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To the Graduate Council:

I am submitting herewith a thesis written by Arthur L. Welden entitled "A Taxonomic Survey of the Myxomycetes of the Great Smoky Mountains National Park." I recommend that it be accepted for twelve quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Botany.

Russell B. Stevens
Major Professor

We have read this thesis
and recommend its acceptance:

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Lowell J. Bailey

Accepted for the Council:

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Dean of the Graduate School

A TAXONOMIC SURVEY OF THE MYXOMYCETES OF THE GREAT SMOKY MOUNTAINS NATIONAL PARK

A THESIS

Submitted to
The Graduate Council
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Master of Science

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by

Arthur L. Welden

March 1951

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I. INTRODUCTION

Myxomycetes, with their curious combination of plant-like and animal-like characteristics, have intrigued biologists for over two centuries. Micheli in 1729 described several forms so accurately that his genera, and in some cases species, still can be recognized. Linnaeus, though contributing nothing himself, was able to include descriptions of seven species in his Species Plantarum. Micheli and Fries, among early biologists, recognized and commented on the plasmodial stage. They believed, as had their predecessors, that the Myxomycetes belong in the Gasteromycetes. Schrader in 1797 was one of the first to dissent from this view. However, final proof of the differences between Myxomycetes and Gastromycetes was provided by De Bary.

Modern understanding of this group began with De Bary (1854) who noted that the spores of Trichia rubuginosa,* on germination, gave rise to flagellated swarm-cells and not the expected mycelial tube. De Bary's monograph (1864), and Cienkowski's studies in 1863 on plasmodia, established the generalized life-cycle of slime molds.

The taxonomic position of Myxomycetes long has been a subject of debate. Some consider slime molds as protozoa and exclude them from the Plant Kingdom, (Bessey, 1950). De Bary referred to them at first as being among the lowest

* Now known as Hemitrichia vesparium.

animals, but later he concluded that the question whether they were plants or animals was of no consequence. Schroter (1899) considered that they are plants belonging to the phylum Myxothallophyta. Recently Martin (1932) has classified slime molds as a class of true fungi coordinate in rank with the Phycomycetes, Ascomycetes, and Basidiomycetes.

II. TAXONOMIC STUDIES

A. Introduction

Relatively little taxonomic work on Myxomycetes of The Great Smoky Mountains National Park has been done. Apparently only two papers on the slime molds of this region have been published. Mr. L. M. Cooley (1934) published a preliminary report on the Myxomycetes of Eastern Tennessee which included species occuring in the Park. Relying largely on specimens deposited in the herbarium at the University of Tennessee, Cooley did not include locations or elevations in his report. Since these specimens were destroyed by fire in 1934 at the University of Tennessee, it is no longer possible to distinguish species collected in the Park from those collected elsewhere. Dr. Robert Hagelstein,* on the 1939 foray of the Mycological Society of America, collected sixty-six species occuring within the Park. In the published report of that foray locations and elevations were omitted from the species list, but fortunately a few of his specimens are on file in the Mycological Herbarium of the University of Tennessee and are listed here in the appropriate places.

B. Methods

This study was confined to the area of The Great

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* See Linder, 1941.

Smoky Mountains National Park. The Park comprises parts of Blount, Sevier, and Cocke Counties in Tennessee and parts of Haywood and Swain Counties in North Carolina. Collections were made from October 20, 1949 through October 15, 1950, in all counties except Haywood County.

For the greater part of the study mature fruiting bodies were brought into the laboratory for identification. During the latter part of the work a bark-culture method was used to provide additional material.* In this procedure bark collected from likely locations is placed in Petri dishes and soaked with carbon-filtered, distilled water. After several days the water is decanted and the bark allowed to dry. If plasmodia were present, fructifications frequently appeared in from several days to three weeks. Occasionally rewetting and drying will yield additional specimens. Any fruiting bodies appearing on the wood must be harvested as soon as possible after maturity to avoid decay.

Keys appearing in this thesis are of the "punch-card" type, a departure from the conventional type. They were made with the help of Dr. R. B. Stevens. Rocket Analysis cards,** 8" by 5", are used and the keys prepared

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* Suggested by Mr. R. K. Benjamin, University of Illinois

** Obtainable from Charles Hadley and Company

in much the same manner as for a card index. A series of diagnostic characters were listed and each assigned a number. A species of slime mold was taken, a card assigned to it and, whenever a characteristic of the species agreed with one on the original list, the card was punched at the appropriate hole. Generic characters were punched on the top and left-hand side of the card, specific characters on the bottom and right-hand side.

To use this key a steel needle is inserted into the hole bearing the same number of the characteristic noted in the unknown specimen. Lifting the needle allows all cards for genera with that character to drop out of the "deck". The same procedure is used to determine species. This type of key has the distinct advantage of flexibility as to the order in which decisions may be made. Each decision is entirely independent of any other decision and one can choose the most obvious first. Determination of genus before species is the only instance wherein one must adhere to a given sequence.

These cards also make a convenient place to keep collection data and other pertinent information.

C. Keys and Annotated Lists

All descriptions and authorities for generic and specific names are those appearing in Martin's North

American Flora (1949). This monograph was used freely in the preparation of the keys to genera and species. For synonyms and illustrations the reader is referred to that work. Specific names used by Hagelstein have been changed, when necessary, to conform with those employed by Martin. While other descriptions were sometimes used, North American Flora seems to best describe the forms occuring in this area. Exsiccati collected are deposited in the Mycological Herbarium, University of Tennessee, Knoxville.

Other collections of workers in this area which have been deposited in the University of Tennessee's Mycological Herbarium and have not been previously reported are included with their names appearing with their collections.

KEY TO GENERA

The number which appears to the right of the characteristic is the number punched on the analysis card.

Spore characters

Spores borne externally upon "fruiting tips".....1

Spores borne internally within spore cases.....2

Spores in mass pallid or bright-colored to dingy-olivaceous, hyaline or subhyaline by transmitted light, rarely dingy-blackish.....3

Spores in mass black or deeply violaceous to ferruginous, rarely colorless.....4

Fructification characters

A. Type of fructification

Sporangiate.....5

Aethalial.....6

Pseudoaethalial.....7

Plasmodiocarpous.....8

B. Lime present

on peridium only, amorphous.....9

on peridium only, crystalline, stellate.....10

on peridium only, crystalline, scale-like....11

on stipe, columella and sometimes hypothallus but never on peridium and capillitium.....12

C. Peridium

fugacious, net derived from sporangial walls meeting at expanded nodes.....13

fugacious, net derived from sporangial walls not meeting at expanded nodes, threads longitudinally parallel.....14

fugacious, parts of it adhering to capillitium as platelets.....15

with dictydine granules.....16

dictydine granules absent.....17

net from sporangial walls lacking.....18

persistent.....19

fugacious.....20

Capillitial characters

A. present or absent

absent, pseudocapillitium absent.....21

absent, pseudocapillitium present.....22

present, variously marked.....23

present, smooth and unmarked.....24

present, of solid threads.....25

B. Markings

with warts, cogs, rings, or spines but never spines.....26

distinctly spiralled.....27

always smooth.....28

faintly spiralled.....29

C. Coloring

pink, rose or red.....30

yellow or some shade of yellow.....31

usually darkish, purplish or ferruginous.....33

colorless or white.....34

D. Columella

present, giving rise along its length to a capillitium whose ultimate ends are united to form a surface net.....35

present, giving rise along its length to a capillitium whose ultimate ends are free.....36

present, giving rise at its tip to a capillitium whose ultimate ends are united to platelets left after peridium has dehisced....37

present, giving rise at its tip to a capillitium, long persistent peridium.....38

present, but not giving rise to a capillitium, or if giving rise to a capillitium not in a characteristic fashion.....39

present, extending nearly to apex of sporangium where it expands into a disk from which the capillitium depends.....40

absent.....41

E. Threads

Short, free elaters.....42

Long, sometimes united into a net.....43

F. Calcium present or absent

threads connecting calcareous nodes.....44

capillitium of calcareous tubules of approximately equal diameter.....45

composed of both calcareous tubules and non-calcareous threads.....46

lime absent.....47

Class MYXOMYCETAE

Assimilative phase a multinucleated mass of protoplasm, the plasmodium, naked or in part composed of branching veins differentiated into two zones or regions: the outer region composed of an amorphous gelat'nous sheath, and an inner region of active protoplasm. The plasmodium grows immersed within the interstices of wood, bark, leaves, dung, soil or litter, emerging to the surface before fruiting and capable of movement within or upon the substratum. Reproductive phase is characterized by spores or spore-like cysts, sometimes borne externally on individual stalks, usually in the interior of spore cases, these are usually seated on a horny, spongy, or calcareous base, the hypothallus. Spores, on germination, give rise to one or more naked myxamoebae or swarm cells. Under unfavorable conditions, the plasmodium sometimes is transformed into a horny, resistant mass, the sclerotium, consisting of multinucleate cell-like units capable of resuming plasmodial characters under favorable conditions.

Subclass 1. EXOSPOREAE

Hypothallus usually continuous sending up erect pillars constituting sporophores which may anastomose or branch repeatedly, forming scattered or continuous fructi-

fications often of wide extent. Entire surface of the pillars and often the basal portions areolate, each areole giving rise to a slender stalk tipped by a spore.

Order. CERATIOMYXALES

With the characters of the subclass.

Family 1. CERATIOMYXACEAE

With the characters of the subclass.

1. CERATIOMYXA Schroet. in E. & P.

Nat. Pfl. 1: 16. 1889.

With the characters of the family.

2. Ceratiomyxa fructiculosa (Mull.) Macbr.

N. Am. Slime-Moulds 18. 1899.

Fructifications white or yellowish, rarely pinkish, greenish, or apricot, arising from a broadly effused and sometimes fertile hypothallus as clusters of erect pillars which may be branched in dendroid fashion or unbranched, branches varying from a few, short and thick, to very numerous, filiform and anastomosing, rarely forming a fertile crust without erect branches; total height 1-10 mm., occasionally more; spores smooth, hyaline, variable

in size and shape but predominately oval or ellipsoid, 10-13 by 6-7 microns; plasmodium watery, yellow or tinted with pink, apricot or green.

Ramsey Cascades, log, 3170 ft., no. 19854; Ft. Harry, log, 3200 ft., no. 19853; Near Park Headquarters, log, 1500 ft., no. 19855; Greenbrier Cove, log, 1680 ft., no. 19856; Deals Gap, conifer stump, 1955 ft., no. 19857; Cades Cove, log, 1800 ft., no. 19858.

Distribution: Blount, Sevier, Swain Counties; May through August.

Subclass 2. MYXOGASTRES

Hypothallus usually amorphous, rarely conspicuous, horny substratum, sometimes apparently lacking. Spores borne internally within fructifications of various forms; peridium or cortex frequently fugacious in part or in whole at maturity. Spore, on germination, producing one or two, rarely more, swarm cells or myxamoebae.

Order. LICEALES

Spores pallid, yellow or olivaceous or dingy-blackish in mass, by transmitted light hyaline or subhyaline to smoky, never bright purplish. True capillitium absent.

Pseudocapillitium present or absent, often well developed and conspicuous.

Family 1. LICEACEAE

Fructification of separate sporangia, small plasmodiocarps, or sporangia closely massed to form a pseudoaethalium. Capillitium lacking. Pseudocapillitium occasionally present.

1. LICEA Schrad. Nov. Gen. Pl. 16. 1797.

Fructification of small, sessile or stalked sporangia or of small plasmodiocarps. Capillitium lacking. Spores in mass usually dingy, pallid, ochraceous, olivaceous, or brownish, by transmitted light hyaline to subhyaline or rarely dark, smooth or spiny.

11. Licea operculata (Wingate) G. W. Martin, Mycologia 34: 702. 1942.

Sporangia scattered, stalked, urn-shaped or subglobose, dull brown to blackish, 0.1-0.3 mm. in diameter, with a membranous, yellow, iridescent or vernicose lid; total height 0.4-1 mm.; stalk subcylindric, attenuate above, rough, furrowed, nearly black; spores yellowish in mass, colorless by transmitted light, globose, smooth, 8-11 microns in diameter; plasmodium dull orange.

Trail to Bull Head Mountain, conifer log, 2750 ft., no. 19859, bark culture.

Distribution: Sevier County; August.

2. TUBIFERA J. F. Gmel. Syst. Nat. 2: 1472. 1791.

Sporangia cylindric or ellipsoid, connate in a thick, spongy hypothallus forming a pseudoaethallium. Walls membranous, granular, persistent. Dehiscence apical. Capillitium lacking. Pseudocapillitium regularly present in one species, occasionaly represented in others as threadlike processes presumably derived from the wall of the abortive sporangia.

KEY TO SPECIES

91- Hypothallus expanded; spores 6-8 microns in diameter. . . . . .T. ferruginosa.

90- Hypothallus stalk-like; spores under 6 microns in. . . diameter. . . . . .T. microsperma.

1. Tubifera ferruginosa (Batsch) J. F. Gmel. Syst. Nat. 2: 1472. 1791.

Sporangia cylindric to ovoid, to 5 mm. tall and 0.4 mm. wide, usually crowded and angular from pressure, forming a pseudoaethalium up to 15 cm. or more in extent, sometimes loosely clustered, pale umber to deep reddish-brown or

purplish-brown; peridium thin, translucent, iridescent, persistent; dehiscence apical or, when the sporangia are closely compacted, by breaking away of their tips as lids; hypothallus well developed, cellular to spongy, colorless or pallid until colored by the spores; spores umber-brown in mass, pallid by transmitted light, globose, reticulate over about three-fourths of their surface, 6-8 microns in diameter; plasmodium colorless or white, becoming rose, then brown.

Cades Cove, log, 1800 ft., no. 19860; trail to Bull Head Mountain, conifer log, 2750 ft., no. 19861; Gregory's Bald, log, 4948 ft., no. 15197, J. P. Porter; The Sinks, log, 1565 ft., no. 15198, J. P. Porter; The Sinks, log, 1565 ft., no. 15199, J. P. Porter.

Distribution: Blount and Sevier Counties; July through September.

2. Tubifera microsperma (Berk. & Curt.) G. W. Martin
Mycologia 39: 461. 1947.

Sporangia angular-cylindric, to 4 mm. tall and 0.4 mm. wide, crowded into a subglobose or hemispheric pseudoaethalium upon a spongy, stem-like, sulcate hypothallus 2-6 mm. tall; peridium thin, translucent, evanescent; total height to 10 mm.; spores umber-brown in mass, reticulate

over two-thirds of the surface, globose, 4.5-5.5 microns in diameter; plasmodium white, then red.

Collected by Dr. Robert Haglestein in 1939.

Family 2. RETICULARIACEAE

Fructification an aethalium, in Alwisia stalked and sporangium-like. Capillitium lacking. Pseudocapillitium always present in the form of simple or branched tubes, threadlike portions or internal walls, or frayed or perforated membranes. Spores brown or pallid in mass, subhyaline by transmitted light.

2. LYCOGALA Micheli; Adans. Fam. Pl. 2: 7. 1763

Fructification an aethalium. Peridium tough, externally versiculose, traversed by interlocking tubular structures which pierce the homogenous inner layer and merge with the tubes of the pseudocapillitium of branched or simple tubes, variously sculptured or nearly smooth. Spores gray or pinkish in mass, colorless by transmitted light.

KEY TO SPECIES

91- Aethalium subglobose, pallid to blackish, 3-12 mm. in diameter; cortex minutely roughened to warted. . . . .

. . . . . .L. epidendrum.

90- Aethalium subglobose, dark brown to black, 2-5 mm. in diameter; peridium marked with black scale-like warts, often tessellate. . . . . L. exiguum.

1. Lycogala epidendrum (L.) Fries, Syst. Myc. 3: 80. 1829.

Aethalia scattered or crowded, subglobose to depressed-spherical or irregular from pressure, pinkish-gray or yellowish-brown to deep olivaceous to nearly black, 3-15 mm. broad; cortex warted with yellow to brownish-black scale-like warts or merely roughened, rather thin and fragile; dehiscence apical; pseudocapillitium composed of long, branching and anastomosing flattened tubes marked with conspicuous transverse folds and wrinkles, the main branches near the origin of the inner side of the cortex, 12-25 microns in diameter, the secondary branches 6-12 microns in diameter, the numerous free ends clavate or obtuse; spores at first pinkish-gray in mass, changing to pale ochraceous or pallid, by transmitted light colorless, globose, reticulate, 6-7.5 microns in diameter; plasmodium coral-red.

Beech Gap along road to Clingman's Dome, 5100 ft., no. 19862; Deals Gap, log and moss, 1955 ft., no. 19863; Greenbrier Cove, log, 1680 ft., no. 19864; Ft. Harry, stump,

3200 ft., no. 19865; Chimney's Parking Area, log, 3500 ft., no. 19866; Cades Cove, deciduous log, 1800 ft., no. 19867; Trillium Gap trail, stem, 3562 ft., no. 19868; Elkmont, log, 2146 ft., no. 19869; the Sinks, log, 1565 ft., no. 1518, J. P. Porter.

Distribution: Blount, Sevier, and Swain Counties; January through October.

2. Lycogala exiguum Morgan, Jour. Cinc. Soc. Nat. Hist. 15: 134. 1893.

Aethalia scattered or gregarious, subglobose, small, 2-5 mm. in diameter; cortex yellow-brown, thickly covered with dark purplish or black scale-like patches, which may be nearly confluent and which are usually divided internally into numerous chambers; dehiscence beginning by an apical tear, soon irregular; pseudocapillitium composed of colorless, branching tubules arising from the inner portion of the cortex, somewhat wrinkled transversely, 2-10 microns in diameter; spores ochraceous in mass, by transmitted light colorless, marked with faint irregular warts and line, 5-6 microns in diameter; plasmodium probably pink or red.

Hickory Flats Creek, log, 1560 ft., no. 19870; base of Camel Hump Mountain, stump, 2500 ft., no. 19871.

Distribution: Sevier and Cocke Counties. June-July.

Family 3. CRIBARIACEAE

Sporangiate or, in one genus, varying to aethalioid. Sporangial walls membranous, dotted with numerous dark dictydine granules, some of which usually occur on the spores. Peridium fragile, fugacious except for the net-like thickenings which typically remain as an enclosure about the spore chamber. Capillitium none. Spores yellow, brown, red, or purple in mass, pale by transmitted light.

1. LINBLADIA Fries, Summa Veg. Scand. 449. 1849.

Hypothallus thick, spongy. Fructification varying from a pulvinate aethalium with a continuous cortex through a pseudoaethalium to a cluster of sessile or substipitate sporangia. Dictydine granules present. Spores ochraceous in mass.

