccomyces prunophorae Higgins; "shot hole"; leaf spot.

Phyllosticta circumscissa Cke.; leaf spot.

Phyllosticta virginiana (Ell. & Halst.) Tassi; leaf spot.

Podosphaera clandestina (Wall. ex Fr.) Lév.; powdery mildew.

Pseudomonas syringae van Hall; bacterial leaf blast.

Stigmia carpophila (Lév.) M.B. Ellis; blight.

Taphrina communis (Sadeb.) Gies; "plum pockets".

Taphrina flavorubra Ray; pockets and shoot hypertrophy.

Taphrina pruni Tul.; "plum pocket"; on leaves and fruit.

Taphrina wiesneri (Rathay) Mix; witches broom.

On fruits:

Fusicladium carpophilum (Thüm.) Oud., (≡Cladosporium carpophilum Thüm.); scab.

Fusicladium cerasi (Rabh.) Sacc., (≡Cladosporium cerasi (Rabh.) Bensaude & Keitt, stat. perfect. Venturia cerasi Aderh.); scab.

Phytophthora cactorum (Leb. & Cohn) Schroet.; causes fruit rot and collar rot.

Sclerotinia fructicola (Wint.) Rehm, (≡Monilinia fructicola (Wint.) Honey); causes brown rot of fruit and blossom, and twig blight.

On stems:

Agrobacterium tumefaciens (Sm. & Towns.) Conn. (≡Pseudomonas tumefaciens (Sm. & Towns.) Stev.); "crown gall".

Apiosporina morbosa (Schw.) v. Arx (≡Dibotryon morbosum (Schw.) Th. & Syd.); "black knot".

Dermea cerasi (Pers. ex Fr.) Fr.; apothecia black, cup-shaped.

Erwinia amylovora (Burr.) Winslow et. al.; "fire blight"; wilt and dieback.

Eutypella sorbi (Fr.) Sacc. (stat. imp. Cytospora rubescens Fr.).

Massaria conspurcata (Wallr.) Sacc.; pseudothecia large, immersed in bark; ascospores brown, large, 4-celled, 70-85 x 14-18 μ , thick hyaline gelatinous coating around ascospores.

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia vulgaris Tode ex Fr.); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on stem.

Tympanis prunicola Groves; apothecia black, cup-shaped.

Valsa leucostoma (Pers.) Fr. (stat. conid. Cytospora leucostoma (Pers.) Sacc.); "Cytospora canker".

Root rot and decay:

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum purpureum (Pers. ex Fr.) Fr.); superficial sap rot; causes "silver leaf".

Daedelia unicolor Bull. ex Fr.; white spongy rot; sporophores thin, shelving, less than 10 cm wide, upper surface gray, very hairy, often greenish because of algae, lower surface whitish with mazelike pores.

Fomes pomaceus (Pers.) Lloyd

Ganoderma applanatum (Pers. ex Wallr.) Pat. (\equiv Fomes applanatus (Pers. ex Wallr.) Gill.); white mottled rot, white spongy rot; sporophores perennial, hard, woody, shelflike, up to 70 cm in width, upper surface smooth, zoned, gray or grayish brown, lower surface white when fresh, brown when bruised, yellow-brown with age.

Polyporus pubescens Schum. ex Fr.

Polyporus sulphureus Bull. ex Fr.

Polyporus tulipiferae (Schw.) Overh.

Polyporus versicolor L. ex Fr.

Poria prunicola (Murr.) Sacc. & Trott.

PYRUS

P. communis L.; common pear.

On leaves:

Fabraea maculata Atk. (stat. conid. Entomosporium maculatum Lév.);
leaf blight or fruit spot.

Mycophaerella sentina (Fr.) Schroet. (stat. conid. Septoria
piricola Desm.); leaf spot.

On stems:

Erwinia amylovora (Burr.) Winslow et. al.; "fire blight"; wilt and
dieback.

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia
vulgaris Tode); "coral spot"; canker and dieback; conspicuous
pink to orange-red cushions (imperfect state) on dead branches.

QUERCUS

Q. macrocarpa Michx.; bur oak, scrub oak.

On leaves:

Apiognomonina errabunda (Rob.) Hoehn. (= Gnomonia quercina Kleb.);
anthracnose.

