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EXCERPT FROM A REPORT OF A PATHOLOGICAL INSPECTION
OF MESA VERDE NATIONAL PARK AUGUST 16, 1941

Three species of *Gymnosporangium* were noted, of which one (*G. nelsoni*) was responsible for the epidemic condition on service berry. The other two species were *G. speciosum* and *G. inconspicuum* respectively. All are indigenous to the park, and their unusual abundance and frequency this year is undoubtedly due to extremely favorable climatic conditions which have temporarily favored prolific development. Unless these conditions should recur for several successive seasons serious damage to either the service berry or the juniper is not likely to follow, except the possibility mentioned in the following discussion of *Gymnosporangium nelsoni*.

All species of *Gymnosporangium* are dependent upon the presence of two host plants for their existence. The stage on Juniper produces spores which can only infect *Amelanchier* or related species and vice-versa. There are ten or more species known in Colorado of which only one, the cedar apple rust (*G. juniperi-virginianae*), is considered to be of economic importance. For this reason much is unknown regarding life histories and physiological requirements, facts which would be very important should control become advisable.

Description of *Gymnosporangiums* Found in Mesa Verde

G. nelsoni Arth.

On Junipers: *Juniperus utahensis*, *J. monosperma*, *J. scopulorum*.

Forms nearly spherical galls, half an inch to two inches in diameter which

eventually kill the twig or branch on which they occur. The spores occur in chestnut brown exudations from the galls which resemble thin films of gelatin in their appearance and behavior with respect to moisture. Spores may be produced for several successive years following infection, the duration being dependent on the time required for the affected twig or branch to die. On small trees a heavy infection is frequently fatal, and on large trees the rust sometimes causes such a heavy reduction in foliage that the tree is considerably weakened and death is premature, though not necessarily sudden. It is not at all impossible that the heavy infection on service berry this year will result in heavy infection of the juniper, the results of which will be a conspicuous dying of twigs and branches for several years to come.

On service berries: Noted on several species of Amelanchier and also on Peraphyllum ramosissimum or wild crab apple. Forms reddish cushion-like spots mainly on the leaves (rarely on fruits). On the upper side of the leaf, tiny black fruiting bodies appear; on the lower side of the leaf hornlike sacs of white tissue develop in which are enclosed a bit of red-orange powder consisting of spores. The sacs at maturity burst first at their tips and later along their sides, releasing the powdery spores which are capable of infecting junipers only.

G. speciosum Peck

On junipers: J. monosperma, J. utahensis. Forms elongate spindle-shaped swellings on branches and stems; in the case of large old stems the hypertrophy is frequently more tumour or canker-like than spindle-shaped. The spores are born in orange-red tongues of gelatin-like material about a

quarter of an inch or less high and frequently extending an inch or more along the axis of the branch or stem. The swellings are in general long-lived and produce successive crops of spores for many years. The rust is responsible for premature death of many attacked trees. Ellsworth Bethel, who collected rusts for many years in Colorado, states that when he visited the Mesa Verde country in 1897 and 1900 the rust was epidemic on Juniperus utahensis there.

On *Fendlera* and *Philadelphus* (*Philadelphus* was not observed within the Park): Effect is similar to the previous species except that the white spore sacs open at their tips only. *Fendlera* occurs as an occasional bush, never making a solid cover over several acres as is frequently the case with *Amelanchier* in the park.

G. inconspicuum Kern

On Junipers: Forms reddish brown films containing spores on foliated (rarely on woody) twigs. Trees attacked by this rust frequently can be detected by their dense foliage in the affected portions which strongly suggests witches' broom formation. The "brooms" are not nearly so distinct as in other species of *Gymnosporangium*.

On service berries: *Amelanchier* and *Peraphyllum*. Attacks chiefly fruits, causing reddish cushiony spots on which develop tiny black bodies and large horns or sacs as described for the previous species. The sacs are considerably larger than those of the foregoing species and open only at their tips. Badly attacked fruits presumably have little or no value as wildlife food.