1. Lindbladia effusa (Ehrenb.) Rost.; Fuckel, Jahrb. Nass. Ver. Nat. 27-28: 68. 1873

Sporangia, when appearing in sporangiate form, 0.3-0.7 mm. in diameter, bright olivaceous to blackish, often more or less iridescent; entire fructification 2-20 cm. or more in extent; in aethalioid forms the membranes, which are

thickly dotted with dictydine granules, remain as a pseudocapillitium; net lacking or occasionally imperfectly developed; spores pallid by transmitted light, globose, faintly warted, 6-7.5 microns in diameter; plasmodium nearly black.

Clingman's Dome, log of Abies Fraseri, 6642 ft., no. 20041.

Distribution: Sevier County; July.

2. CRIBARIA Pers. Neues Mag. Bot. 1: 91. 1794.

Sporangiate, globose to pyriform, usually stalked, sometimes sessile. Sporangial wall thickened above and sometimes below in net-like fashion, at maturity fugacious except for the net and often the lower portion of the sporangium. Dictydine granules present on the cup and net and usually on the spores.

KEY TO SPECIES

91- Cup lacking, replaced by 8-15 firm ribs radiating from the tip of the stalk. . . . . C. splendens.

90- Cup lacking; sporangium 0.4-0.7 mm. in diameter; stalk stout, less than 6 times the diameter of the sporangium . . . . . C. intricata.

89- Cup present, margin between it and the net faint; per-

forated margin of the cup merging with the reticulations of the net; net lax. . . . . C. macrocarpa.

88- Stalk long, usually more than four times the diameter of the sporangium; sporangium over 0.3 mm. in diameter; aspect yellow-brown or ochraceous; few ends in net . . . . . .C. tenella.

87- As above (no.88) except few ends in net numerous; stalk relatively stout; cup often lacking. . . . C. intricata.

86- Stalk relatively short, less than 4 times the diameter of the sporangium; sporangium over 0.3 mm. in diameter; dictydine granules 2 microns in diameter or less; aspect dull orange or ferruginous; net lax and irregular with flat nodes. . . . . C. rufa.

85- As above (no. 86) except without ferruginous tints; meshes of the net small; spore mass bright yellow to bright olivaceous; on wood. . . . . .C. aurantiaca.

84- Sporangia bright rose-purple, 0.3-0.5 mm. in diameter. . . . . .C. elegans.

83- Sporangia bright rose-purple, 0.6-1.2 mm. in diameter. . . . . .C. purpurea.

1. Cribaria splendens (Schrad.) Pers.

Syn. Fung. 191. 1801

Sporangia gregarious, globose, 0.3-0.7 mm. in

diameter, ochraceous when filled with spores, dull to dusky brown when these are discharged, stipitate; stalk long 3-4 times the diameter of the sporangium, subulate, erect or nodding, purplish-brown; hypothallus small; net brown with large meshes, imperfectly defined, flattened nodes and flattened threads; dictydine granules small; cup none, its place supplied by nine to ten distinct, firm ribs which radiate from the stipe and support the net, branching to blend with its reticulations, occasionally partially connected by a delicate hyaline membrane; spores ochraceous in mass, colorless by transmitted light, smooth or nearly so, 6-7 microns in diameter, plasmodium lead-colored.

Bull Head Mountain trail, conifer bark, 2500 ft. no. 19872, bark-culture; Fork Ridge - Bryson City trail, log, 5500 ft., no. 19873.

Distribution: Sevier and Swain Counties; July through September.

2. Cribaria intricata Schrad. Nov. Gen. Pl. 7. 1797.

Sporangia gregarious, globose, stipitate, nodding, dusky brown, 0.5-0.7 mm. in diameter; stalk 1.5-3 mm. long, slender, furrowed, tapering upward, dark brown; cup present or absent, when present varying from bowl-like and occupying

the lower third of the sporangium, through shallow and saucer-like to basal disk; net regular, the nodes dark, prominent, thickened, expanded, angular, each giving rise to 5-8 connecting threads and numerous free ends, meshes of medium size, often triangular; hypothallus conspicuous; spores ochraceous in mass, pallid by transmitted light, spinulose, 6-7 microns in diameter; plasmodium greenish, lead colored, or brownish black.

Greenbrier Cove, conifer log, 1680 ft., no. 19874; Cades Cove, log, 1800 ft., 19875.

Distribution: Blount and Sevier Counties; June.

3. Cribaria macrocarpa Schrad. Nov. Gen. Fl. 8. 1797.

Sporangia more or less closely, gregarious, stipitate, yellowish-brown or bronze, pear-shaped or obovate, large 0.8-1 mm. in diameter; stalk brown, furrowed, erect or more often nodding, almost equal to the sporangium or longer, arising from a thin, iridescent hypothallus; cup distinct marked by numerous dark brown radiating ribs, iridescent, perforate above, deeply dentate, and merging gradually into the network, of which the dark nodes are more distinctly expanded about half way up, less so at the apex and below, the filaments exceedingly delicate, simple, with occasional

free ends projecting into the small meshes; spores yellowish in mass, almost colorless by transmitted light, minutely roughened, 7-8 microns in diameter; plasmodium slate-colored.

Trail to Hannah Mountain, conifer log, 2550 ft., no. 19876.

Distribution: Blount County; August.

4. Cribaria tenella Shrad. Nov. Gen. Pl. 6. 1797.

Sporangia gregarious, globose, small mostly 0.3-0.5 mm. in diameter, olivaceous or ochraceous, long-stipitate, nodding; stalk slender, dark brown or blackish, very long, reaching 6 mm. in length, weak and flexuous; cup variable, sometimes well defined, brown, costate, sometimes represented by the costae only, connected by a thin transparent membrane, rarely obsolete; net well differentiated, the meshed part small, irregular, the nodes small, black, prominent, rounded, connected by transparent threads, free ends usually few; spores olivaceous-ochraceous in mass, pallid by transmitted light, globose, almost smooth, 5-7 microns in diameter.

Deals Gap, conifer log, 1955 ft., no. 19877.

Distribution: Swain County, August.

5. Cribaria rufa (Roth) Rost. Monog. 232. 1875.

Sporangia scattered, subglobose or turbinate, stipitate, erect, dull brick-red or reddish-orange, 0.5-0.7 mm. in diameter; stalk about equaling the height of the sporangium or longer, dark brown or black; cup one-third to one-half the sporangium, the margin toothed, the wall ribbed and continuous with the open, wide-meshed net; net yellow or orange, the threads flattened, the nodes expanded but not thickened, bearing large, pale granules about 2 microns in diameter, free ends none; spore concolorous in mass, pale yellow by transmitted light, verruculose, 5-7 microns in diameter; plasmodium white.

Indian Camp Creek, chestnut log, 3750 ft. no. 19878; Fork-Ridge - Bryson City trail, log, 5500 ft., no. 19879; Andrews Bald, log, 5860 ft., no. 19880.

Distribution: Swain and Cocke Counties; July through October.

6. Cribaria aurantiaca Schrad. Nov. Gen. Pl. 5. 1797.

Sporangia gregarious, globose, stipitate, nodding, yellowish or dusky, 0.4-0.7 mm. in diameter; stalk subulate,

dark, 2-4 times the height of the sporangium; cup prominent, about one-third the height of the sporangium, marked by delicate radiating veins, the margin denticulate, the teeth numerous, slender; net irregular, the nodes broad, flattened, branching and angular, the threads slender, with few free ends; dictydine granules small, 0.5-1 microns in diameter; spores bright yellow to bright ochraceous in mass, colorless by transmitted light, minutely punctate, 5-6 microns in diameter; plasmodium slate-gray or greenish.

Cades Cove (Old Mill), log. 1800 ft., no. 19881; Andrews Bald, conifer log, 5860 ft., no. 19882; trail to Hannah Mountain, log, 2550 ft., no. 18993; Greenbrier Cove, log, 1680 ft., no. 19884.

Distribution: Blount, Sevier, and Swain Counties; June through October.

7. Cribaria elegans Berk & Curt.; Berk.
Grevillea 2: 67. 1873.

Sporangia gregarious, globose, stipitate, erect or nodding, 0.3-0.5 mm. in diameter, deep lilac or rose-purple; stalk long, slender, tapering upward, almost black, arising from a scanty hypothallus; calyculus about one-third the sporangium, finely ribbed, covered, especially above, with small purple granules, the margin toothed or

perforate; net well developed, the meshed small, polygonal, the threads delicate, colorless with many free ends, the nodes dark, numerous, rather prominent; spores purple in mass, pale violaceous by transmitted light, smooth, 6-6.5 microns in diameter.

Cades Cove, log, 1800 ft., no. 15102, Hagelstein.

Distribution: Blount County; August.

8. Cribaria purpurea Schrad. Nov. Gen.
Pl. 8. 1797.

Sporangia gregarious, depressed-globose, stipitate, erect, large, 0.6-1.2 mm. in diameter, reddish-purple; stalk concolorous, furrowed about twice the diameter of the sporangium in length, on a distinct hypothallus; calyculus persistent, occupying less than half the sporangium, obscurely ribbed and sometimes marked by concentric plications, the margin toothed; net poorly differentiated, the meshes and the flat nodes, unthickened, irregular in form and size, the threads pale and broad, the free ends short and not numerous; spores rose-purple in mass, pale or colorless by transmitted light, nearly smooth, 5-7 microns in diameter; plasmodium scarlet.

Fork Ridge - Bryson City Trail, log, 5500 ft., no. 19885; Mt. Le Conte, log, 6593 ft., no. 19886, J. P. Porter,

Distribution: Blount County; August.

3. DICTYDIUM Schrad. Nov. Gen. Pl. 11.
1797.

Sporangiate, the sporangia stalked, globose or depressed-globose. Peridium delicate, evanescent except for a net composed mainly of prominent longitudinal ribs extending from the base of the sporangium or the margin of the cup nearly or quite to the apex, joined by very slender transverse filaments, sometimes forming an irregular network at the apex or the base. Cup lacking or well developed, but shallow.

1. Dictydium cancellatum (Batsch)
Macbr. N. Am. Slime-Moulds 172. 1899.

Sporangia gregarious, often forming extensive fruitings, often umbilicate above, deep reddish-brown or brownish-purple; stalk pale above, otherwise concolorous or dark, subulate, long, usually twisted at the tip or sometimes irregular, especially above; dictydine granules large, dark, on the net and on the spores; spores reddish or purplish in mass, pale red by transmitted light, globose, nearly smooth, 5-7 microns in diameter.

Fir Island on Tennessee Highway 71, log, 4000 ft., no. 19887; Ft. Harry, log, 3200 ft., no. 19888; Trillium Gap Trail, conifer log, 3562 ft., no. 19889; Indian Camp Creek, log, 3750 ft., no. 19890; Cades Cove, log, 1680 ft., 19892; Cades Cove, log, 1800 ft., no. 15108, Hagelstein.

Distribution: Blount, Sevier, and Cocke Counties; June through August.

Order. TRICHIALES

Spores in mass bright-colored, yellow, orange, or red, hyaline or subhyaline by transmitted light. Capillitium always present, threadlike, usually sculptured, free or attached.

Family 1. DIANEMACEAE

Sporangiate or plasmodiocarpous, rarely short-stipitate. Peridium usually single or occasionally with a granular outer layer. Capillitium of solid threads either coiled and hair-like or nearly straight, attached to the base of the peridium, simple or, if branched, the branching at wide angles, smooth or with minute sculpturing.

3. PROTOTRICHIA Rost. Monog. Append. 38. 1876.

Sporangiate, sessile, rarely short-stipitate or subplasmodiocarpous. Peridium thin, transparent. Capillitium of solid threads, often twisted about each other in spirals, attached at the base of the sporangium and becoming subdivided above, the penicillate tips attached to the upper wall. Spores brown in mass, pinkish in transmitted light.

1. Prototrichia metallica (Berk.) Massee, Jour. Roy. Micr. Soc. 1889: 350. 1889.

Sporangia 0.5-2 mm. in diameter, orange-brown to dull brown, sometimes rosaceous; peridium thin, transparent,

iridescent, bearing on its inner surface the persistent ends of the capillitial threads; capillitium of numerous brown threads, sometimes anastomosing to form a network at the bases and tips, the extremities attached to the upper wall; spores orange-brown to brown in mass, pallid or pinkish by transmitted light, spiny, 10-13 (15) microns in diameter; plasmodium white.

Collected by Dr. Haglestein in 1939.

Family 2. TRICHIACEAE

Plasmodiocarpous or sporangiate, sessile or stalked. Capillitium of tubular threads, simple, branched or united into a net, free, or attached at the base, nearly smooth or more commonly strongly sculptured in characteristic fashion.

1. PERICHAENA Fries, Symb. Gast. 11. 1817.

Sporangiate to plasmodiocarpous. Peridium double, the outer layer granular, occasionally calcareous, sometimes poorly developed, the inner membranous, closely attached. Capillitium of simple or branched tubular threads, slightly roughened, warted, or spiny. Spores yellow, minutely warted or spinulose.

KEY TO SPECIES

91- Fructifications predominately plasmodiocarpous, of dark reddish-brown, short, stout, curved, often ring shaped plasmodiocarps. . . . . P. chrysosperma.

90- Fructifications predominately sporangiate; sporangia greatly flattened on a broad base, usually densely aggregated and angular from mutual pressure; dehiscence circumscissile. . . . . .P. depressa.

1. Perichaena chrysosperma (Currey) Lister, Mycet. 196. 1894.

Plasmodiocarpous, flexuous, arcuate or annular to subreticulate, occasionally shortened to spherical, 0.2-0.5 mm. in diameter, rarely stalked, ochraceous-brown to dark chestnut or nearly black; peridium double, the outer layer composed of granular material, sometimes incomplete or lacking except at the base, the inner thin, translucent; dehiscence irregular or areolate or sometimes, in the globose fruitings, circumscissile; capillitium of slender threads, variable in quality, minutley to strongly spinulose; spores yellow in mass, spinulose, 7-10 microns in diameter; plasmodium white upon emergence, becoming brownish, pinkish-gray, or rose.

Ft. Harry, log, 3200 ft. no. 19893; Near Newfound Gap,

log, 4200 ft., no. 15132, Hagelstein.

Distribution: Sevier and Swain Counties; March and August.

2. Perichaena depressa Libert, Pl. Crypt. 378. 1837.

Sporangiate, depressed-pulvinate, crowded and polygonal by mutual contact, rarely scattered, 0.1-1 mm. in diameter, chestnut to dark purplish-brown or nearly black, sometimes hoary form evaporation residue or impregnated with crystalline lime; dehiscence circumscissile, by a definite performed lid; capillitium of slender, branched, yellow threads 2-3 microns in diameter, minutely warted and often displaying numerous globose or elliptic expansions, usually abundant but sometimes rather scanty; spores deep yellow in mass, paler by transmitted light, minutely warted, 9-12 microns in diameter; plasmodium white or yellowish.

Cades Cove, conifer log, 1800 ft., no. 19894.

Distribution: Blount County; March.

3. ARCYRIA (Hill) Wiggers, Prim. Fl. Holsat. 109. 1780.

Sporangia subcylindric, ovoid or globose, stipitate or sometimes sessile by a point. Peridium thin, fugacious

above, typically separating by a definite line of dehiscence just above the base, the lower portion remaining as a persistent, cup-like or saucer-like calyculus, the margin between the calyculus and the persistent peridium not distinct in some species. Stalk often packed with cellular vesicles resembling spores, but larger. Capillitium netted, elastic, frequently expanding to more than twice the height of the sporangium after the disappearance of the peridium, attached to the sides of the calyculus or merely to the center at the summit of the stipe and then breaking away freely, variously marked with half-rings, cogs, warts, spines, reticulations, or occasionally with inconspicuous spiral bands. Spores concolorous in mass, hyaline or bright-colored by transmitted light.

KEY TO SPECIES

91- Capillitium almost free from cup; capillitium marked with transverse plates, cogs, and half-rings arranged in an open spiral. . . . . A. incarnata.

90- Capillitium firmly attached to the cup. . . . . .A. cinerea, A. insignis, A. denudata.

89- Sporangia white, pale gray to ochraceous or rarely dull greenish, cylindruc; stalks often united; capillitium marked with dense spines. . . . . A. cinerea?

88- Sporangia bright rose to pale salmon; small; capillitium

marked by distinct cogs or half-rings arranged spirally. . . . . A. insignis.

87- Sporangia bright red to brick-red, weathering to reddish -brown; larger; capillitium marked by transverse bands and spines in loose spirals. . . . . .A. denudata.

1. Arcyria incarnata (Pers.) Pers. Obs. Myc. 1: 58. 1796.

Sporangia crowded, cylindric, stalked or nearly sessile, 1-2 mm. tall, 0.5-0.8 mm. broad, becoming greatly expanded, rosaceous to crimson, weathering to brown; peridium evanescent except for the shallow, saucer-like, inwardly roughened, usually plicate calyculus; stalk usually short, sometimes merely a point, concolorous or darker, arising from a dull red, inconspicuous, but often continuous hypothallus; capillitium loose, very elastic, expanding to twice the original height of the fructification or more, consisting of a network of rosy threads 3-5 microns in diameter, ma rked with transverse plates, cogs, and half-rings arranged in an open spiral, attached to the calyculus at the center only and breaking away freely; spores rosy in mass, colorless by transmitted light, marked with a few scattered warts, 7-8 microns in diameter; plasmodium white.

Near Cherokee Orchard, wood, 220 ft., no. 15089,

Hagelstein; Cades Cove, wood, 1800 ft., no. 19895; Indian Camp Creek, log, 3750 ft., no. 19896; Greenbrier Cove, log, 1680 ft., no. 19897; Park Headquarters, log, 1500 ft., no. 19898; Hickory Flats Creek, deciduous log, 1500 ft., no. 19899.

Distribution: Blount, Sevier, and Cocke Counties; May through August.

2. Arcria cinerea (Bull.) Pers. Sym. Fung. 184. 1801.

Sporangia stipitate, scattered, gregarious, or united by their stalks into clusters of 2-20 or more, ovoid or subcylindric, rarely broadly ovate, 0.1-0.8mm. in diameter, 0.3-4 mm. tall, pale gray or drab to pallid-ochraceous, rarely greenish; peridium fugacious except for fragments which often remain attached to the expanded capillitium; calyculus concolorous or darker, often nearly black, crowded with spore-like cells, more or less fused with others in clustered developments; capillitium firmly attached to the cup, the meshes close, the threads 2-4 microns in diameter, wider below, densely spinulose; spores pale gray or yellowish in mass, colorless by transmitted light, with a few scattered warts that are inconspicuous, 6-8 microns in diameter; plasmodium white, less commonly gray or yellowish.