Discosia artocreas Tode ex Fr.; leaf spot; black pycnidia, conidia
hyaline, fusoid with single appendage at each end.

Fusidium aeruginosum Lk. (≡ Cylindrium aeruginosum (Lk.) Lindau),
common on fallen leaves.

Marasmius epiphyllus Fr.; common on fallen leaves.

Marasmius felix Morg.

Marssonina martini (Sacc. & Ell.) Magn.; leaf spot.

Microsphaera penicillata (Wallr. ex. Fr.) Lév.; powdery mildew.

Pestalozzia unicolor (Berk. & Curt.) Sacc.; leaf spots; dark cushion-
shaped acervuli, conidia dark, several-celled with two or three
hyaline apical appendages.

Phyllosticta livida Ell. & Ev.; leaf spot.

Taphrina caerulescens (Mont. & Desm.) Tul.; leaf blister.

On stems:

Aleurodiscus acerinus (Pers. ex. Fr.) Hoehn & Litch.

Aleurodiscus griseocanus (Pers.) Hoehn. & Litsch

Amphisphaeria applanata (Fr.) Ces. & de Not.

Diaporthe taleola (Fr.) Sacc.

Diatrype stigma Hoffm. ex Fr.

Didymorphaeria diplospora (Cke.) Rehm.

Metasphaeria querna Dearn. & Bisby

Ostropa cinerea (Pers.) Fr.

Pseudovalsa longipes (Tul.) Sacc. (stat. conid. Coryneum
umbonatum Nees); twig curl.

Rosellinia ligniaria (Grev.) Nits.

Strickeria obducens (Fr.) Wint.

Valsa ambiens (Pers. ex Fr.) Fr. (stat. conid. Cytospora ambiens
Sacc.); ascospores hyaline, 15-20 x 3-4 μ .

Valsaria insitiva (Tode) Ces. & de Not.

Root rot and decay:

Corticium centrifugum (Lév.)

Corticium confluens (Fr.) Fr.

Corticium contiguum Karst. (= C. crustaceum (Karst.) Hoehn. & Litsch.)

Corticium litschaueri Burt

Daedalea unicolor Bull. ex Fr.; white spongy rot; sporophores thin, shelving, less than 10 cm wide, upper surface gray, very hairy, often greenish because of algae, lower surface whitish with maize like pores.

Fistulina hepatica Schaeff. ex Fr.; "brown oak"; wood stain.

Fomes igniarius (L. ex Fr.) Kickx ; "false tinder fungus"; white trunk rot; decay zone usually surrounded by fine black lines, sporophores more or less hoof-shaped, upper surface blackish and later cracked and cinderlike; interior of conk dark brown, lower surface dirty white to brownish.

Hymenochaete curtisii (Berk.) Morgan; white rot.

Panus stipticu Fr. (= Panellus stipticus (Fr.) Karst.)

Peniophora cinerea (Fr.) Cke.

Peniophora pubera (Fr.) Sacc.

Polyporus brumalis Pers. ex Fr.

Polyporus planellus (Murr.) Overh.

Polyporus pubescens Schum. ex Fr.

Polyporus resinosus Schrad. ex Fr.; "patchy white rot".

Polyporus versicolor L. ex. Fr.; "rainbow conk"; soft white
spongy sap rot.

Propolis faginea (Schrad.) Karst.

Stereum gausapatum (Fr.) Fr.; root and butt rot.

ROSA

R. acicularis Lindl.; prickly rose.

R. arkansana Porter (= R. suffulta Greene); Prairie rose.

R. woodsii Lindl.; common wild rose.

On leaves:

Botrytis cinerea Pers.; gray mold.

Diplocarpon rosae Wolf (\equiv Fabraea rosae (Wolf.) Seav., stat. conid.

Marssonina rosae (Lib.) Lind.); black spot.

Mycosphaerella rosicola B.H. Davis (stat. conid. Cercospora rosicola Pass.); leaf spot.

Phragmidium fusiforme Schroet.; leaf rust.

Phragmidium montivagum Arth.; leaf rust.

Phragmidium mucronatum (Pers.) Schlecht.; leaf rust.

Phragmidium rosae-arkansanae Diet.; leaf rust.

Phragmidium speciosum (Fr.) Cke.; leaf rust.