Cades Cove, deciduous log, 1800 ft., no. 15163, J. P. Porter; Near Park Headquarters, log, 1500 ft., no. 19900; Cades Cove, log 1800 ft., no. 19901; Indian Camp Creek, stem, 3750 ft., no. 19902; Along Tennessee Highway 73, log, 1927 ft., no. 19903; Near Camel Hump Mountain., log, 3250 ft., no. 19904; Greenbrier Cove, log, 1680 ft., no. 19905; trail to Bull Head Mountain., deciduous bark, 2500 ft., no. 19906, bark-culture; back of the Sinks, log, 1565 ft., no. 19907.

Distribution: Blount, Sevier and Cocke Counties; May through August.

3. Arcyria insignis Kalchb. & Cooke; Kalchbr. Grevillea 10: 143. 1882.

Sporangia gregarious or clustered, or occasionally solitary, stipitate, bright rose to pale salmon, occasionally fading to yellowish, ovate or cylindric, 0.5-1.5 mm. tall; stalk rather short, 0.2-0.4 mm. in height, reddish; capillitium a close network of delicate threads usually with a few bulbous free ends, beset with transverse bands and spines arranged in a loose spiral, in part minutely spinulose to nearly smooth, attached to the calyculus; spores colorless by transmitted light, with a few scattered and inconspicuous warts, 6-8 microns in diameter; plasmodium watery white.

Deals Gap, conifer log, 1955 ft., no. 19908; Cades Cove, log, 1800 ft., no. 19910.

Distribution: Blount and Swain Counties; June through August.

4. Arcyria denudata (L.) Wettst. Verh. Zool.-Bot. Ges. Wein 35: Abh. 535. 1886.

Sporangia crowded or gregarious, stalked, ovoid or short-cylindric, tapering upward, 2-3 mm. tall, pompeian red to brick-red, weathering to brown; peridium evanescent except for the plicate calyculus; stalk dark or concolorous, striate, ascending from a small hypothallus, 0.5-1.5 mm. long; capillitium elastic, usually erect, bright red or carmine, fading to brown, the threads 3-4 microns in diameter, marked with a series of rather distant cogs or half-rings arranged spirally around the axis, attached to the whole inner surface of the calyculus, hence not deciduous; spores red or reddish-brown in mass, colorless by transmitted light, with a few scattered warts, 6-8 microns in diameter; plasmodium white.

Newfound Gap, log, 4200 ft., no. 15087, Hagelstein; the Sinks, log, 1565 ft., no. 15169, J. P. Porter; Greenbrier Cove, log, 1680 ft., no. 15168, J. P. Porter; along Highway 71, log, 1500 ft., no. 19911; Cades Cove, twigs, 1800 ft.,

no. 19912; trail to Hannah Mtn., log and moss, 2550 ft., no. 19913.

Distribution: Blount and Sevier Counties; June through November.

4. OLIGONEMA Rost. Monog. 291. 1875.

Fructification sporangiate, the sporangia densely crowded. Peridium membranous. Capillitium of short or long, simple or branched elaters, nearly smooth or obscurely sculptured with spirals and sometimes with spines, warts or rings; spores yellow.

KEY TO SPECIES

91- Peridium granular, tough; sporangia elongate, erect, tending to be crowded in a single layer; spores with a nearly complete reticulation, the bands narrow. . . . . .O. flavidum.

90- Peridium granular, delicate; sporangia irregularly globose, tending to be heaped; spores with incomplete reticulations, the bands often broad, pitted. . . . . .O. Schweinitzii.

1. Oligonema flavidum (Peck) Peck, Ann. Rep. N. Y. State Mus. 31: 42. 1879.

Sporangia bright yellow, sessile, densely clustered,

globose, subglobose, or elongate, becoming cylindric or obpyriform when massed, 0.2-0.5 mm. broad, 0.5-0.8 mm. tall; peridium thin, somewhat opaque, roughened or minutely papillate, with irregular fan-like markings, opening irregularly above; capillitium not usually abundant, of short to moderately long elaters, .0-300 microns long and 3-4 microns in diameter, irregular, swollen in places and occasionally branched, sculptured with minute warts a rranged so as to form indistinct spirals, the apices generally blunt, sometimes ending in one or more points; spores globose, covered with a coarse-meshed, often irregular but usually complete reticulation, the bands narrow, with few pits, 13-15 microns in diameter; plasmodium watery-white, then yellow.

Greenbrier Cove, leaf, 1680 ft., no. 19915.
Distribution: Sevier County; March.

2. Oligonema Schweinitzii (Berk.) G. W. Martin, Mycologia 39: 460. 1947.

Sporangia bright yellow, shining, sessile, irregularly globose, 0.1-0.5 mm. in diameter, usually crowded in dense clusters and often superimposed; peridium thin, translucent, nearly smooth with fan-like markings; elaters usually sparse, 3-4 microns in diameter, simple or branched,

with faint, usually dextrose, spiral markings, otherwise nearly smooth, sometimes with occasional rings, the apices often apiculate; spores irregularly and often incompletely reticulate, the meshes mostly large, the bands often broad and pitted, 12-17 microns in diameter; plasmodium yellow.

Cades Cove (Old Mill), log, 1800 ft., no. 19914.
Distribution: Blount County; November.

5. TRICHIA Hall. Hist. Strip.
Helv. 3: 114. 1768.

Sporangiate or plasmodiocarpous, sessile or stipitate. Peridium membranous or cartilaginous. Capillitium elastic, of free, simple or sparsely branched elaters, accuminate at the tips and marked with 2-5 or more spiral bands. Spores yellow, yellow-brown, or reddish.

KEY TO SPECIES

91- Sporangiate, sessile, rarely short-stalked; elaters with two spiral bands only. . . . . T. varia.

90- Sporangiate, sessile, rarely shor-stalked; spores delicately reticulate. . . . . T. scabra.

89- Sporangiate, sessile, rarely short-stalked; spores more or less coarsely reticulate, reticulations in the form of narrow bands 2 microns high, sparsely pitted; elaters 6-8 microns in diameter. . . . . .T. favoginea.

88- Sporangiate, sessile, rarely short-stalked; spores more or less coarsely reticulate, reticulations in the form of pitted bands that are almost complete; bands up to 1 micron high; elaters 4-6 microns in diameter. . . . . T. affinis.

87- As above (no. 88) except reticulations are incomplete, sometimes reduced to pitted wart-like ridges up to 0.5 microns high. . . . . .T. persimilis.

86- Sporangiate, stalked; elaters tapering to long, slender tips; spores delicately reticulate. . . . . .T. pusilla.

85- Sporangiate, stalked; elaters spiny; spores warted or spiny. . . . . .T. erecta.

84- Sporangiate, stalked; elaters of unifrom thickness with short tips. . . . . .T. subfusca.

83- Sporangiate, stalked; elaters tapering gradually to long, slender tips; spores spinulose to minutely warted . . . . . .T. botrytis.

82- Sessile, sporangiate; spores spinulose to minutely warted. . . . . .T. contorta.

1. Trichia varia (Pers.) Pers. Neues Mag. Bot. 1: 90. 1794.

Sporangia gregarious or crowded, globose, obovoid or somewhat elongate, 0.5-0.9 mm. broad, sessile or with a short, black stalk, ochraceous, yellow-brown, or olivaceous,

shining; hypothallus broadly expanded, horny, inconspicuous; capillitium of rather long, simple or rarely branched elaters, 3-5 microns in diameter, bearing two or rarely three irregular spiral bands, these prominent and narrow and in places remote, the apices acute, curved, about twice the diameter in length; spores yellow to orange-yellow in mass, dull, pale yellow by transmitted light, guttulate, delicately warted, 12-13 microns in diameter; plasmodium white.

Trail to Bull Head Mountain, deciduous log, 2500 ft., no. 19916; Ft. Harry, log, 3200 ft., no. 19917; Deals Gap, conifer log, 1955 ft., no. 19918.

Distribution: Blount, Sevier, and Swain Counties; March through September.

2. Trichia contorta (Ditmar) Rost. Monog. 259. 1875.

Sporangia pulvinate or rarely short-stalked, to short plasmo-diocarpous, closely gregarious to scattered, 0.5-0.8 mm. wide, dull yellowish-brown to dark reddish-brown, occasionally blackish; wall membranous or cartilaginous, more or less thickened with granular material or rarely with lime; capillitium ochraceous or dull yellow in mass, the elaters simple or sometimes branched, 3-5 microns in diameter, bearing four or five even or irregular spiral

bands, smooth or spiny or with long, spine-like processes formed by spirals freed from the elater, the ends more or less swollen and tipped with one or two curved spines; spores bright ochraceous in mass, pale yellow by transmitted light, spinulose, 10-13 (-14) microns in diameter; plasmodium watery white.

Ramsey Cascades, decaying wood, 3170 ft., no. 18301, J. H. and S. H. Taylor.

Distribution: Sevier County; October, 1947.

3. Trichia scabra Rost. Monog. 258. 1875.

Sporangia sessile, crowded upon a well-developed, dark hypothallus, globose or turbinate, 0.6-0.8 mm. in diameter, dull orange or golden-brown, smooth, shining; capillitial mass clear golden-yellow or rusty-orange, the elaters simple, long, 4-6 microns in diameter, bearing three or four closely wound, regular, spinulose, spiral bands, the apices short, acuminate; spores golden-yellow in mass, yellow by transmitted light, the surface marked with a fine-meshed reticulum, 10-12 microns in diameter; plasmodium white.

Cades Cove, log, 1800 ft., no. 19919; Chimneys Parking Area, log, 3500 ft., no. 19920.

Distribution: Blount and Sevier Counties;

November and March.

4. Trichia favoginea (Batsch) Pers. Neues Mag. Bot. 1: 90. 1794.

Sporangia sessile, closely crowded, obovate, cylindric or angular from pressure, 0.6-0.7 mm. in diameter, 0.7-1.9 mm. tall, olivaceous yellow, smooth and shining; peridium thin, translucent, persistent, opening somewhat stellately; capillitium mass golden-yellow, forming a continuous weft above the opened sporangia, the threads bright yellow, usually long, 6-8 microns in diameter, bearing four or five spiral bands, those smooth or with scattered, short spines and connecting by longitudinal striae, the apices short-tapering, about equal to the width of the elater; spores golden yellow in mass, bright yellow by transmitted light, marked by a conspicuous reticulation, often more or less imperfect, the bands narrow and high, with pits lacking or, if present, usually not conspicuous, mostly 13-16 microns in diameter; plasmodium white, creamy, or yellow.

Ramsey Cascades, decaying wood, 3170 ft., no. 18300, J. H. and S. H. Taylor; Near Newfound Gap, wood, 4200 ft., no. 15158, Hagelstein; Chimneys Parking Area, deciduous log, 3500 ft., no. 19921; trail to Hannah Mtn., conifer log, 2550 ft., no. 19922; Noland Divide, stump, 5250 ft., no.

19923; Indian Camp Creek, hemlock log, 3750 ft., no. 19924; Fir Island along Tennessee Highway 71, conifer log, 4000 ft., no. 19925; Cades Cove, log, 1800 ft., no. 19926; Chimneys Picnic Area, deciduous log, 2950 ft., no. 19927; Ft. Harry, conifer log, 3200 ft., no. 19928; below Rocky Spring Gap, brick bark, 5200 ft., no. 19929.

Distribution: Blount, Sevier, Cocke and Swain Counties; February through August.

5. Trichia affinis De Bary; Fuckel, Jahrb. Nass. Ver. Nat. 23-24: 336. 1870.

Sporangia sessile, globose or obovoid, crowded on a membranous hypothallus or sometimes scattered in small groups or solitary, 0.5-1 mm. in diameter, ochraceous or rather dull golden-yellow; wall membranous, thin, transparent, pale yellow, marked with punctate lines; capillitium yellow, of long elaters, 4-6 microns in diameter, marked with 3-5 spirals, these smooth or minutely warter, the apices short-apiculate; spores dull yellow or ochraceous in mass, clear yellow by transmitted light, marked by a coarse and nearly complete reticulation, and usually in addition, by broken warts and lines, the bands usually broad, and distinctly pitted, 0.5-1 microns high, usually 13-16 microns in diameter; plasmodium watery-white.

The Sinks, birch log, 1565 ft., no. 19930; Cades Cove, log, 1800 ft., no. 19931; Indian Creek, wood, 2250 ft., no. 19932, L. R. Hesler.

Distribution: Blount, Sevier, and Swain Counties; January, June, July.

6. Trichia persimilis P. Karst. Not Sallsk.
Faun. Fl. Fenn. 9: 353. 1868.

Sporangia sessile, irregularly globose or broadly clavate, 0.5-0.8 mm. in diameter, yellow-brown to tawny, sometimes iridescent, crowded on a thin hypothallus; peridium membranous, yellow; capillitium of long or short elaters, 4-6 microns in diameter, marked with four closely set spiral bands, usually bearing short spines, the apices short, sometimes furcate or bifurcate; spores dull yellow or ochraceous in mass, bright yellow by transmitted light, marked by elongate warts forming a fragmentary or irregular reticulation, the bands bread, flat, and pitted, mostly 13-16 microns in diameter; plasmodium white.

Near Park Headquarters, wood, 1500 ft., no. 19933; above Chimneys Picnic Area, log, 2950 ft., no. 19934; Cades Cove, birch bark, 1800 ft., no. 19935; Mt. Le Conte, log, 6593 ft., no. 19936, C. W. Horton.

Distribution: Blount and Sevier Counties; January through April, October.

7. Trichia pusilla (Hedw.) G. W. Martin, comb. nov.

Sporangia stalked, rarely sessile, turbinate, 0.6-0.8 mm. in diameter, shining olive or olivaceous-brown, up to 3 mm. in total height; peridium membranous, yellow, often translucent; stalk cylindric, furrowed, dark brown below, paler above, usually about 1 mm. long, filled with spore-like vesicles; capillitium and spores olivaceous-yellow in mass; elaters simple or branched, olivaceous, bearing 3-5 spirals, smooth, 4-5-5.5 microns wide in center tapering gradually to the long, slender tips; spores pale yellow by transmitted light, bearing a delicate reticulation over most of the surface, the balance minutely warted, 10-13 microns in diameter; plasmodium white or rose.

Cades Cove (Old Mill), log, 1800 ft., no. 19937; Mt. Le Conte, wood, 6593 ft., no. 19938, S. A. Cain; Rainbow Falls, hemlock log, 3000 ft., no. 15081, A. J. Sharp and L. R. Hesler.

Distribution: Blount and Sevier Counties; September through November.

8. Trichia erecta Rex. Proc. Acad. Phila. 1890: 193. 1890.

Sporangia stalked, scattered or loosely gregarious, sometimes in clusters of two or three, globose or turbinate,

0.5-0.7 mm. in diameter, nut-brown, the upper portion often displaying broad, yellow bands arranged in a reticulate pattern, the yellow portion representing the inner peridium, the darker portion the granular thickenings constituting the outer peridium; total height 1-2 mm.; stalk cylindric, stout, 0.1-1 mm. high, 0.2-0.3 mm. thick, dark brown, opaque; mass of spores and capillitium bright-yellow to orange-yellow; elaters 3.5-4 microns in diameter, bearing four spirals, coarsely spinulose, spores by transmitted light pale, minutely warted, 11-13 microns in diameter; plasmodium white.

Near Newfound Gap, log, 4200 ft., no. 15158, Hagelstein; Chimneys Picnic Area, conifer log, 2950 ft., no. 19939;

Distribution: Sevier County; April through August.

9. Trichia subfusca Rex, Proc. Acad. Phila. 1890: 192. 1890.

Sporangia stalked, rarely sessile, subglobose or pyriform, scattered or gregarious, occasionally united in pairs, dull tawny brown without lines of dehiscence, 0.4-0.8 mm. in diameter; stalk short, stout, dark brown or black, rarely exceeding the height of the sporangium; capillitium and spores bright straw-yellow; elaters cylindric, 4-6 microns in diameter, with four rather uneven, smooth spirals, ending in abrupt, often curved tips; spores yellow

by transmitted light, minutely and closely warted, 11-15 microns in diameter; plasmodium chocolate-brown.

Fork Ridge - Bryson City trail, conifer wood, 5500 ft., no. 19940.

Distribution: Swain County; October.

10. Trichia botrytis (J. F. Gmel.) Pers. Neues Mag. Bot. 1: 89. 1794.

Sporangia stalked, rarely sessile or subplasmodiocarpous, turbinate or pyriform, 0.6-0.8 mm. in diameter, often clustered on united stalks, dull olive-yellow to reddish or purplish-brown; peridium double, the inner membranous, the outer composed of dark granular thickenings, often separating before dehiscence and forming areolae separated by the light inner wall; dehiscence irregular; stalk cylindric, dull yellow or dark reddish or purplish-brown, opaque, filled with amorphous material; total height 1-3 mm.; spores and capillitium dull yellow to ochraceous-brown; elaters simple or sometimes branched, bearing 3-5 smooth spirals, 4-5 microns in diameter at the center, tapering gradually to long, slender, acuminate tips; spores pale by transmitted light, minutely warted, 10-12 microns in diameter; plasmodium purple-brown.

Greenbrier Pinnacle, trail, log, 3750 ft., no. 19941; trail to Bull Head Mtn., conifer stump, 2500 ft., no. 19942; Andrew's Bald, conifer wood, 5860 ft., no. 19943; Clingman's Dome, log, 6642 ft., no. 19944.

Distribution; Sevier and Swain Counties; June through October.

6. HEMITRICHIA Rost. Versuch 14. 1873.

Fructification sporangiate, stalked or sessile, or plasmodiocarpous. Peridium cartilaginous, tough and usually persistent below as an irregular cup, thinner and more or less fugacious above. Stalk, when present, solid and filled with spore-like vesicles or amorphous material. Capillitium of tubular threads these ornamented with two or more usually conspicuous, spiral bands and united into a more or less elastic net, with or without free ends. Spores red, orange, or yellow in mass, bright and pale by transmitted light.

KEY TO SPECIES

91- Plasmodiocarps large, netted, yellow: spores reticulate . . . . . H. serpula.

90- Sporangiate, yellow or brown; stalk expanding upward, merging gradually with vase-like base of the peridium; papillitium minutely roughened, spirals sinistrose. . .

. . . . . H. clavata.

89- Sporangiate, yellow; stalk cylindric, sharpely distinguished from the shallow, cup-like base of the peridium; capillitium smooth. . . . . .H. stipitata.

88- Mass of spores and capillitium brick-red; sporangia usually clustered, their stalks, when present, united; occasionally appearing as subplasmodiocarpous in form. . . . . H. vesparium.

1. Hemitrichia serpula (Scop.) Rost.; Lister. Mycet. 179. 1894.

Fructification plasmodiocarpous, often covering several square centimeters; terete, branching freely and usually everywhere reticulate, bright yellow, rusty or tawny; peridium thin, transparent, with irregular, longitudinal dehiscence; hypothallus like the peridium or a little darker, the margins between adjoining segments often separated by a black line; capillitium variable, a tangle of long, yellow threads, sparingly branched, free everywhere except below, spinulose, the tips spiny, the spirals three or four, with traces of longitudinal striae; spores golden-yellow in mass, pale yellow by transmitted light, globose, coarsely reticulate, 11-16 microns in diameter; plasmodium white, then yellow.

The Sinks, log, 1565 ft., no. 19945; Fir Island along Tennessee Highway 71, conifer log, 4000 ft., no. 19946; Indian Camp Creek, limb, 3750 ft., no. 19947; Cades Cove, log, 1800 ft., no. 19948; Cades Cove, log, 1800 ft., no. 19949, sporangiate form; Cades Cove, birch log, 1800 ft., no. 19951; Ft. Harry, wood, 3200 ft., no. 19951.

Distribution: Blount, Sevier and Cocke Counties; March through October.

One unusual form of H. serpula was collected. The description is as follows:

> Sporangiate, short plasmodiocarpous, sometimes heaped, pulvinate, shining yellow to yellowish brown, semi-reticulate.

In all other characteristics it was the same as normally occuring forms.

2. Hemitrichia clavata (Pers.) Rost.;
Fuckel, Jahrb. Nass/ Ver. Nat. 27-28: 75. 1873.

Sporangia stalked, gregarious or crowded, broadly clavate or pyriform, 1-2 mm. tall, olivaceous-yellow; peridium shining, dehiscent above, one-half to two thirds remaining as a goblet-shaped calyculus, marked within by rather coarse papillae or broken reticulations; stalk rather short, attenuate downwards and merging gradually

into the base of the sporangium above, hollow, yellow above, shading into reddish-brown below, arising from the thin, dark, reddish-brown hypothallus; capillitium yellow or somewhat olivaceous, somewhat elastic, the threads 4.5-6.5 microns in diameter, spirals -four or five closely wound, minutely roughened, with occasional free ends, these often swollen, obtuse, or tipped a broad based apiculus 2-4 microns long; spores pale yellow by transmitted light, globose or subglobose, coarsely papillate, the papillae frequently elongate into ridges which form a more or less complete reticulation, 7-9 microns in diameter; plasmodium white.

Ramsey Cascades, decaying wood, 3170 ft., no. 18301, J. H. and S. H. Taylor; Cades Cove, log, 1800 ft., no. 19952; Below Rocky Spring Gap, log, 5200 ft., no. 19953, E. H. Cooley; Ft. Harry, wood, 3200 ft., no. 19954; Beech Gap along road to Clingman's Dome, beech log, 5100 ft., no. 19955; Fir Island along Tenn. Highway 71, wood and moss, 4000 ft., no. 19956; Greenbrier Cove, log, 1685 ft., no. 19957; Chimneys Parking Area, deciduous log, 3500 ft., no. 19958.

Distribution: Sevier and Swain Counties; February, March and June.

3. Hemitrichia stipitata (Massee) Macbr.

N. Am. Slime-Moulds 207. 1899.

Sporangia stalked, scattered, rarely crowded, globose or turbinate, olivaceous-yllow, 1-3 mm. tall; hypothallus thin, dark reddish-brown; stalk dark reddish-brown, 0.5-2 mm. tall, slender, uniform in diameter and color; peridium thin, dull yellow, opening above, one-half or less persistent as a petaloid calyculus. finely papillate or delicately reticulate within; capillitium yellow, dense, netted, elastic, with few free ends, these obtuse, the threads 5-7 microns in diameter, with four or five spirals, smooth; spores globose, yellow, minutely spimulose or delicately reticulate, 7-8 microns in diameter; plasmodium yellow, turning red in fruiting.

Indian Camp Creek, log, 3750 ft., no. 19949; Ft. Harry, log, 3200 ft., no. 19960; Chimney Parking Area, 3500 ft., no. 19961; The Sinks, wood, 1565 ft., no. 19962, J. P. Porter; Raven's Ford, wood, 2037 ft., no. 19963; Cades Cove, log, 1800 ft., no. 19964; trail to Hannah Mtn., log, 2550 ft., no. 19965; Near Park Headquarters, log, 1500 ft., no. 19966; Fir Island along Tenn. Highway 71, log, 4000 ft., no. 19967; Greenbrier Cove, log, 1685 ft., no. 19968.

Distribution: Blount, Sevier, Cocke and Swain Counties; March through September.

4. Hemitrichia vesparium (Batsch) Macbr.

N. Am. Slime-Moulds 203. 1899.

Sporangia clustered or crowded, rarely single, clavate or subcylindric, 1-1.3 mm. tall, 0.5-0.7 mm. in diameter, stalked or occasionally sessile, dark wine-red to nearly black; peridium in perfect specimens glossy or shining metallic, opaque; dehiscence by a dome-shaped lid, the basal portion of the peridium remaining as a deep cup, the clusters, when empty, suggesting a wasp's nest, rarely irregular; stalk solid, often fused, forming large clusters, concolorous; capillitium of intertwisted threads, 5-6 microns in diameter, sparingly branched, marked by three or four spiral ridges, very spiny, the free ends acuminate, terminating in a spine, the whole mass deep red; spores brownish-red in mass, reddish orange by transmitted light, warted, subglobose, 10-12 microns in diameter; plasmodium deep red to black.

A sporangiate, sessile form was collected in this study in which the peridium appeared granular and reddish-brown; dehiscence was by fragmentation of the peridium.

Near Gatlinburg, log, 1500 ft., no. 15123, Hagelstein; The Sinks, wood, 1565 ft., no. 19969; Cades Cove (Old Mill), leaves, 1800 ft., no. 19970; Near Park Headquarters, log, 1500 ft., no. 19971; Cades Cove, log, 1800 ft., no. 19972,

sessile sporangiate form; Beech Gap on road to Clingman's Dome, beech log, 5100 ft., no. 19973; Near Park Headquarters, log, 1500 ft., no. 19974; base of Camel Hump Mtn., log, 3250 ft., no. 19975; Greenbrier Cove, log, 1685 ft., no. 19976; Deals Gap, log, 1955 ft., no. 19977; Ramsey Cascades; log, 3750 ft., no. 19978; trail to Hannah Mtn., log, 2550 ft., no. 19979; Cades Cove, bark, 1800 ft., no. 19980; Below Rocky Spring Gap, twigs, 5200 ft., no. 19981, E. H. Cooley; Ft. Harry, log, 3200 ft., no. 19982; Cades Cove (Abrams Falls) log, 1800 ft., no. 19983; Elkmont, log, 2141 ft., no. 19984; trail to Bull Head Mtn., decidious wood, 2750 ft., no. 19985.

Distribution: Blount, Sevier, Cocke and Swain Counties; throughout the year.

Order. STEMONITALES

Spores in mass black or deep vidaceous to ferruginous, rarely colorless. Neither peridium nor capillitium calcareous, lime rarely present, and then restricted to hypothallus, stipe, and columella. Capillitium thread-like, usually dark.

Family 3. STEMONITACEAE

Sporangiate to aethalioid. Peridium membranous,

persistent to fugacious, never gelatinous. Columella usually present. Capillitium thread-like, branching and usually anastomosing, arising from the columella or from the base of the sporangium or aethelium. Hypothallus membranous, often common to a group of sporangia. Spores black, purplish-brown or ferruginous in mass.

4. DIACHEA Fries, Syst. Orbis. Veg. 143. 1825.

Sporangia globose or bylindric, stipitate or sessile. Peridium simple, thin, iridescent, tending to be persistent. Columella and stipe, when present, calcareous, rigid, thick, tapering upward. Capillitium limeless, of delicate threads united into a net, the tips attached to the peridium. Spores black or dark purple in mass.

KEY TO SPECIES

91- Sporangia typically cylindric, stalked; spores faintly marked . . . . . .D. leucopodia.

90- Sporangia globose or nearly so; stalks usually equaling or exceeding the height of the sporangium; spores sparsely but not distinctly spiny or warted. . . . . D. bulbillosa.

1. Diachea leucopodia (Bull.) Rost.

Monog. 190. 1874.

Sporangia closely gregarious, stipitate, metallic blue or iridescent purple, bylindric or ellipsoidal, rarely globose, obtuse, subumbilicate below, 0.4-0.6 mm. in diameter, their total height 1-2 mm.; stalk stout, brittle, calcareous, snow-white, one fourth to one half the total height, tapering upward; hypothallus white, calcareous, venulose, usually forming a conspicuous network from which the sporangia arise, sometimes sparse; columella thick, tapering, blunt, white, calcareous, over half the length of the sporangium and often nearly reaching the tip; capillitium of branching and anastomosing, flexuous threads, brown except at the pale extremities, arising from all parts of the columella; spores nearly black in mass, dull lilaceous by transmitted light, minutely roughened, 8-11 microns in diameter; plasmodium white.

Collected by Dr. Robert Hagelstein in 1939.

2. Diachea bulbillosa (Berk. & Br.)

Lister, Jour. Bot. 36: 165. 1898.

Sporangia gregarious, stipitate, subglobose or obovate, iridescent blue or purple, finally silvery, 0.3-0.5 mm. in diameter, their total height 0.8-1.2 mm; stalk

conic or subcylindric, expanded at the base, calcareous, white or brownish, usually longer than the sporangium; hypothallus often inconspicuous; columella white, calvaceous, the lime, especially in tripical collections, often aggregated into crystalline nodules; capillitium lax, of purplish threads united into a net; spores dark in mass, violet-gray by transmitted light, sparsely and often irregularly but strongly warted, 7-11 microns in diameter; plasmodium white to deep yellow.

Collected by Dr. Robert Hagelstein in 1939.

5. ENERTHENEMA Bowman, Trans. Linn. Soc. 16: 152. 1830.

Sporangiate, stipitate, the stipe continued as a columella to the tip of the sporangium and there expanding into a cup-like disk from which the capillitium depends. Peridium fugacious. Spores dark.

1. Enethenema papillatum (Pers.) Rost. Monog. Append. 28. 1876.

Sporangia globose, fuscous, becoming purplish or ferruginous after spore discharge, 0.4-0.7 mm. in diameter, 1-1.5 mm. tall; stalk black, opaque, attenuate above, about equal to the sporangium, the basal part of the

sporangial wall often remaining attached to the stalk as a ring after dehiscence; capillitium depending from an apical disk, the threads long, dark, flexuous; spores free, olivaceous-fuscous in mass, grayish-brown by transmitted light, minutely warted, D-12 microns in diameter; plasmodium watery-white.

Collected by Dr. Hagelstein in 1939.

6. STEMONITIS Gled. Meth. Fung. 140. 1753.

Sporangiate, the sporangia cylindric, stalked, gregarious or densely clustered. The stalk extending into the sporangium as a columella. Capillitium arising from along the entire length of the columella, branching repeatedly, the final before united into a surface net. Spores black, fuscous, brown or ferruginous in mass. Hypothallus membranous, usually well developed, often common to a cluster.

KEY TO SPECIES

91- Spores spiny reticulate. . . . . S. fusca.

90- Spores sharply and conspicuously banded-reticulate . . . . . S. virginiensis.

89- Sporangia distinct; capillitium open, purplish-brown; meshes of net mostly 20-50 microns in diameter; spores

faintly and closely warted, 7-9 microns in diameter. . . . . .S. splendens.

88- Sporangia distinct, purplish-brown or drab, dense, stout, blunt, 3-7 mm. tall; capillitium and columella not expanded; meshed of the surface net under 20 microns in diameter, scantily developed above; spores distinctly warted or spiny, over 7 microns in diameter; usually on wood. . . . . .S. pallida.

87- Capillitium dense; sporangia distinct, bright ferruginous, 7-20 mm. tall; spores nearly smooth, 5-7 microns in diameter. . . . . S. axifera.

86- Capillitium dense; sporangia distinct, pale ferruginous, 2-5 mm. tall; spores nearly smooth, 4-5 microns in diameter. . . . . .S. Smithii.

85- Capillitium dense with membranous expansions; sporangia distinct; fructifications purplish-ferruginous, closely fasciculate; columella often expanded at the tip; spores over 7 microns in diameter. . . . . .S. favogenita.

1. Stemonitis fusca Roth. Mag. Bot. Romer & Usteri 12: 26. 1787.

Sporangia slender, cylindric, tufted, often in large colonies, on a brown, membranous hypothallus, 6-20 mm. tall, deep fuscous, becoming paler as the spores are

shed; stalk black, shining, rather long, from nearly half the total height in shorter fructifications to one-fourth or less in those that are taller; columella dark brown or blackish, reaching nearly or quite to the apex; capillitium arising from all parts of the columella branching and anastomosing freely; spores fuscous in mass, violet-brown by transmitted light, spinulose, the spines arranged in a reticulate pattern, 7-9 microns in diameter; plasmodium white.

Clingman's Dome, Abies log, 6642 ft., no. 15194, L. R. Hesler; Near Cherokee Orchard, wood, 2700 ft., no. 15153, Hagelstein; Hickory Flats Creek, conifer limb, 1500 ft., no. 19986; Near Park Headquarters, log, 1500 ft., no. 19987; Deals Gap, log, 1955 ft., no. 19988; trail to Hannah Mtn., log, 2500 ft., no. 19989.

Distribution: Blount, Sevier, and Swain Counties; June through August.

2. Stemonitis virginiensis Rex, Proc. Acad. Phila. 1891: 391. 1891.

Sporangia cylindric or elongate-ovate, lilac-brown, 2-8 cm. tall, gregarious in small clusters on a common hypothallus; stalk black, shining, 0.5-2 mm. tall; columella reaching the apex, giving rise to a delicate cap-

illitium; spores bright brown in mass, pale lilac-brown by transmitted light, marked by a sharp reticulation of narrow bands, 6.5-9 microns in diameter.

Ft. Harry, stump, 3200 ft., no. 19990; Cades Cove, log, 1800 ft., no. 19991.

Distribution: Blount and Sevier Counties; July through October.

3. Stemonitis splendens Rost. Monog. 195. 1874.

Sporangia long-cylindric, flexuous, purplish-brown, closely fasciculate or less commonly gregarious, 7-25 mm. tall, forming large and conspicuous fruitings; stalk black, polished, 1-4 mm. tall, arising from a membranous, silvery or purplish hypothallus; columella reaching nearly to the apex, often coiled and tortuous toward the tip; capillitium purple-brown, open, arising from few branches, the surface net regular, the meshes large, mostly 20-50 microns large in diameter; spores purplish in mass, lilaceous-brown by transmitted light, faintly and closely warted, 7-9 microns in diameter; plasmodium white or pale yellow.

Ramsey Cascades, decaying wood, 3170 ft., no. 18303, J. H. and S. H. Taylor; Gregory's Bald, deciduous wood,

4948 ft., no. 19992, J. P. Porter; Indian Camp Creek, log, 3750 ft., no. 19993.

Distribution: Blount, Sevier, and Cocke Counties; July through August.

4. Stemonitis axifera (Bull.) Macbr. N. Am. Slime-Moulds 120. 1899.

Sporangia cylindric, acuminate, bright rusty-brown, becoming pale brown, 7-20 mm. tall, fasciculate in small or medium-sized clusters, occasionally in large fruitings, arising from a membrancus hypothallus; stalk black, shining, 3-7 mm. tall; columella branching freely and evenly, dissipated below the apex; surface net delicate, small-meshed, persistent; spores bright reddish-brown in mass, pale by transmitted light, nearly smooth or minutely punctate, 5-7 (7.5) microns in diameter; plasmodium white or pale yellow.

Gregorys Bald, deciduous log, 4948 ft., no. 15082, J. P. Porter; trail to Bull Head Mtn., stump, 2750 ft., no. 19994; Greenbrier Cove, log, 1685 ft., no. 19995; Cades Cove (Old Mill), stem, 1800 ft. no. 19996; Near Park Headquarters; log, 1500 ft., no. 19997; Ramsey Cascades, log, 3170 ft., no. 19998; Indian Camp Creek, log, 3750 ft., no. 19999.

Distribution: Blount, Sevier, and Cocke Counties; June through September.

5. Stemonitis Smithii Macbr. Bull. Nat. Hist. Univ. Iowa 2: 381. 1893

Sporangia in small, close-packed clusters, subcylindric, tapering to base and tip, erect, light cinnamon-drab to vinaceous-fawn, 2.5-5 mm. tall; stalk jet black, shining, about two-fifths the total height; columella dark, becoming brown at the tip, gradually tapering and becoming dissolved into the capillitium some distance below the apex; capillitium abundant, light brown, the threads of the interior sparingly united, the surface net delicate, the meshes small, regular, polygonal; hypothallus thin, distinct, common to a cluster; spores bright reddish-brown in mass, pale brown or almost colorless by transmitted light, nearly smooth, 4-5 microns in diameter; plasmodium greenish-yellow to reddish-purple.

Cades Cove, log, 1800 ft., no. 20000; Ramsey Cascades, conifer log, 3170 ft., no. 20001; Cades Cove (Old Mill), log, 1800 ft., no. 20002; along Tennessee Highway 73, log, 1500 ft., no. 20003.

Distribution: Blount and Sevier Counties; June and July.

6. Stemonitis flavogenita Jahn, Verh.
Bot. Ver. Brand. 45: 165. 1904.

Sporangia cylindric, obtuse, closely fasciculate, wood-brown at first, becoming natal-brown with the disappearance of the spores, 4-8 mm. tall, occasionally taller; stalk short, black; columella ending abruptly just below the apex, often with plate-like expansions, the surface net delicate, the meshes uneven, mostly small, with many free spine-like ends; hypothallus membranous, varying from pallid, through dull red to nearly black; spores rich brown in mass, lilaceous-brown by transmitted light, verruculose, 7-9 microns in diameter; plasmodium yellow, pallid or white.

Noland Divide, log, 5250 ft., no. 20004.
Distribution: Swain County; July.

7. Stemonitis pallida Wingate; Macbr.
N. Am. Slime-Moulds 123. 1899.

Sporangia gregarious in large groups, occasionally somewhat clustered within the colony, stipitate, erect, cylindric, rather stout, obtuse, 2-6 mm. tall, dusky drab, becoming pallid as the spores disappear; stalk short or of medium height, one-third the total height or a little more, black, polished, rising from a thin, brown or iridescent

hypothallus; columella percurrent, ceasing abruptly at the apex; capillitium dense, forming at the surface a close-meshed net, poorly developed above; spores dark brown in mass, dusky by transmitted light, nearly smooth, 6.5-8 microns in diameter; plasmodium white or greenish-yellow.

Collected by Dr. Robert Hagelstein in 1939.