Phyllosticta rosicola Massal.; leaf spot.

Seimatosporium discosioides (Ell. & Ev.) Shoem.; leaf spot.

Sphaeloma rosarum (Pass.) Jenkins; leaf spot; anthracnose.

Sphaerotheca macularis (Wallr. ex Fr.) Lind; powdery mildew.

Sphaerotheca pannosa (Wallr. ex Fr.) Lév.; powdery mildew.

Virus; mosaic virus

On stems:

Agrobacterium tumefaciens (Sm. & Towns.) Conn.; "crown gall".

Leptosphaeria coniothyrium (Fckl.) Sacc. (stat. conid. Coniothyrium fockelii Sacc.); stem canker.

Valsa ambiens (Pers. ex Fr.) Fr.; (stat. conid. Cytospora ambiens Sacc.).

SALIX

S. amygdaloides Anderss.; peach leaved willow.

S. arctica Pall.; arctic willow.

S. arctophila Cock.; arctic lower willow.

S. discolor Mühl.; large pussy willow.

S. fragilis L.; brittle willow, cracked willow.

S. glauca L.; blue-green willow.

On leaves:

Ciborinia foliicola (Cash & Davidson) Whetz.; "black rib".

Drepanopeziza salicis (Tul.) Hoehn.; leaf spot.

Drepanopeziza sphaerioides (Fr.) Nannf.

Drepanopeziza triandrea Rimpau (stat. conid. Marssonina kriegleriana (Bres.) Magn.); leaf spot.

Gloeosporium salicis West., anthracnose.

Marssonina santonensis (Pass.) Magn.; leaf spot.

Melampsora epitea Thuem.; leaf rust (II, III); 0, I on conifers.

Melampsora paradoxa Diet. & Holw. (= Melampsora bigelowii Thuem);
leaf rust (II, III); 0, I on Larix spp.

Phyllactinia guttata (Fr.) Lév.

Pollacia saliciperda (All. & Tub.) Arx; shoot blight.

Ramularia rosae (Fckl.), Sacc.; leaf spot.

Rhytisma salicinum (Pers.) Fr.; tar spot.

Septoria didyma Fckl. ; leaf spot.

Septoria salicicola (Fr.) Sacc.; leaf spot.

Sphaceloma murrayae Jenkins & Gvodsinsky.

Taphrina amentorum (Sadob.) Rostr.; catkin hypertrophy.

Uncinula salicis (DC. ex Mérat) Wint.; powdery mildew.

On stems:

Camarosporium salicinum Grove.

Cryptosporiopsis scutellata (Oth) Petr.

Diaporthe tessella (Pers.) Rehm.

Diaporthe stigma Hoffm. ex Fr.

Diplodina salicis West.; twig blight.

Discella carbonacea (Fr.) Berk. & Br.

Dothiorella pyrenophora (Karst.) Sacc. var. salicis Karst.

Griphosphaeria corticola (Fckl.) Hoehn.; dieback.

Hypoxylon mammatum (Wahl.) Miller (=H. purinatum (Klotzsch)

(cke.); "Hypoxylon canker"; mostly on Populus spp.

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia

vulgaris Tode); "coral spot"; canker and dieback; conspicuous

pink to orange-red cushions (imperfect state) on stem.

Pezicula ocellata (Pers.) Seaver.

Septomyxa salicis Groves.

Trimmatostroma salicis Corda

Tympanis salicina Groves

Valsa ambiens (Pers. ex Fr.) Fr.

Valsa sordida Nits. (stat. conid. Cytospora chrysosperma (Pers.) Fr.)

Root rot and decay:

Daedalea confragosa Bolt. ex Fr.; soft white rot.

Daedalea unicolor Bull. ex Fr.; white spongy rot; sporophores thin, shelving, less than 10 cm wide, upper surface gray, very hairy, often greenish because of algae; lower surface whitish with mazelike pores.

Favolus alveolaris (DC. ex Fr.) Quél.; sporophores reniform, more or less stipitate up to 10 cm., in width, upper side reddish yellow to purple brick red, lower surface white to yellowish, pores angular,

hexagonal, usually in radiating lines.

Fomes igniarius (L. ex Fr.) Kickx , "false tinder fungus"; white trunk rot; occasional on this host.