7. COMATRICHA Preuss, Linnaea 24: 140. 1851.

Sporangia cylindric to globose, scattered, gregarious or densely crowded. Columella typically, usually nearly reaching the apex of the sporangium, rarely lacking, giving rise to numerous branches which sub-divide and often anastomose to form a capillitial net, the ultimate branchlets free. Peridium free, usually evanescent, sometimes persistent. Spores black, purple, or ferruginous in mass, violaceous-brown to pallid by transmitted light.

KEY TO SPECIES

91- Sporangium cylindric, lilac brown; peridium entirely fugacious; stalk dark red to nearly black C. typhoides.

90- Sporangia globose to ovate, rarely short-cylindric. . . . . C. pulchella.

89- Sporangia cylindric, black, peridium entirely fugacious; stalk jet black, shining. . . . . C. Suskdorfi.

1. Comatricha Suksdorfi Ellis & Ev. Bull.
Washburn Lab. Nat. Hist. 1: 5. 1884.

Sporangia scattered to densely gregarious, stipitate, erect, bluntly cylindric, black, their total height 2-8 mm.; peridium usually quickly evanescent, sometimes persistent, silvery; stalk jet-black, shining, even, usually about one-half the total height, sometimes shorter; hypothallus dark brown, broken or continuous; columella black, giving rise to a dark, dense capillitium, the threads anastomosing freely, with numerous, often pallid, free ends; spores black in mass dark violaceous-brown by transmitted light, paler on one side, distinctly spiny, 10-13 microns in diameter.

Ramsey Cascades, decaying wood, 3170 ft., no. 18299, J. H. and S. H. Taylor.

Distribution: Sevier County; October.

2. Comatricha typhoides (Bull.) Rost.;
Lister, Mycet. 120. 1894.

Sporangia gregarious or scattered, stipitate, cylindric or narrowly ovate, obtuse, erect or arcuate, lilac brown, 0.3-0.6 mm. in diameter, their total height 2-5 mm.; peridium silvery, tardily fugacious, sometimes persisting in patches; stalk dark red to nearly black,

often covered with a silvery film about half the total height, sometimes shorter, continuing into the sporangium as the tapering columella; capillitium a dense network of pale brown threads, with numerous anastomoses, the ultimate branchlets short, delicate; hypothallus distinct, reddish-brown, often continuous; spores rich lilac-brown in mass, pale by transmitted light, faintly punctate and with few scattered clusters of dark warts, 6-8 microns in diameter; plasmodium white.

Near Newfound Gap, log, 4200 ft., no. 15099, Hagelstein; Near Park Headquarters, log, 1500 ft., no. 20005; Ca des Cove, log, 1800 ft., no. 20006.

Distribution: Blount, Sevier, and Swain Counties; August through October.

3. Comatricha pulchella (C. Bab.) Rost.
Monog. Append. 27. 1876.

Sporangia gregarious, sometimes crowded, stipitate, ovate to cylindric, acuminate, pale brown or ferruginous, their total height 0.7-1.5 mm.; stalk black, shorter than the sporangium; hypothallus thin, membranous, either circular and individual or forming a more or less continuous film under the colony; columella straight, tapering, reaching almost to the apex; capillitium dense, flexuous,

dark brown, with many anastomoses and few free ends; spores brown in mass, pale lilac-brown by transmitted light, minutely but uniformly punctate, 7-8 microns in diameter; plasmodium watery-white or colorless.

Collected by Dr. Robert Hagelstein in 1939.

8. CLASTODERMA Blytt, Bot. Zeit. 38: 343. 1880.

Sporangiate, globose, stipitate. Peridium breaking up at maturity into rounded or angular fragments which remain attached to the tips of the capillitium. Columella short, sometimes nearly obsolete. Capillitium arising from the apex of the columella, of branching and anastomosing threads bearing at the free tips the peridial platelets.

1. Clastoderma Debaryanum A. Blytt. Bot. Zeit. 38: 343. 1880.

Sporangia scattered or gregarious, 0.1-0.2 mm. in diameter, 1-1.3 mm. tall; peridium rosaceous-brown; stem slender, stuffed with dark, granular material below, translucent brown above, the two portions usually abruptly divided by a swollen ring; spores bright rosaceous-brown in mass, pallid by transmitted light, smooth, 8-10 microns

in diameter; plasmodium watery-white or greenish.

Trail to Hannah Mtn., wood, 2550 ft., no. 20007; trail to Bull Head Mtn., deciduous bark, 2750 ft., no. 20008, bark-culture.

Distribution: Blount and Sevier Counties; August and September.

9 LAMPRODERMA Rost. Versuch 7. 1873.

Fructification sporangiate, stalked or sessile, globose or ellipsoid. Peridium tough, membranous, persistent, shining with metallic iridescence. Columella cylindric or clavate, one-half to two thirds the height of the sporangial cavity, rarely shorter or lacking. Capillitium arising mainly from the apex for the columella, the branches becoming thinner and often paler as they approach the periphery.

KEY TO SPECIES

91- Columella divided at the apex into several main branches which give rise to the circinate capillitium. . . . . L. Arcyrionema.

90- Columella not divided at the apex, but giving rise directly to the capillitium. . . . . L. columbinum.

1. Lamproderma Arcyrionema (Sommerf.)

Rost. Monog. 206. 1874.

Sporangia globose or depressed-globose, 0.3-1 mm. in diameter, often umbilicate below, metallic blue or iridescent-purple, short-stipitate or sometimes sessile, gregarious or scattered, the total height 0.6-1.5 mm.; stalk when present, usually rather stout, even, dark, short, rarely exceeding three-fifths of the total height; hypothallus a thin, continuous, reddish-brown membrane, or, when the sporangia are scattered, broken up into basal disks; columella black, cylindric or tapering slightly toward the apex, reaching the center of the sporangium cavity, the tip obtuse; capillitium lax, flaccid, flexuous, the threads branching and anastomosing to form a net loose at the center, denser toward the perifery, the threads pale brown as they leave the columella, becoming darker, then gradually paler toward the colorless tips; spores violaceous to purple gray by transmitted light, minutely warted, 8-11 microns in diameter; plasmodium watery-white, rarely yellow.

Ft. Harry, wood, 3200 ft., no. 20009; trail to Bull Head Mtn., conifer log, 2750 ft., no. 20010; trail to Bull Head Mtn., wood, 2750 ft., no. 20011.

Distribution: Sevier County; August and September.

2. Lamproderma columbinum (Pers.) Rost.; Fuckel, Jahrb. Nat. 27-28: 69. 1873.

Sporangia globose or ellipsoid, scattered or gregarious, 0.5-1 mm. in diameter, rich violet or purple with a metallic iridescense, the total height 2-3 mm.; peridium membranous, persistent; stalk long, usually about three-fourths the total height, black, straight subulate; columella cylindric, with a conic apex, or clavate, one-third to one-half the height of the sporangium; capillitium brownish-purple, originating from all parts of the columella, ridge, sparingly forked at the center, then anastomosing freely to form a large-meshed, open net; spores black in mass, smoky-brown by transmitted light, punctate, 11-14 microns in diameter; plasmodium white, rarely yellow.

Near Newfound Gap, log, 4200 ft., no. 15125, Hagelstein; Fork Ridge - Bryson City trail, conifer log, 5500 ft., no. 20012; Andrew's Bald, conifer log, 5860 ft., no. 20013; Clingmans Dome, conifer log, 6642 ft., no. 20014.

Distribution: Sevier and Swain Counties; August through October.

Order. PHYSARALES

Spores black or deep violaceous in mass, violaceous or

violaceous-brown by transmitted light. Capillitium thread-like or tubular, usually forming a net-work, often charged with lime. Peridium usually limy.

Family 1. PHYSARACEAE

Capillitium netted, calcareous, very rarely nearly limeless, composed either of calcareous tubes of nearly uniform diameter, or more commonly of calcareous nodes connected by slender, hyaline tubules. Peridium usually limy. Spores black, deep violaceous or dark gray in mass, dark purple-brown or violaceous-brown by transmitted light.

1. FULIGO Hall. Hist. Strip. Helv. 3: 110. 1768.

Fructification aethalioid, occasionally subplasmodiocarpous, consisting of interwoven and poorly defined tubes, each with a calcareous wall; outer portion sterile, forming a fragile cortex, sometimes nearly lacking. Basal layer membranous hypothallus, the intermediate portion containing spores, capillitium, and limy walls derived from the plasmodial tubes. Capillitium of hyaline, tubular threads connecting lime-knots, often rather scanty. Spores dark in mass.

1. Fuligo septica (L.) Weber; Wiggers,
Prim. Fl. Holsat. 112. 1780.

Aethalia pulvinate, rarely subplasmodiocarpous, usually large, 2-20 cm. in their longer dimension, 1-3 cm. thick, white, ochraceous, tawny, greenish, brown, or violet; cortex calcareous, fragile, usually rather thick and separable; capillitium of white, yellow or reddish lime-knots connected by hyaline threads, sometimes scanty; spores spherical, dull black in mass, purplish-brown by transmitted light, minutely spinulose, 6-9 microns in diameter; plasmodium usually yellow, sometimes white or creamy.

Indian Creek, log, 2022 ft., no. 20015, L. R. Hesler; Indian Gap, log, 5265 gt., no. 20016, L. R. Hesler; Park Boundary on old N. C. Highway 288, leaves and wood, 2039 ft., no. 20017; Ramsey Cascades, moss bank, 3170 ft., no. 20018; trail to Hannah Mtn., conifer log, 2550 ft., no. 20020.

Distribution: Blount, Sevier, and Swain Counties; June through October.

2. BADHAMIA Berk. Trans. Linn. Soc. 21: 153. 1853.

Sporangiate or somewhat plasmodiocarpous. Peridium usually thin, breaking irregularly. Capillitium a network

of calcareous tubules, the nodes only slightly enlarged, rarely with a few hyaline threads, Stipe, when present, membranous. Columella present or absent. Spores black in mass, adherent in clusters or free.

1. Badhamia Curtisii (Berk.) Rost.
Monog. Append. 5. 1876.

Sporangia gregarious or scattered, often forming extensive fruitings, obovoid, 0.5-0.7 mm. in diameter, grayish or purplish-brown, stipitate, rarely sessile; peridium thin, brittle, paler and somewhat calcareous above, more persistent and darker below, merging into the stalk; stalk erect, usually about the height of the sporangium, prolonged as a columella into the sporangium for about two-thirds of its total height; capillitium dense, white or pale brown, radiating from the columella; hypothallus dark, thin, continuous or netted beneath the colony; spores dark brown in mass, dark violet or purple-brown by transmitted light, strongly warted, often verrucose-reticulate or with a coarse overlying reticulation, variable in size in different collections but mostly 13-17 microns in diameter; plasmodium yellow.

Mt. Le Conte, leaves and twigs, 6593 ft., no. 20019, A. J. Sharp and L. R. Hesler.

Distribution: Sevier County; August.

3. PHYSARUM Pers. Neues Mag. Bot.
1: 88. 1794.

Sporangiate to plasmodiocarpous, rarely almost aethalioid. Peridium single or double, calcareous. Stalk, when present, usually tubular, translucent or stuffed with lime or dark amorphous material. Capillitium a network of hyaline tubules connecting calcareous nodes, attached to the base and peridium. Lime in peridium, capillitium, and stipe in the form of amorphous granules, not crystalline. Spores black or dark brown in mass, violaceous-brown or violaceous by transmitted light.

KEY TO SPECIES

91- Capillitium reticulate, not notably radiating from the base of the peridium or columella; nodes rounded or angular, rarely fusiform, the connecting threads not dichotomously branched, plasmodiocarps or sessile sporaggiate, sometimes on a constricted base or a stalk-like expansion of the hypothallus, never truly stalked; peridium single or, if double, the inner portion delicate and firmly attached to the limy outer wall.

90- As above (91) except peridium plainly double, the two

layers firmly united or separable.

89- As above (91) except primarily sporangiate and stipitate (sessile and plasmodiocarpous forms occur in many species but usually accompanied by stipitate sporangia); columella present.

88- As above (89) except columella lacking and lime-knots massed in center to form a pseudocolumella or calcareous nucleus.

87- As above (88) except pseudocolumella or calcareous central mass lacking; sporangia globose to oval or depressed globose.

86- Capillitium radiating from the base of the sporangia; nodes elongate-fusiform, usually small, sometimes spike-like when attached to the peridium; connecting threads dichotomously branched.

91-

85- Sporangiate, white or pale ashy-gray, but often forming short plasmodiocarps, these rarely branching or netted; wall fragile or membranous, more or less encrusted with flakes of lime; spores globose; area of dehiscence, if present, not a pale line; capillitium not elastic. . . . . P. cinereum.

84- Sporangiate, globose or pulvinate, red or brown, occasionally green; nodes rounded, yellow, with red centers; capillitium not elastic; spores globose. . .

. . . . . P. lateritium.

83- Plasmodiocarps bright yellow or orange, often branching or netted, usually accompanied by short plasmodiocarps or sporangiate fruitings; spores mostly less than 10 microns in diameter . . . . P. superbum.

90-

82- Primarily plasmodiocarpous; plasmodiocarps long, often branched or reticulate, usually accompanied by shorter plasmodiocarps or sporangiate fruitings; spores minutely spiny, 8-10 microns in diameter. . . . . .P. bivalve.

81- Primarily sporangiate; sporangia creamy or ochraceous to yellow or brown, flattened, elongate, subplasmodiocarpous, densely crowded. .P. contextum.

89-

80- Columella large and conspicuous, slender, almost reaching the apex; sporangia ellipsoid, greenish; spores 6-7 microns in diameter. . . .P. penetrale.

79- Columella large, conspicuous, usually short; sporangia subglobose or clavate, yellow; spores over 10 microns in diameter. . . . . .P. Listeri.

78- Columella small, usually a conical projection of calcareous stalk; sporangia honey-yellow; stalk white,

yellow, or tawny; nodes white. . . . . P. melleum.

77- Columella small, usually a conical projection of a calcareous stalk; sporangia orange to bronze-tawny; stalk orange-red; nodes yellow or red. . . . . .P. pulcherripes.

76- Columella small, usually a conical projection of a calcareous stalk; sporangia white to bluish-gray; stalk and capillitium white. . . . .P. globuliferum.

75- Columella small, usually a conical projection of a calcareous stalk; sporangia and stalk deep maroon; nodes purple. . . . . P. pulcherrimum.

88-

74- Fructification sporangiate, globose, stipitate; capillitium delicate, with few nodes; stalk calcareous; central lime mass usually spherical. . .P. stellatum.

73- Fructification globose, sporangiate, stipitate; capillitium dense; stalk not calcareous; central lime mass usually spherical. . . . . .P. nucleatum.

87-

72- Sporangia white or ashy-gray; nodes white; stalk opaque, solid, erect, calcareous, fragile, snow-white; peridium Didymimum-like. . . . . .P. leucopus.

71- Sporangia globose to subdepressed or ovate, ashy-gray or white, larger than 0.6 mm. in diameter; peridium

not strongly calcareous, often iridescent; nodes white; stalk non-calcareous, dark or externally frosted with lime. . . . . .P. leucophaeum.

70- Peridium iridescent blue or bronze, often mottled with red or orange; stalk orange. . .P. psittacinum.

69- Peridium not crustose or varnished, double, dull-yellow or ochraceous to yellow-brown to dusky; stalk short, stout, sometimes lacking, orange or brown, translucent; stalk and base not flesh-colored. . . . . P. flavidum.

68- Peridium not crustose or varnished, dull yellow or ochraceous to yellow-brown or dusky; stalk white or dull brown, calcareous, opaque. . . . .P. sulphureum.

67- Peridium bright-yellow or orange, rarely gray with yellow nodes; stalk long, slender, calcareous; base of the peridium not persistent; nodes small, sparse; dehiscence petaloid. . . . . .P. tenerum.

86-

66- Sporangiate, stalked, not compound, usually nodding on long stalks, gray or white; capillitium dense, delicate with small nodes, white. . . . . .P. nutans.

65- Sporangiate, stalked, not compound, usually nodding on long stalks, yellow, greenish-yellow or orange, often fading; capillitium dense, delicate with small

nodes, yellow or orange. . . . . P. viride.

1. Physarum cinereum (Batsch) Pers. Neues Mag. Bot. L: 89. 1794.

Sporangia sessile, closely gregarious, crowded or heaped, subglobose or elongate, merging into short plasmodiocarps, 0.3-0.5 mm. broad, calcareous, white or cinerous, or nearly limeless and iridescent to drab; peridium single, thin, more or less densely coated with lime or flecked with lime; capillitium abundant, the nodes often angular and with the calcareous deposits extending into the internodes; spores purplish-brown in mass, clear violaceous by transmitted light, minutely warted, 9-13 microns in diameter; plasmodium watery-white or colorless, sometimes becoming bright yellow before fruitings.

Collected by Dr. Robert Hagelstein in 1939.

2. Physarum lateritium (Berk. & Rav.) Morgan Jour. Cinc. Soc. Nat. Hist. 19: 23. 1896.

Sporangiate, sessile, globose or subglobose, 0.3-0.7 mm. in diameter, or occasionally forming short plasmodiocarps, gregarious or clustered, yellowish-red, orange, or scarlet, sometimes fading; peridium thin, somewhat rugulose, dotted with minute scarlet scales; capillitium delicate,

usually dense, the nodes rounded, yellow, often with red centers, connected by a network of hyaline or yellow threads, many of the nodes limeless, consisting merely of membranous expansions; spores violet-brown in mass, clear bright violet by transmitted light, minutely warted, 7-9 microns in diameter; plasmodium orange-yellow.

Collected by Dr. Robert Hagelstein, 1939.

3. Physarum superbum Haglest. Mycologia 32: 386. 1940.

Sporangiate, sessile, solitary or in small clusters, 0.4-0.6 mm. in diameter, or forming elongate plasmodiocarps up to 12 mm. in length, bright yellow; peridium rugulose, pellicose, transparent yellow to orange-red, bearing small clusters of minute yellow or orange calcareous granules; capillitium well developed, persistent, the nodes firm, angular, unequal, pallid to bright yellow, 10-25 microns in diameter, the connecting threads, hyaline or yellowish, branched; spores pale violaceous-brown, minutely echinulate, 8-10 microns in diameter.

Collected by Dr. Robert Hagelstein in 1939.

4. Physarum bivalve Pers. Ann. Bot. Usteri 15: 5 1795.

Plasmodiocarpous, crowded, laterally compressed, white, gray, or yellowish, the plasmodiocarps usually interspersed with shortened, sporangiate fructifications, these sometimes with a constricted base; peridium double, the outer layer usually thickly calcareous, especially above and then white, sometimes nearly limeless below and then drab or yellowish; the inner wall delicate, colorless; dehiscence by a more or less regular longitudinal fissure; capillitium abundant, the nodes large, white; spores black in mass, dull violet by transmitted light, minutely gray, pallid, or yellowish.

Collected by Dr. Haglestein in 1939.

5. Physarum contextum (Pers.) Pers. Syn. Fung. 168. 1801.

Sporangiate or subplasmodiocarpous, sessile, densely crowded, sometimes almost aethalia, oval, reniform, or elongate, 0.3-0.6 mm. wide; peridium double, the outer layer thick, calcareous, yellow, ochraceous, or pallid, rarely pinkish-buff, the inner layer membranous, pallid or yellowish; capillitium dense, the nodes white; columella none; spores nearly black in mass, deep violet-brown by transmitted light, distinctly and irregularly spinulose, 11-13 microns in diameter; plasmodium yellow.

Near Newfound Gap, log, 4200 ft., no. 15136, Hagelstein; Indian Camp Creek, rock and leaves, 3750 ft., no. 20021.

Distribution: Sevier and Cocke Counties; July and August.

6. Physarum penetrale Rex, Proc. Acad. Phila. 1891. 389. 1891.

Sporangia stipitate, scattered, globose to ellipsoidal or pyriform, 0.4-0.6 mm. in total height, 0.3-0.4 mm. in diameter, erect or nodding; peridium greenish-gray to yellowish-gray calcareous scales, rupturing to the base in two to four segments; capillitium dense, persistent, the nodes rounded, pale yellow, fading to white; columella reaching to about four-fifths the height of the sporangium, acuminate, or enlarged at the tip, orange-brown to dull yellow or pallid; stalk variable in height, slender, subulate, rugulose, translucent, not calcareous, dull red or orange-brown, often flattened laterally at the base; spores brown in mass, brownish-lilac by transmitted light, very minutely spinulose, 6-7 microns in diameter; plasmodium orange-yellow.

Collected by Dr. Robert Hagelstein in 1939.

7. Physarum Listeri Macbr. in Macbr. & Mart. Myxom. 62. 1934.

Sporangia gregarious, stipitate, subglobose or short-allantoid, bright yellow to dull orange or olivaceous, or dark and iridescent in limeless phases, mostly 0.8-1 mm. broad; peridium double, the outer portion smooth or reticulately rugulose, the lime deposits dense to scanty or nearly lacking, the inner portion dark, shining olivaceous, dehiscent except for a persistent collar at the base; stalk stout, calcareous, smooth, with a membranous outer wall, 0.5-1 mm. tall, cylindric or expanding upward, white below, changing to yellowish or orange above, rising from a netted, strand-like hypothallus, columella large, subglobose or depressed-clavate; capillitium of rigid, slender or coarse, radiating, yellow, linear or fusiform, or occasionally large and rounded; spores black in mass, purple-brown by transmitted light, coarsely and somewhat irregularly spiny, 10-13 microns in diameter; plasmodium orange.

Cades Cove, log, 1800 ft., no. 15141, Hagelstein.

Distribution: Blount County; August.

8. Physarum melleum (Berk. & Br.) Massee, Monog. 278. 1892.

Sporangia stipitate, gregarious, globose or somewhat flattened below, 0.4-0.5 mm. in diameter, usually yellow to dull orange, but varying from yellowish-gray to bright orange-red or brown; peridium rugulose, encrusted with lime, persistent below; stalk cylindric or tapering upward, stout, opaque, white, yellow, or tawny, furrowed, calcareous short about equal to the sporangium; columella small, conic, white or yellowish; capillitium abundant, the nodes large, angular, white or yellow; hypothallus white or colorless; spores pale violet-brown by transmitted light, minutely warted, 7.5-10 microns in diameter; plasmodium yellow.

Collected by Dr. Robert Hagelstein in 1939.

9. Physarum pulcherripes Peck, Bull. Buffalo Soc. Nat. Sci. 1: 64 1873.

Sporangia globose, stipitate, 0.5-0.7 mm. in diameter, orange-yellow to tawny, calcareous above, dark iridescent beneath, the walls thin, decidious; stalk slender, erect, calcareous, deep red, orange or pale at the apex, somewhat shading to black below, supported on a well-developed hypothallus; columella small, conic, rarely subglobose; capillitium dense, the meshes small, the nodes reddish or yellow, small, rounded; spores dark-violaceous in mass, violet by transmitted light, faintly warted,

with clusters of darker warts, 8-10 microns in diameter; plasmodium yellow.

Collected by Dr. Robert Hagelstein in 1939.

10. Physarum globuliferum (Bull.) Pers. Syn. Fung. 175. 1801.

Sporangia stipitate, gregarious, often in extensive colonies, sometimes united in clusters, globose or slightly depressed, 0.4-0.7 mm. in diameter, 0.6-1.5 mm. tall, white or pale ochraceous; peridium membranous, bearing crustose patches of lime granules; stipe subulate, slender, wrinkled, brittle, calcareous, yellowish, or reddish, usually exceeding the sporangium; columella short, conic, or blunt; hypothallus scanty, inconspicuous; capillitium dense, delicate, persistent, the nodes small, rounded, white, many of the junctions limeless; spores dark grayish-brown in mass, violet by transmitted light, minutely warted, the warts in indistinct clusters, 7-9 microns in diameter; plasmodium yellow.

Trail to Bull Head Mtn., log, 2750 ft., no. 20022, bark-culture.

Distribution: Sevier County; September.

11. Physarum pulcherrimum Berk. & Rav.; Berk. Grevillea 2: 65. 1873.

Sporangia stalked, gregarious, globose, 0.4-0.5 mm. in diameter, even or somewhat wrinkled, deep maroon, reddish-violet or purple; stalk cylindric, even, impregnated with lime, concolorous or darker; columella small, sometimes lacking; capillitium delicate, dense, the numerous, small, rounded, purple-red nodes connected by pinkish-white threads; spores dark brown in mass, pale pinkish-violet by transmitted light, globose, nearly smooth, 7.5-8.5 microns in diameter; plasmodium deep purple or dark red. Collected by Dr. Robert Hagelstein in 1939.

12. Physarum stellatum (Massee) G. W. Martin, Mycologia 39: 461. 1947.

Sporangia globose, 0.4-0.6 mm. in diameter, stipitate, gregarious, sometimes closely so, erect or nodding, gray, brownish-gray, or bronze; peridium thin, metallic, splitting at maturity in floriform fashion into 6-12 segments; stalk calcareous, white or yellowish, often shading to fuscous or black below, rather long, tapering upward; hypothallus inconspicuous; columella lacking; capillitium delicate, white or colorless, usually radiating from a central nucleus, the extra-nuclear nodes few, small,

fusiform; spores brown in mass, pale violet by transmitted light, delicately warted, 8-10 microns in diameter; plasmodium light gray.

Ft. Harry, log, 3200 ft., no. 20023; Ft. Harry, polypore fungus, 3200 ft., no. 20024.

Distribution: Sevier County; August.

13. Physarum nucleatum Rex, Proc. Acad. Phila. 1891: 389. 1891.

Sporangia stipitate, spherical, white, about 0.5mm. in diameter, erect or nodding; peridium membranous, studded with rounded, white calcareous nodules, the lime sometimes scanty and the peridium then metallic, the lower portion thicker and remaining as collar on the stem after the upper portion has disappeared; stalk subulate, yellowish-white, rugose, not calcareous, about 1 mm. long; columella none; capillitium dense, white, the nodes small, white, rounded, aggregated in the center to form a conspicuous ball of lime, free from the stalk; spores black in mass, violet-brown by transmitted light, minutely spinulose, 6-7 microns in diameter.

Collected by Dr. Robert Hagelstein in 1939.

14. Physarum leucopus Link, Ges. Nat. Freud Berlin Mag. 3: 27. 1809.

Sporangia gregarious, stipitate, globose, white, about 0.5 mm. in diameter; peridium calcareous, the lime in small, frosty particles, suggesting Didymium; stalk white, calcareous, sulcate, brittle, tapering upward, about to the sporangium, sometimes very short; columella none; capillitium rather lax, the nodes large, angular, white, connected by long, hyaline threads; spores in mass, pale violet-brown by transmitted light, distinctly warted, 8-10 microns in diameter; plasmodium white, often tinted with blue, green, yellow.

Collected in 1939 by Dr. Robert Hagelstein.

15. Physarum leucophaeum Fries, Symb. Gast. 24. 1818.

Sporangia gregarious or scattered, subglobose to depressed, stipitate, varying to sessile or rarely subplasmodiocarpous, bluish-ashen to white, darker below, 0.5-0.8 mm. in diameter, the total height 1-1.5 mm.; peridium thin, membranous, iridescent, flecked with lime or sometimes rather strongly calcareous, having usually a dark basal disk or shallow cup, rarely umvilicate, convex or plane below; stalk usually short, fuscous to reddish-brown, often powdered with white, arising from a dark, more or less, netted hypothallus; capillitium delicate, dense, the

nodes few, white, angular or branching; spores black in mass, dark violaceous by transmitted light, minutely roughened, 9-11 microns in diameter.

Fork Ridge - Bryson City trail, log, 5500 ft., no. 20025.

Distribution: Swain County; July.

16. Physarum psittacinum Ditmar in Strum, Deuts. Fl. Pilze 1: 125. 1817.

Sporangia scattered or gregarious, stalked, globose, depressed-globose, or reniform, 0.5-0.8 mm. in diameter, the total height 0.8-1.2 mm., bronze or iridescent blue, more or less mottled with orange, granular or subcrystalline material; stalk cylindric or tapering slightly upward, rugose, limeless, orange, or orange-red, or fulvous, rising from a small, concolorous hypothallus; columella none; capillitium dense, the angular, brittle orange nodes numerous and often confluent in the center; spore brown in mass, pale brown by transmitted light, minutely but distinctly warted, the warts often in groups, 8-10 microns in diameter; plasmodium orange-red.

Collected by Dr. Robert Hagelstein in 1939.

17. Physarum flavidium)Peck) Peck, Ann. Rep. N.Y.

State Mus. 31: 55. 1879.

Sporangia gregarious or scattered, short-stipitate, globose, 0.6-0.8 mm. in diameter, pale yellow or ochraceous to orange or yellow-brown, smooth or slightly roughened by minute lime granules; peridium double, the outer layer calcareous, fragile, the inner layer membranous; stalk usually short, about half the diameter of the sporangium in length, occasionally longer, orange-brown, translucent, furrowed, expanded below; capillitium abundant, the nodes large, white stellate-angular, the internodes delicate, short; spores black in mass, violaceous-brown by transmitted light, strongly spinulose, 10-12 microns in diameter; plasmodium greenish.

Collected by Dr. Robert Hagelstein in 1939.

18. Physarum sulphureum Alb. & Schw. Consp. Fung. 93. 1805.

Sporangia gregarious, stipitate, substipitate, or sessile, 0.4-0.6 mm. in diameter, about 1 mm. tall, regularly or irregularly globose, ellipsoid, obovate, or cylindric-clavate, occasionally plasmodiocarpous, dingy yellow to olivaceous-brown; peridium varying from thick, crustaceous, and rugulose to thin and translucent, rupturing irregularly; stalk short, cylindric or expanded.

at the base, calcareous, longitudinally rugose, dingy white to ochraceous or grayish-brown; capillitium delicate, small-meshed, the nodes large, angular, white or yellowish, often aggregated at the center; spores dark violet-brown, verruculose, 9-11 microns in diameter.

Collected in 1939 by Dr, Robert Hagelstein.

19. Physarum tenerum Rex, Proc. Acad. Phila. 1890: 192. 1890.

Sporangia gregarious, stipitate, spherical, erect or nodding, small 0.3-0.4 mm. in diameter; peridium single, membranous but thickly studded with circular, flattened, yellow, greenish yellow or ochraceous gray flakes of lime, dehiscing by petal-like lobes; stalk 0.7-2.5 mm. long, subulate, slender, calcareous, opaque, pale yellow above, shading to darker below; columella none; capillitium delicate, the nodes yellow, small, rounded, connected by hyaline threads, many of the junctions often limeless; spores black in mass, violaceous by transmitted light, minutely warted, 8-11 microns in diameter; plasmodium yellow or yellowish-green.

Fork Ridge - Bryson City trail, log, 5500 ft., no. 20026; Indian Camp Creek, stem, 3750 ft., no. 20027.

Distribution: Swain and Cocke Counties; July.

20. Physarum nutans Pers. Ann. Bot. Usteri 15: 6. 1795.

Sporangia stalked, gregarious, depressed-spherical to lenticular, umbilicate, 0.4-0.7 mm. in diameter, sometimes smaller, white or gray, nodding or less commonly erect; peridium thin, usually lobate or petaloid in dehiscence, the basal portion persistent; capillitium delicate, persistent, the threads forming a rather dense network bearing rather few elongate or rounded, white, calcareous nodes; stalk long, black or fuscous below, tapering upward to the tenuous, white apex; spores black in mass, pale lilaceous-brown by transmitted light, minutely roughened, 8-10 microns in diameter; plasmodium bright yellow to greenish-yellow, changing to watery-white before fruiting.

Mt. Le Conte, wood, 6593 ft., no. 20028, A. J. Sharp and L. R. Hesler; trail to Hannah Mtn., conifer log, 2550 ft., no. 20029; trail to Bull Head Mtn., log, 2750 ft., no. 20030.

Distribution: Blount and Sevier Counties; August and September.

21. Physarum viride (Bull.) Pers. Ann. Bot. Usteri 15: 6. 1795.

Sporangia stalked, gregarious, nodding, globose to

lenticular, umbilicate below, yellow, greenish-yellow, greenish gray, rusty-orange, or golden; peridium delicate, encrusted with calcareous flakes, splitting in reticulate or floriform fashion,; capillitium dense, the nodes fusiform, orange or yellow, often fading, connected by hyaline threads; stalks subulate, varying from pale yellow or reddish and darker below to nearly black, usually relatively long; spores fuscuous or violaceous-black in mass, bright violet by transmitted light, nearly smooth, 7-9 microns in diameter; plasmodium yellow or greenish-yellow.

Trail to Bull Head Mtn., bark, 2750 ft., no. 20032; Ft. Harry, stem, 3200 ft., no. 20033.

Distribution: Sevier County; July through September.

7. LEOCARPUS Link, Ges. Nat. Freunde Berlin Mag. 3: 25. 1809.

Sporangiate. Peridium double, the outer wall smooth, polished, limy within, the inner wall delicate, hyaline. Capillitium duplex, comprising a system of strongly calcareous tubules bearing lime-knots intermingled with a network of hyaline, limeless threads, columella none, but a pseudocolumella often present. Spores black in mass.

1. Leocarpus fragilis (Dicks.) Rost. Monog. 132. 1874.

Sporangia gregarious or clustered, stipitate or sessile, short-cylindric, obovate or nearly globose, 0.6-1.6 mm. in diameter, 2-4 mm. tall, pale yellowish or ochraceous to yellowish-brown, chestnut, or deep reddish-brown; stalk when present, weak, usually short, whitish or yellow, forming and extension of the membranous hypothallus; spores spherical, dark, with a paler area on one side, coarsely warted, 12-14 microns in diameter; plasmodium orange-yellow.

Flat Creek, log, 2000 ft., no. 15178, A. J. Sharp and L. R. Hesler; Cherokee Orchard, log, 2700 ft., no. 15127, Hagelstein; Near Mt. Le Conte, twigs, 6593 ft., no. 20031, A. J. Sharp; The Chimney's, moss and twigs, 4755 ft., no, 20034, A. J. Sharp.

Distribution: Sevier and Swain Counties; August.

Family 2. DIDYMIACEAE

Capillitium typically limeless (except in one species of Lepidoderma), threadlike, purple-brown to pallid. Peridium calcareous, the lime either in the form of amorphous granules and then aggregated into a shell-like outer layer or embedded in the substance of a cartilaginous wall, or in crystalline form and sprinkled over the surface as scattered crystals or aggregated into crustose walls or plate-like scales. Spores dark in mass, dark purplish-

brown or violaceous-brown by transmitted light.

1. DIDERMA Pers. Neues Mag. Bot. 1: 89. 1794.

Fructification sporangiate, stalked or sessile, or plasmodiocarpous; peridium usually double, the outer wall calcareous, the lime in granules or rarely in disk-like plates, not in stellate crystals, the inner wall delicate, membranous, closely applied to the outer wall or distant, lacking in some species. Columella usually conspicuous, sometimes reduced to a thickened or intrusive, dome-like base. Spores black in mass, deep violet to pale violaceous-brown by transmitted light.

KEY TO SPECIES

91- Outer peridium porcelain-like, smooth, polished, lilaceous to pinkish, fading to white; fructification depressed, sporangiate or plasmodiocarpous. . . . . .D. *testaceum*.

90- Outer peridium not porcelain-like, white to ochraceous, occasionally dark, limeless; fructification depressed, sporangiate or plasmodiocarpous; sporangia scattered in reticulate colonies, or closely massed to form a crustose pseudothalium; spores 7-9 microns in diameter. . . . . D. *effusum*.

89- Outer wall of the peridium cartilaginous, corrugate-plicate or areolate, inner wall lacking; sporangia usually distinctly stalked, rarely sessile. .D. rugosum.

88- Sporangia stipitate, varying to sessile or plasmodio-carpous, but stalked sporangia usually present; outer wall of the peridium calcareous. . . . D. hemisphaericum.

1. Diderma testaceum (Schrad.) Pers.

Syn. Fung. 167. 1801.

Sporangia gregarious, sessile, hemispheric or depressed-globose, 0.7-1 mm. in diameter, pale flesh-colored or pinkish, rarely pale brownish-red; peridium double, the outer layer thick, crustaceous, polished, the inner separate but close, thin, membranous, often wrinkled, ashen or pinkish-gray; columella prominent, convex, slightly roughened, pinkish-brown or alutaceous; capillitium abundant, the threads delicate, smooth, little-branched, pale or colorless; spores black in mass, violaceous-brown by transmitted light, nearly smooth, 8-9 microns in diameter; plasmodium yellowish-buff.

Cades Cove, wood, 1800 ft., no. 15112, Hagelstein; Cades Cove, twigs and pine needles, 1800 ft., no. 20035; Ft. Harry, leaves, 3200 ft., no. 20036.

Distribution: Blount and Sevier Counties; July and August.

2. Diderma effusum (Schw.) Morgan,
Jour. Cinc. Soc. Nat. Hist. 16: 155. 1894.

Fructification varying from sporangiate, pulvinate, and sessile or rarely with a short, thick, stem-like base, 0.5-1.5 mm. broad, often from a reticulate pattern, through tessellate colonies to broadly effused, continuous, crustose plasmodiocarps to 6 cm. long; peridium double, the outer wall calcareous, crustose, smooth or occasionally bearing scattered crystalline disks, the inner wall membranous, closely applied; columella pulvinate, appressed, pinkish-brown, sometimes scarcely more than a thickened base; capillitium delicate, the threads colorless or pale purple, sparingly branched and anastomosing; spores dark purple in mass, violaceous-brown by transmitted light, minutely warted with faint clusters of larger warts, 7-9 microns in diameter; plasmodium white.