Ganoderma applanatum (Pers. ex Wallr.) Pat. (\equiv Fomes applanatus (Pers. ex Wallr.) Gill.); white mottled rot, white spongy rot; sporophores perennial, hard, woody, shelflike up to 70 cm in width; upper surface smooth, zoned, grayish or grayish brown, lower surface white when fresh, turns brown immediately when bruised, yellow-brown with age.

Polyporus paragamenus Fr.; pitted sap rot; sporophores thin, shelving, less than 4 cm wide, upper surface whitish, lower surface deep purple.

Trametes odora (sommerf. ex Fr.) Fr.

SHEPHERDIA

S. argentea Nutt.; buffalo berry.

S. canadensis (L.) Nutt.; soapberry, soopolallie.

On leaves:

Cercospora manitobana Davis; leaf spot.

Puccinia caricis-shepherdiae J.J. Davis; leaf rust (0,I); II, III
on Carex spp. (sedges).

Puccinia coronata Cda.; leaf rust, (0,I); II, III on grasses.

Septoria shepherdiae (Sacc.) Dearn.; leaf spot.

Sphaerotheca macularis (Wallr. ex Fr.) Magn. (= S. humuli (DC.) Burr.);
powdery mildew.

Root rot and decay:

Fomes ellisianus F.W. Anderson; sporophores woody, up to 15 cm wide,
first nearly white, becoming grayish black, context wood-colored,
pore surface white to buff; known only on Shepherdia.

SORBUS

S. americana Marsh.; American mountain ash.

S. decora (Sarg.) Schneid.; showy mountain ash.

S. scopulina Greene; Greene's mountain ash.

On leaves:

Coniothyrium fuckelii Sacc.

Fabrea maculata Atk. (stat. conid. Entomosporium maculatum Lév.)

Gymnosporangium cornutum Arth. ex Kern; "mountain-ash-juniper rust";
aecia retaining shape, on leaves, causing hypertrophy of
vascular tissue, spore pale brown in mass, matures mid-August to
mid-September; III on Juniperus communis.

Gymnosporangium tremelloides Hartig; "common juniper gall rust" (0,I);
conspicuous orange-yellow leaf spot, aecia loosing shape,
aeciospores dark brown in mass; matures mid-August to mid-September;
III on Juniperus communis.

Erwinia amylovora (Burr.) Winsl. et al.; "fire blight".

Nectria cinnabarina (Tode ex Fr.) Fr. (stat. conid. Tubercularia
vulgaris Tode); "coral spot"; canker and dieback; conspicuous
pink to orange-red cushions (imperfect state) on stem.

Phomopsis sorbicola Grove.

Tympanis conspersa Fr.; small black cup fungus.

Valsa persoonii Nits.

Valsa sordida Nits. (stat. conid. Cytospora chrysosperma
Pers. & Fr.), "Cytospora canker".

Root rot and decay:

Chondrostereum purpureum (Pers. ex Fr.) Pouzar (\equiv Stereum
purpureum (Pers. ex Fr.) Fr.), "silver leaf"; superficial sap rot.

Daedalea unicolor Bull. ex Fr.; white spongy rot, sporophores thin,
shelving, less than 10 cm wide, upper surface gray, very hairy, often
greenish because of algae, lower surface whitish with mazelike
spores.

SYRINGA

S. amurensis (Rupr.) Rupr.; amur lilac, introduced, native of northern China.

S. vulgaris L.; common lilac, introduced, native of Europe.

On leaves:

Microsphaera penicillata (Wallr. ex Fr.) Lév. (= M. alni (Wallr.) Salm.); powdery mildew.

Phytophthora syringae Kleb.; shoot blight.

Pseudomonas syringae van Hall; bacterial blight.

On stem:

Phomopsis depressa (Lév.) Trave.

Sphaeropsis syringae Pk.

THUJA

T. occidentalis L.; eastern white cedar.

TILIA

T. americana L.; basswood.

On leaves:

Cercospora microsora Sacc.; leaf spot.

Gloeosporium tiliae Oud.; leaf spot; anthracnose.

Uncinula clintonii Pk; powdery mildew.

On stems:

Hypoxylon rubiginosum Pers. ex Fr.