Trail to Bull Head Mtn., conifer bark, 2750 ft., no. 20037, bark-culture.

Distribution: Sevier County; September.

3. Diderma hemisphaericum (Bull.) Hornem. Fl.

Dan. 33: 13. 1829.

Sporangia gregarious, discoid, 0.6-1.2 mm. in diameter, depressed above and often umbilicate below, stipitate or sometimes sessile; peridium double, the outer layer white, fragile, crustose, soon breaking at the margins, closely applied to the delicate, cinereous inner layer, which rupture irregularly; stalk up to 1 mm. in height, rather stout, calcareous, white or pallid to alutaceous or brownish, longitudinally furrowed, the furrows continued as veins on the lower surface of the sporangium, nearly lacking; capillitium delicate, the threads colorless or pale violet-brown, sparsely branched, often scanty; spores pale violaceous-brown by transmitted light, nearly smooth, 8-9.5 microns in diameter; plasmodium opaque-white.

Collected by Dr. Robert Hagelstein in 1939.

4. Diderma rugosum (Rex) Macbr. N. Am. Slime-Moulds 105. 1899.

Sporangia scattered, stalked, subglobose, 0.4-0.5 mm. in diameter, white or cinereous with a brownish base; peridium single, thin, scantily charged with lime, reticulately wrinkled, the ridges marking the lines of dehiscence into irregular, polyhedral fragments; stalk well developed, subulate, furrowed, black, 0.4-0.8 mm. high; columella

clavate, rugose, white or pale ochraceous, often attaining half the height of the sporangium; capillitium pale purplish or colorless, the threads forking and anastomosing to form a loose net attached to the base of the sporangium and the columella below and to the peridium at their tips; spores violaceous-brown by transmitted light, minutely warted, 8-10 microns in diameter; plasmodium gray.

Trail to Bull Head Mtn., log, 2750 ft., no. 20038.
Distribution: Sevier County; September.

3. DIDYMIUM Schrad. Nov. Gen. Pl. 20.
1797.

Sporangiate or plasmodiocarpous; peridium thin, membranous, covered with a more or less dense coating of calcareous crystals either scattered loosely over the surface of the sporangium or combined into a crust; columella usually present, sometimes reduced to a thickened, calcareous base; capillitium of branching and anastomosing, limeless threads, often bearing dark, nodular thickenings; spores black in mass, violaceous-brown by transmitted light.

KEY TO SPECIES

91- Plasmodiocarpous or sessile, rarely with short, usually weak stalks; stalkd, when present, hidden by a crust of

lime enveloping the clusters of sporangia. .D. crustaceum.

90- Sporangia somewhat flattened, deeply umbilicate; stalk short, stout opaque; spores violet-brown, minutely warted, 8-11 microns in diameter; capillitium pale. . . . . .D. minus.

89- Sporangia globose with a small umbilicus; stalk translucent, relatively long and slender; spores pale, 7-10 microns in diameter. . . . . .D. nigripes.

88- Sporangia subglobose; stalk yellow or yellowish-brown, translucent; capillitium smooth; lime crystals white; columella pale. . . . . .D. Iridis.

87- Stalk white, calcareous, often accompanied by sessile or plasmodiocarpous fructifications; sporangium subglobose to lenticular. . . . . D. squamulosum.

1. Didymium crustaceum Fries, Syst. Myc. 3: 124. 1829.

Sporangia short-stalked or sessile, closely aggregated, globose, or deformed by pressure, 0.7-2 mm. in diameter, pure white; peridium double, the outer wall limy, fragile, distant, sometimes forming a continuous crust over all or part of the cluster, the inner wall membranous, transparent, scantily clothed with large stellate crystals; stalk, when present, pale buff, weak, 0.2-0.4 mm. high, often more or less limy, not prominent; capillitium rather rigid, sparsely branched, except at the tips, and with few

anastomoses, pallid or purplish; spores black in mass, dark violet-brown by transmitted light, strongly warted, 10-14 (16) microns in diameter; plasmodium white.

Near Newfound Gap, wood, 4200 ft., no. 15114, Hagelstein; Near Mt. Le. Conte, twigs and leaves, 6593 ft., no. 20039, A. J. Sharp and L. R. Hesler; Near Mt. Le Conte, twigs and leaves, 6593 ft., no. 20040, A. J. Sharp and L. R. Hesler.

Distribution: Sevier and Swain Counties; January and August.

2. Didymium squamulosum (Alb. & Schw.) Fries. Symb. Gast. 19. 1818.

Usually sporangiate and stalked, but varying to sessile and plasmodiocarpous often in the same fruiting, white gray, or rarely pinkish; sporangia appearing globose or depressed, in reality discoid and deeply umbilicate below, 0.3-1 mm. in diameter, up to 1.2 mm. in total height; peridium membranous, transparent, somewhat iridescent, usually covered with a thick, white crust of stellate lime crystals which often form a reticulate surface, the lime sometimes scanty; stalk stout, calcareous, fluted, white or ochraceous to orange or pinkish, arising from a discoid, concolorous hypothallus; columella discoid or hemispheric, consisting

of the thickened, umbilicate sporangial base; capillitium variable, the threads slender or coarse, nearly simple or branching profusely, colorless or pallid, less commonly dark, often bearing conspicuous thickenings; spores black in mass, dark violaceous-brown by transmitted light, minutely warted or spinulose, the warts sometimes clustered 8-11 microns in diameter; plasmodium colorless, white or yellow.

Near Cherokee Orchard, wood, 2200 ft., no. 15116, Hagelstein.

Distribution: Sevier County; August.

3. Didymium minus (Lister) Morgan, Jour. Cinc. Soc. Nat. Hist. 16: 1894.

Sporangia stalked, gregarious, depressed-globose, umbilicate below, whitish or gray, 0.4-0.6 mm. in diameter, rarely exceeding 0.8 mm. in total height, occasionally subplasmodiocarpous; peridium delicate, dull, frosted with lime crystals; stalk erect, rather slender, black, faintly striate, opaque and granular, about equal to the diameter of the sporangium, sometimes shorter, rarely lacking; columella dark brown to sordid whitish, globose or depressed-globose, rough, attaining about the center of the sporangium; capillitium delicate, almost colorless, sparsely branched,

radiating; spores black in mass, violet by transmitted light, minutely warted, 8-11 microns in diameter; plasmodium dark purplish-gray.

Clingman's Dome, mossy trunk of Abies Fraseri, 6642 ft., no. 20042, L. R. Hesler.

Distribution: Sevier County; August.

4. Didymium nigripes (Link) Fries, Syst. Myc. 3: 119. 1829.

Sporangia gregarious, stalked, globose or hemispheric, somewhat umbilicate beneath, 0.3-0.5 mm. in diameter, the total height up to 1.5 mm.; peridium smoky, covered with white, calcareous crystals; columella dark brown, shining, translucent; hypothallus scutate, black; capillitium delicate, the threads pale or colorless, bearing occasional thickenings, sparingly branched; spores dark in mass, pale violaceous by transmitted light, minutley warted, 7-10 microns in diameter; plasmodium gray or colorless.

Mt. Le Conte, leaves 6593 ft., no. 20043, A. J. Sharp and L. R. Hesler.

Distribution: Sevier County; August.

5. Didymium Iridis (Ditmar) Fries, Syst. Myc. 3: 120. 1829.

Sporangia gregarious, stalked, globose or somewhat depressed, with a small umbilicus, white, 0.4-0.6 mm. in diameter, their total height up to 1.5 mm.; peridium thin, nearly or quite colorless, more or less densely covered with lime crystals; stalk cylindric or somewhat attenuate upwards, erect, slender, striate, yellow or yellowish-brown, translucent; columella white or whitish, turbinate, depressed-globose or subglobose; capillitium delicate, of colorless or pale purplish-brown, branching threads, always white at the tips; spores brown in mass, pale violet-brown by transmitted light, faintly warted or nearly smooth, 7-9 microns in diameter; plasmodium yellowish-white, pale flesh-color or green.

Elkmont, log, 2141 ft., no. 15176, L. R. Hesler and J. P. Porter; Elkmont, leaves and living stem, 2141 ft. no. 20044.

Distribution: Sevier County; January.

4. LEPIDODERMA De Bary; Rost. Versuch 13. 1863.

Sporangiate, stalked or sessile, or plasmodiocarpous. Peridium cartilaginous, bearing large, crystalline, calcareous

scales. Capillitium rigid, branching, limeless except in a single species.

1. Lepidoderma tigrinum (Schrad.) Rost.;
Fuckel, Jahrb. Nass. Ver. Nat.
27-28: 73. 1873.

Sporangiate, stipitate, rarely sessile, subglobose or somewhat flattened, umbilicate below gregarious or scattered, 0.8-1.5 mm. in diameter, olive or purplish-gray, the surface incompletely covered with rounded or angular crystalline plates of lime; peridium cartilaginous, opaque, dark gray or dull orange-brown, spongy, with orange lime-granules secreted inside; hypothallus dull yellow or orange-brown; columella large, hemispheric, orange, similar to the stalk and containing similar lime granules; capillitium profuse, the dark, sparingly branched, straight or flexuous threads radiatingfrom the columella; spores black in mass, dull purplish-brown by transmitted light, minutely spinulose, 10-13 microns in diameter; plasmodium orange-yellow.

Beech Gap on road to Clingman's Dome, log, 5100 ft., no. 20045.

Distribution: Swain County; March.

III. DISCUSSION

Eighty-eight species of Myxomycetes are found occuring in the Great Smoky Mountains National Park. Nine families are represented by these species. Using number of species as a criterion, the largest family is PHYSARACEAE, followed by TRICHIACEAE, STEMONITACEAE, CRIBARIACEAE, DIDYMIACEAE, LICEACEAE, RETICULARIACEAE, CERATIOMYXACEAE and DIANEMACEAE, in that order.

On the basis of frequency of occurence of individual specimens (only those specimens collected in this study were used), TRICHIACEAE and STEMONITACEAE occur most frequently, followed by CRIBARIACEAE and PHYSARACEAE.

IV. SUMMARY

This taxonomic survey of Myxomycetes in The Great Smoky Mountains National Park lists eighty-eight species; twenty-two of these are reported for the first time for this area. Methods of collection, including a bark-culture method, and preparation of a "punch-card" key are described.

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APPENDEX A

Following is a list of species collected from the Great Smoky Mountain Nation Park. Those with the asterisk are reported for the first time.

Arcyria cinerea
denudata
incarnata
insignis

Badhamia Curtisii

Ceratiomyxa fructiculosa

Clastoderma Debaryanum

Comatrichia pulchella
typhoides
Suksdorfii*

Cribaria aurantiaca*
elegans
intricata
macrocarpa*
purpurea*
rufa*
splendens
tenella

Diachea bulbillosa

leucopodia

Dictydium cancellatum

Diderma effusum

hemisphaericum

rugosum

testaceum

Didymium crustaceum

Iridis

minus*

nigripes

squamulosum

Enethenema papillatum

Fuligo septica

Hemitrichia clavata

serpula

stipitata*

vesparium

Lamproderma Arcyrionema

columbinum

Leocarpus fragilis

Lepidoderma trigrinum*

Licea operculata*

Linbladia effusa*

Lycogala epidendrum
exiguum

Oligonema flavidum
Schweinitzii*

Perichaena chrysosperma
depressa*

Physarum bivalve
cinerum
contextum
flavidum
globuliferum
lateritium
leucophaeum*
leucopus
Listeri
melleum
necleatum
nutans

penetrale
psittacinum
pulcherripes
pulcherrimum
stellatum*
sulphureum
superbum
tenerum
viride