Massariella curreyi (Tul.) Sacc.

Sphaeropsis olivacea Otth.

Root rot and decay:

Fomes igniarius (L. ex Fr.) Kickx ; "false tinder fungus"; white trunk rot; decay zone usually surrounded by fine black lines, sporophores more or less hoof-shaped, upper surface blackish and later cracked and cinderlike; interior of conk dark brown, lower surface dirty white to brownish.

Ganoderma applanatum (Pers. ex Wallr.) Pat. (≡ Fomes applanatus (Pers. ex Wallr.) Gill.); white mottled rot, white spongy rot; sporophores perennial, hard, shelflike, up to 70 cm wide, upper surface smooth, zoned, grayish or grayish brown, lower surface white when fresh, turns brown immediately when bruised.

ULMUS

U. americana L.; white elm, American elm.

U. pumila L.; Siberian elm, frequently sold as Chinese elm, introduced.

On leaves

Apiognomonina errabunda (Rob.) Hoehn.

Gnomonia ulmea (Schw.) Thüm. (stat. cond. Gloeosporium ulmeum Miles); leaf spot.

Phyllosticta ulmicola Sacc.; leaf spot.

On stem:

Ceratocystis ulmi (Buism.) Moreau, (stat. conid. Pesotum ulmi (Schwarz) Crane & Schoknecht. ≡ Graphium ulmi Schwarz); "Dutch elm disease"; wilt and dieback; the fungus carried by native elm bark beetle, Hylurgopinus rufipes, and European elm bark beetle, Scolytus multistriatus; this disease found for the first time in 1975 at several locations in Manitoba but not yet in Alberta or Saskatchewan.

Diplodia melanena Lév.

Dothiorella ulmi Verrall & May; wilt and dieback, commonly isolated from suspected "Dutch elm disease" samples.

Graphium penicillioides Corda; on the bark of elm attacked by native elm bark beetle, Hylurgopinus rufipes, found in Manitoba and Saskatchewan; could be confused with conidial state of Ceratocystis ulmi (Dutch elm disease) without microscopic examination.

Nectria cinnabarina Tode ex Fr. (stat. conid. Tubercularia vulgaris Tode); "coral spot"; canker and dieback; conspicuous pink to orange-red cushions (imperfect state) on stem.

Sphaeropsis ulmicola Ell. Ev.; twig canker.

Tubercularia ulmea Carter; "coral spot"; similar to conidial state of Nectria cinnabarina (Tubercularia vulgaris).

Valsa ambiens (Pers. ex Fr.) Fr. (stat. conid. Cytospora ambiens Sacc.)

Valsa sordida Nits. (stat. conid. Cytospora chrysosperma Pers. ex Fr.)

Verticillium albo-atrum Reinke & Berth.; wilt and dieback.

Verticillium cyclosporum (Grove) Mason & Hughes.

Root rot and decay:

Corticium vellereum Ell. & Cragin

Daedalea unicolor Bull. ex Fr.

Peniophora affinis Burt.

Peniophora cinerea (Fr.) Cke.

Pleurotus ulmarius (Bull. ex Fr.) Kummer; white spongy rot;
sporophores whitish, tough, off-centered stalks.

Polyporus conchifer (Schw.) Fr.

Polyporus hirsutus Wulf. ex Fr.

Polyporus tulipiferae (Schw.) Overh.

VIBURNUM

V. edule (Michx.) Raf.; low bush cranberry.

V. lentage L.; nannyberry, sweet viburnum.

On leaves:

Cercospora varida Pk.; leaf spot.

Coleosporium viburni Arth.; leaf rust, leaf blight (II, III); 0, 1
states on hard pines but not yet found in western Canada.

Microphaera penicillata (Wallr. ex Fr.) Lév. (=Microsphaera alni
(Wallr.) Wint.

Puccinia linkii Klotzsch; leaf rust (III); autoecious species.

Ramularia viburni Ell. & Ev.; leaf spot.

On stems:

Cryptosporella lentaginis (Ell. & Ev.) Rehm.

Dermea viburni Groves.

Diaporthe viburni Dearn. & Bisby.

Didymella manitobaensis Dearn. & Bisby.

Didymosphaeria epidermidis (Fr.) Fckl.

Eutype milliaria (Fr.) Sacc.

Root rot and decay:

Corticium centrifugum (Lév.) Bres.

Corticium contiguum Karst.

Host Index

alder, green	<u>Alnus crispa</u> (Ait.) Pursh
alder, mountain	<u>Alnus tenuifolia</u> Nutt.
alder, speckled	<u>Alnus rugosa</u> (Du Roi) Spreng.
apple	<u>Malus pumila</u> Mill.
ash, black	<u>Fraxinus nigra</u> Marsh.
ash, green	<u>Fraxinus pennsylvanica</u> Marsh. var. <u>subintegerrima</u> (Vahl) Fern.
ash, Manchurian	<u>Fraxinus mandchurica</u> Rupr.
basswood	<u>Tilia americana</u> L.
birch, alaska	<u>Betula neoalaskana</u> Sarg.
birch, dwarf	<u>Betula glandulosa</u> Michx.
birch, paper	<u>Betula papyrifera</u> Marsh.
birch, water	<u>Betula occidentalis</u> Hook.
birch, white	<u>Betula papyrifera</u> Marsh.
box-elder	<u>Acer negundo</u> L.
buffaloberry	<u>Shepherdia argentea</u> Nutt.
caragana	<u>Caragana arborescens</u> Lamb.
cedar, eastern white	<u>Thuja occidentalis</u> L.
cherry, choke	<u>Prunus virginiana</u> L.
cherry, pin	<u>Prunus pensylvanica</u> L. f.
cotoneaster	<u>Cotoneaster acutifolia</u> Turcz.
cottonwood	<u>Populus sargentii</u> Dode
cottonwood, black	<u>Populus trichocarpa</u> Torr. & Gray
cottonwood, eastern	<u>Populus deltoides</u> Bartr.
cottonwood, lanceleaf	<u>Populus acuminata</u> Rydb.

Host Index

cottonwood, yellow	<u>Populus angustifolia</u> James
crabapple	X <u>Malus adstringens</u> Zobel
crabapple, prairie	<u>Malus ioensis</u> (Wood) Britt.
cranberry, low bush	<u>Viburnum edule</u> (Michx.) Raf.
dogwood, alternate-leaved	<u>Cornus alternifolia</u> L. f.
dogwood, round-leaved	<u>Cornus rugosa</u> Lamb.
elm, American	<u>Ulmus americana</u> L.
elm, Chinese	<u>Ulmus pumila</u> L.
elm, Siberian	<u>Ulmus pumila</u> L.
elm, white	<u>Ulmus americana</u> L.
fir, alpine	<u>Abies lasiocarpa</u> (Hook.) Nutt.
fir, balsam	<u>Abies balsamea</u> (L.) Mill.
fir, subalpine	<u>Abies lasiocarpa</u> (Hook.) Nutt.
firethorn	<u>Cotoneaster pyrantha</u> (L.) Spach.
hawthorn, black	<u>Crataegus douglasii</u> Lindl.
hawthorn, golden-fruited	<u>Crataegus chrysocarpa</u> Ashe
hazelnut, American	<u>Corylus americana</u> Walt.
hazelnut, beaked	<u>Corylus cornuta</u> Marsh. (<u>C. rostrata</u> Ait.)
honeysuckle, bracted	<u>Lonicera involucrata</u> (Richards.) Banks
honeysuckle, fly	<u>Lonicera villosa</u> (Michx.) R. & S.
honeysuckle, hairy	<u>Lonicera hirsuta</u> Eaton
honeysuckle, swamp-fly	<u>Lonicera oblongifolia</u> (Goldie) Hook.
honeysuckle, tartarian	<u>Lonicera tartarica</u> L.
honeysuckle, twining	<u>Lonicera dioica</u> L. var. <u>glaucescens</u> (Rydb.) Butters
hop-hornbeam	<u>Ostrya virginiana</u> (Mill.) K. Koch
ironwood	<u>Ostrya virginiana</u> (Mill.) K. Koch

Host Index

juniper, common	<u>Juniprus communis</u> L.
juniper, creeping	<u>Juniperous horizontalis</u> Moench
juniper, western	<u>Juniperus scopulorum</u> Sarg.
Labrador tea, common	<u>Ledum groenlandicum</u> Oeder
Labrador tea, glandular	<u>Ledum glandulosum</u> Nutt.
Labrador tea, northern	<u>Ledum palustre</u> L. var. <u>decumbens</u> Ait.
larch, alpine	<u>Larix lyallii</u> Parl.
larch, Siberian	<u>Larix sibirica</u> Ledeb.
larch, subalpine	<u>Larix lyallii</u> Parl.
larch, western	<u>Larix occidentalis</u> Nutt.
lilac, amur	<u>Syringa amurensis</u> (Rupr.) Rupr.
lilac, common	<u>Syringa vulgaris</u> L.
maple, Manitoba	<u>Acer negundo</u> L.
maple, mountain	<u>Acer spicatum</u> Lam.
may-day tree	<u>Prunus padus</u> L. var. <u>commutata</u> Dipp.
mountain ash, American	<u>Sorbus americana</u> Marsh.
mountain ash, Green's	<u>Sorbus scopulina</u> Greene
mountain ash, showy	<u>Sorbus decora</u> (Sarg.) Schneid.
nannyberry	<u>Viburnum lentago</u> L.
oak, bur	<u>Quercus macrocarpa</u> Michx.
oleaster	<u>Elaeagnus angustifolia</u> L.
pear, common	<u>Pyrus communis</u> L.
pea-tree, Siberian	<u>Caragana arborescens</u> Lamb.
pine, eastern	<u>Pinus strobus</u> L.
pine, jack	<u>Pinus banksiana</u> Lamb.
pine, limber	<u>Pinus flexilis</u> James

Host Index

pine, lodgepole	<u>Pinus contorta</u> Dougl. var. <u>latifolia</u> Engelm.
pine, mugo	<u>Pinus mugo</u> Turra
pine, red	<u>Pinus resinosa</u> Ait.
pine, white bark	<u>Pinus albicaulis</u> Engelm.
plum, wild	<u>Prunus americana</u> Marsh.
poplar, balsam	<u>Populus balsamifera</u> L. (= <u>P. tacamahaca</u> Mill.)
red twin-berry	<u>Lonicera utahensis</u> S. Wats.
rose, common wild	<u>Rosa woodsii</u> Lindl.
rose, prairie	<u>Rosa arkansana</u> Porter (<u>R. alcea</u> Greene, <u>R. suffulta</u> Greene)
rose, prickly	<u>Rosa acicularis</u> Lindl.
Russian- olive	<u>Elaeagnus angustifolia</u> L.
saskatoon	<u>Amelanchier alnifolia</u> (Nutt.) Nutt.
serviceberry, western	<u>Amelanchier alnifolia</u> (Nutt.) Nutt.
silver-berry	<u>Elaeagnus commutata</u> Bernh.
soapberry	<u>Shepherdia canadensis</u> (L.) Nutt.
soopolallie	<u>Shepherdia canadensis</u> (L.) Nutt.
spruce, black	<u>Picea mariana</u> (Mill.) B.S.P.
spruce, Colorado	<u>Picea pungens</u> Engelm.
spruce, engelmann	<u>Picea engelmannii</u> Parry
spruce, mountain	<u>Picea engelmannii</u> Parry
spruce, Norway	<u>Picea abies</u> (L.) Karst.
spruce, white	<u>Picea glauca</u> (Moench) Voxx
tacamahac	<u>Populus balsamifera</u> L. (= <u>P. tacamahaca</u> Mill.)
tamarack	<u>Larix laricina</u> (Du Roi) K. Koch

Host Index

tamarack, western	<u>Larix occidentalis</u> Nutt.
trembling aspen	<u>Populus tremuloides</u> Michx.
viburnum, sweet	<u>Viburnum lentago</u> L.
willow, arctic	<u>Salix arctica</u> Pall.
willow, arctic-lover	<u>Salix arctophila</u> Cork.
willow, blue-green	<u>Salix glauca</u> L.
willow, brittle	<u>Salix fragilis</u> L.
willow, cracked	<u>Salix fragilis</u> L.
willow, large pussy	<u>Salix discolor</u> Mühl
willow, Pacific	<u>Salix lasiandra</u> Benth.
willow, peached-leaved	<u>Salix amygdaloides</u> Anderss.
willow, wolf	<u>Elaeagnus commutata</u> Bernh.

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