Prototrichia metallica

Stemonitis axifera
favogenita*
fusca
pallida
Smithii*
splendens
virginiensis*

Trichia affinis*
Botrytis
contorta*
erecta
favoginea
pensimilis*
pusilla
scabra*

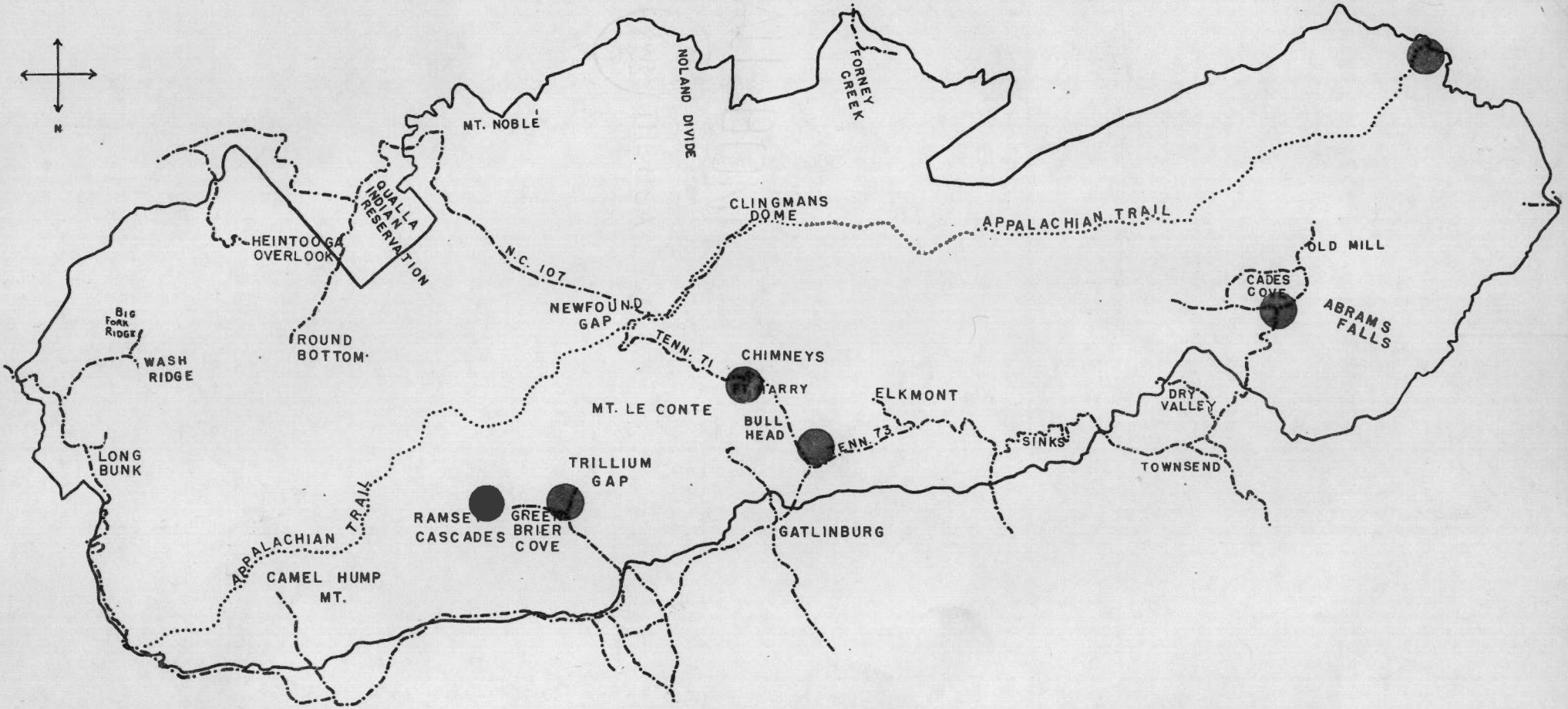
subfusca

varia

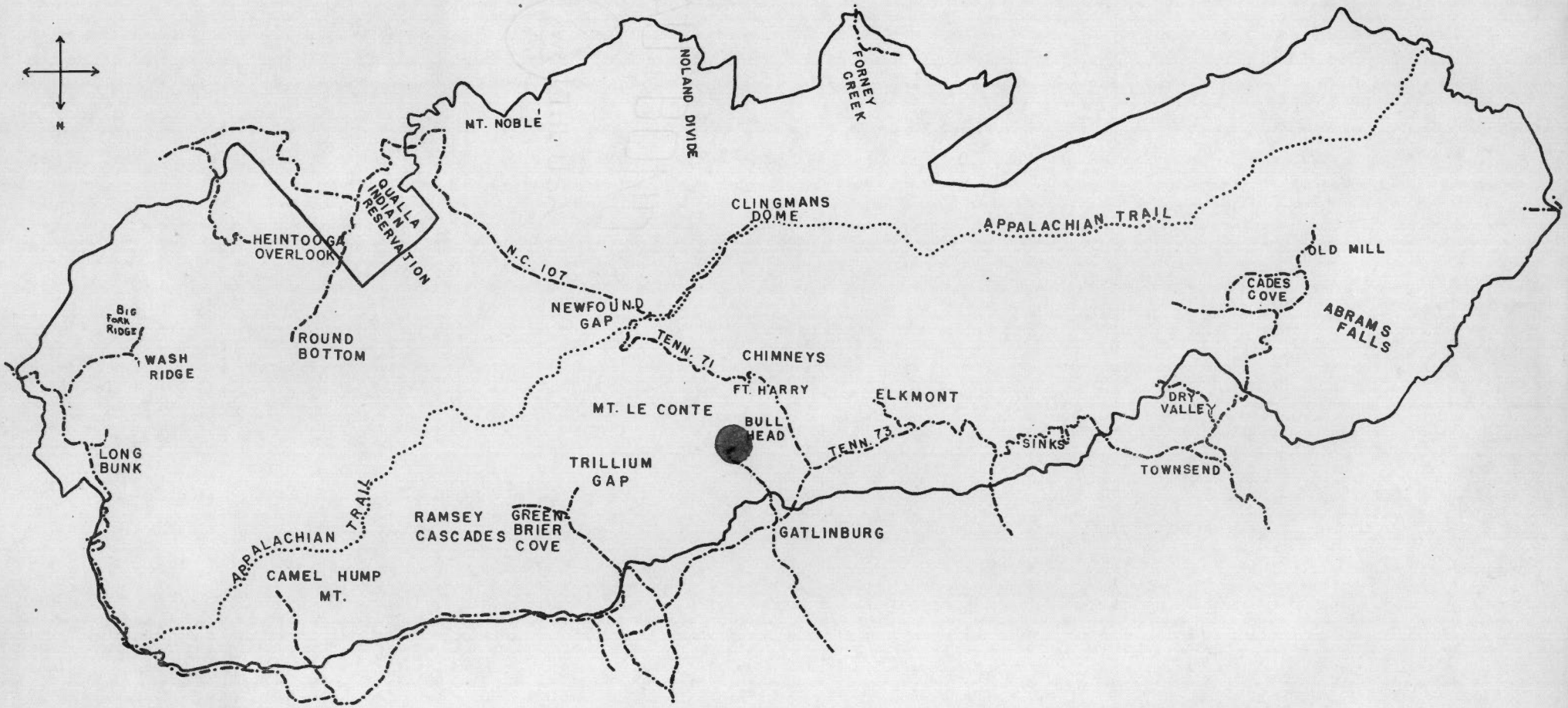
Tubifera ferruginosa

microsperma

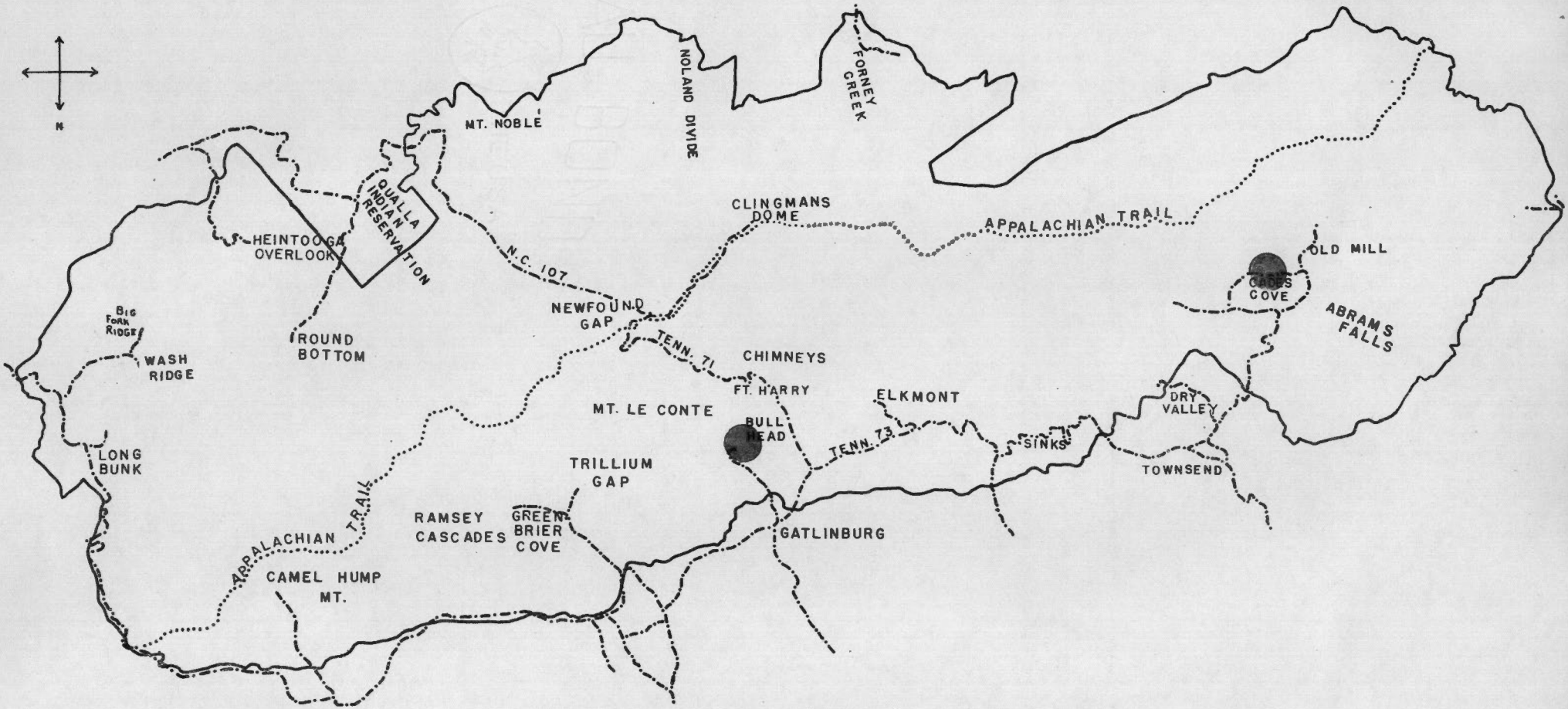
APPENDEX B



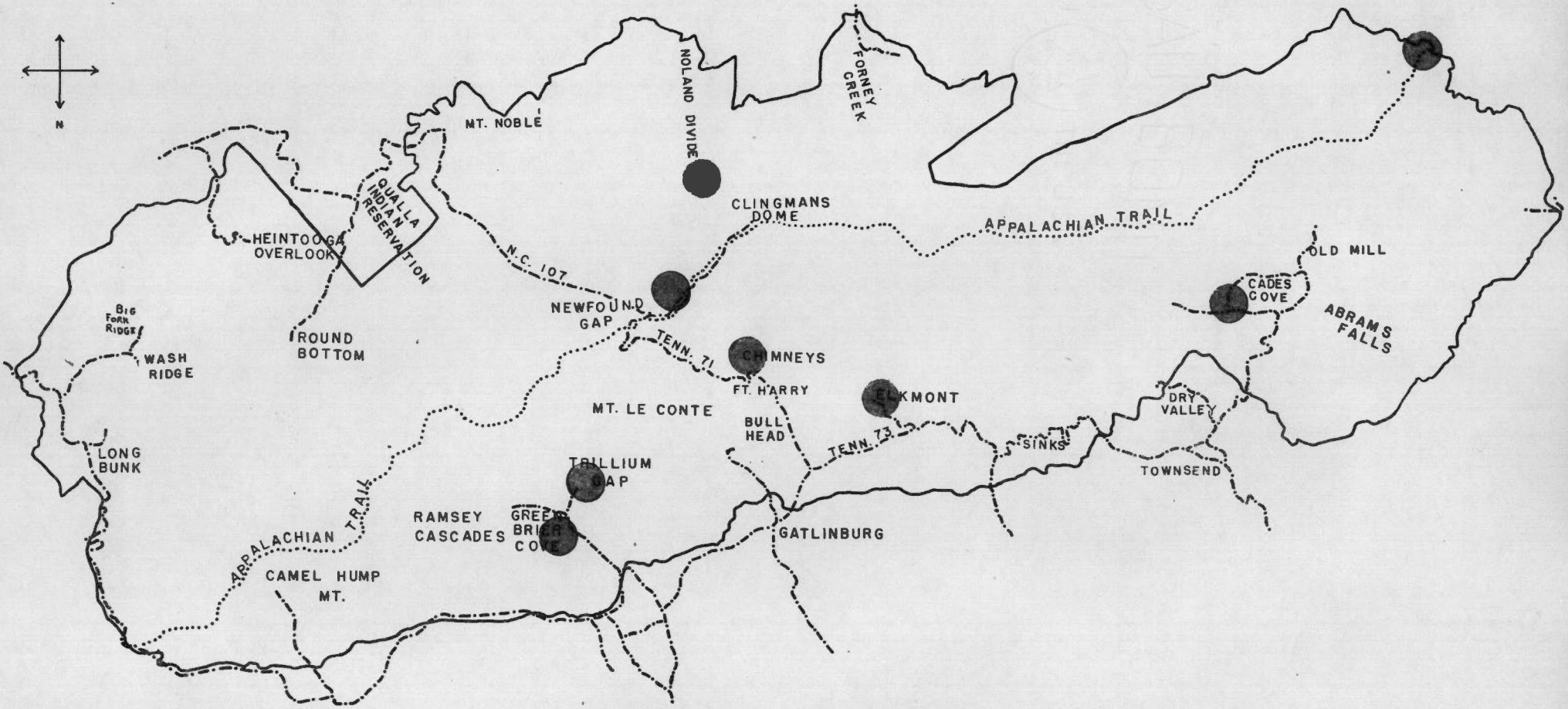
Map 1. Distribution of Ceratiomyxa fructicolosa (Müll.) Macbr. ●



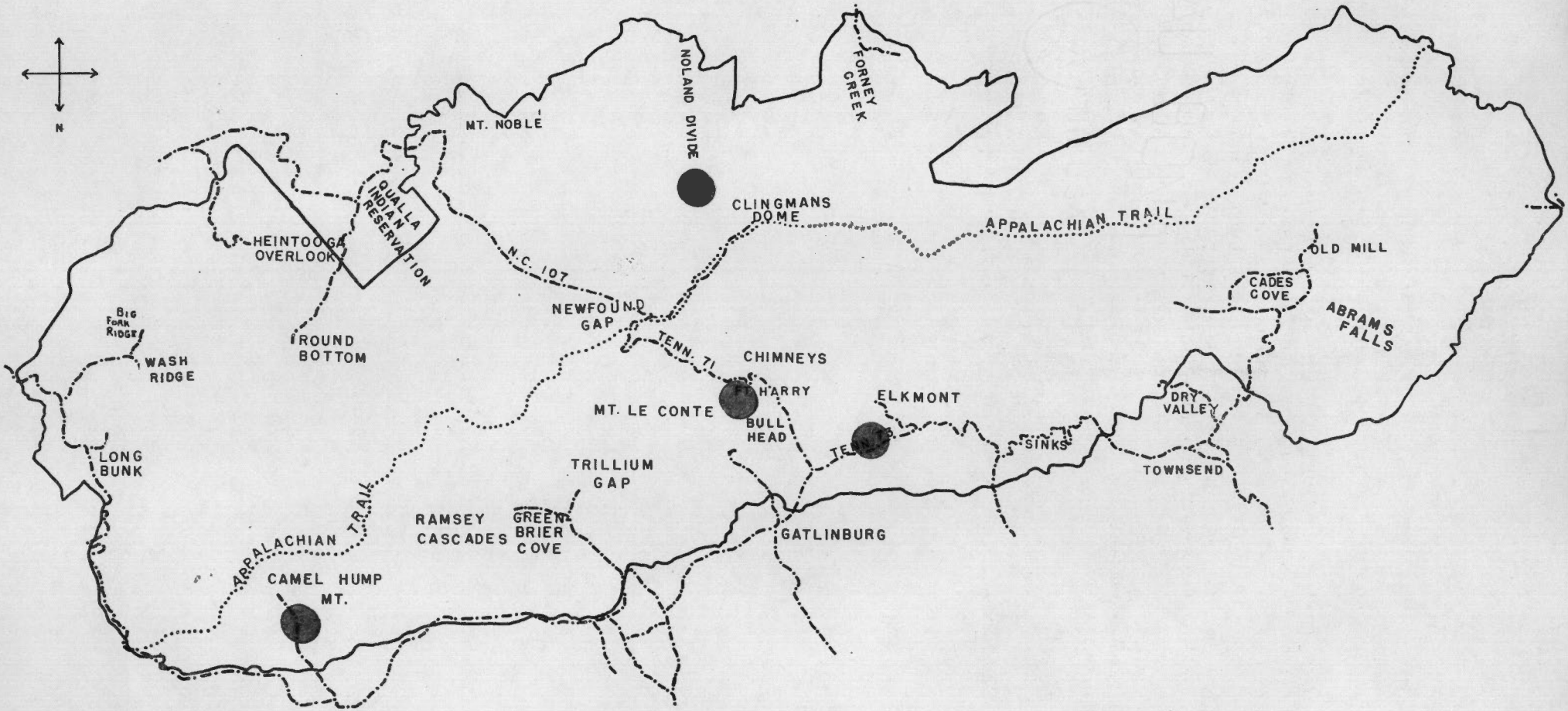
Map 2. Distribution of Licea operculata (Wingate) G. W. Martin ●



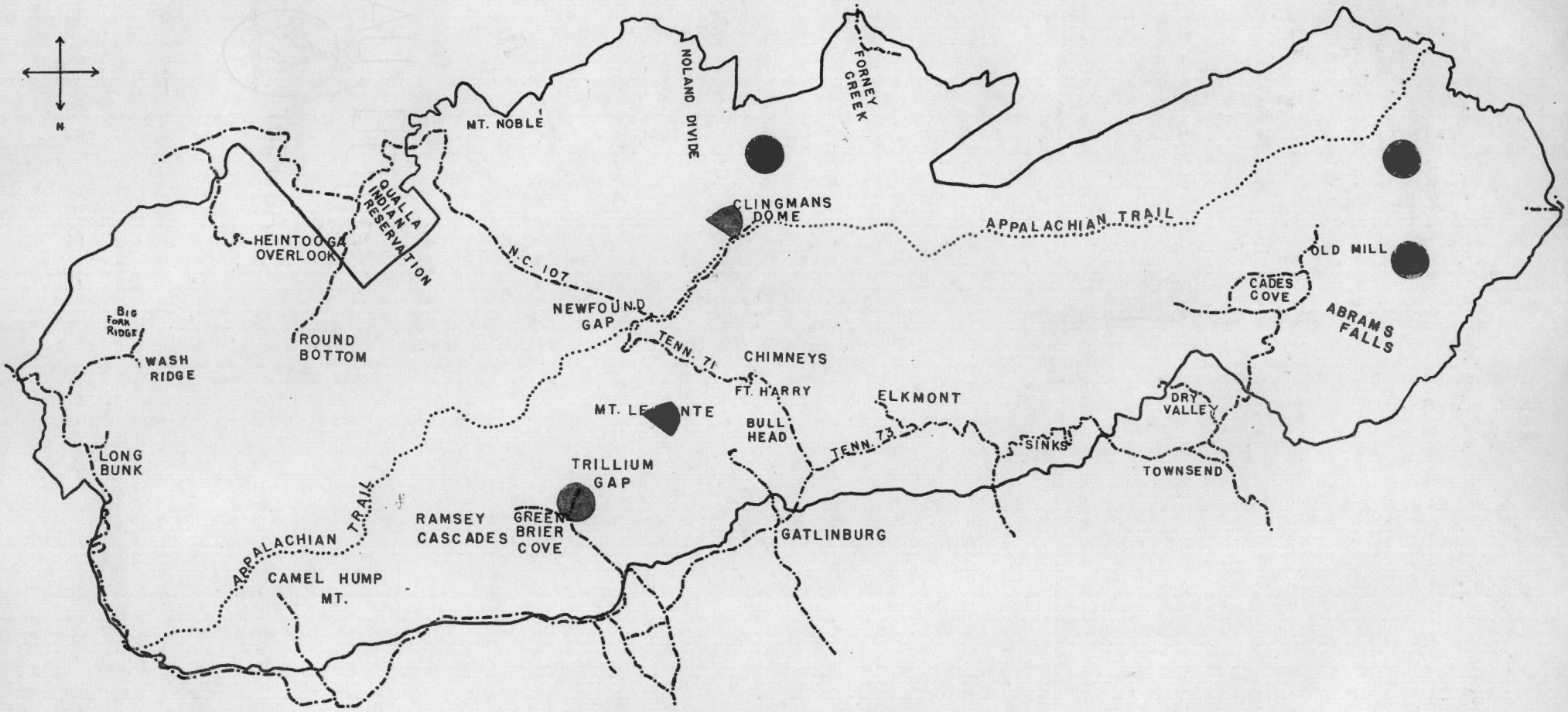
Map 3. Distribution of Tubifera ferruginosa (Batsch) J. F. Gmel. ●



Map 4. Distribution of Lycogala epidendrum (L.) Fries ●

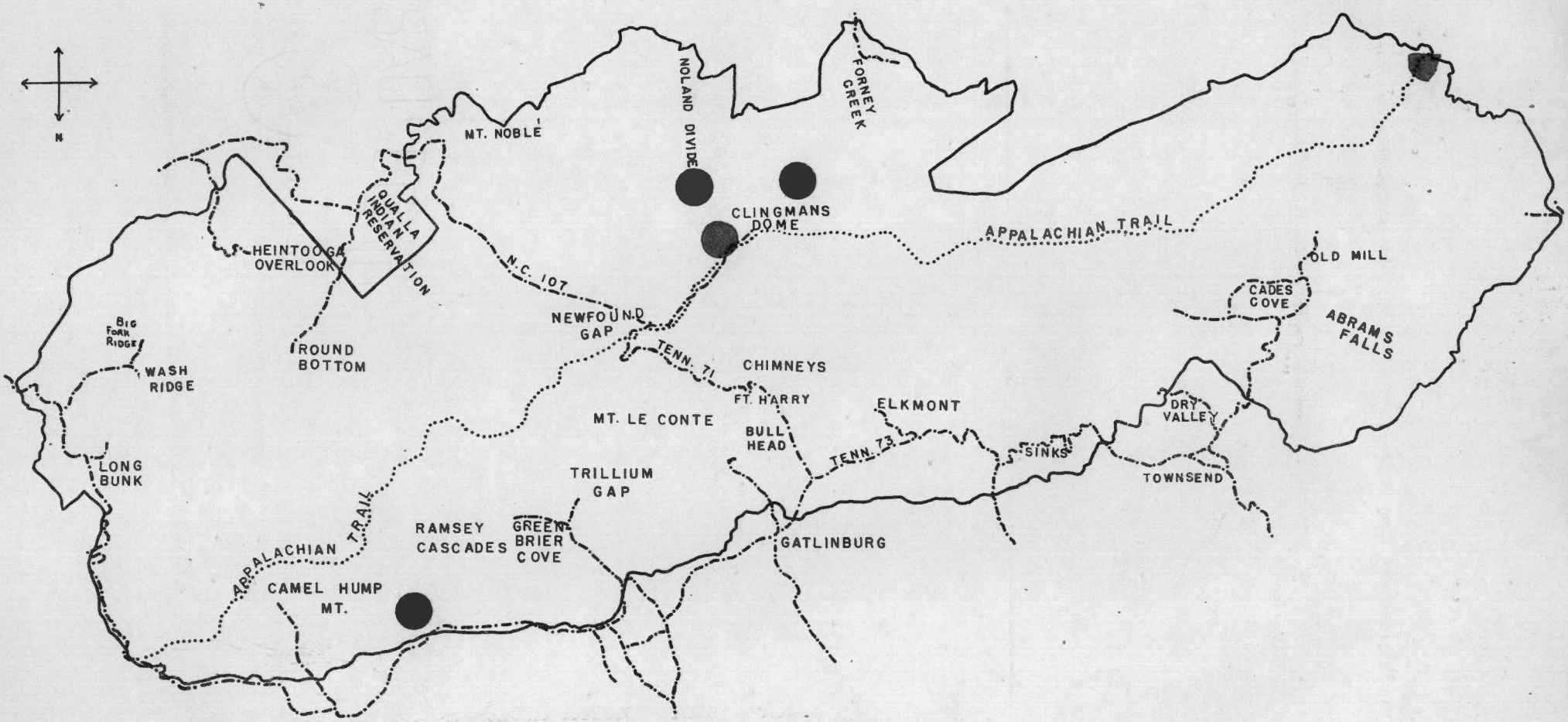


Ma p 5. Distribution of Lycogala exiguum Morgan ●



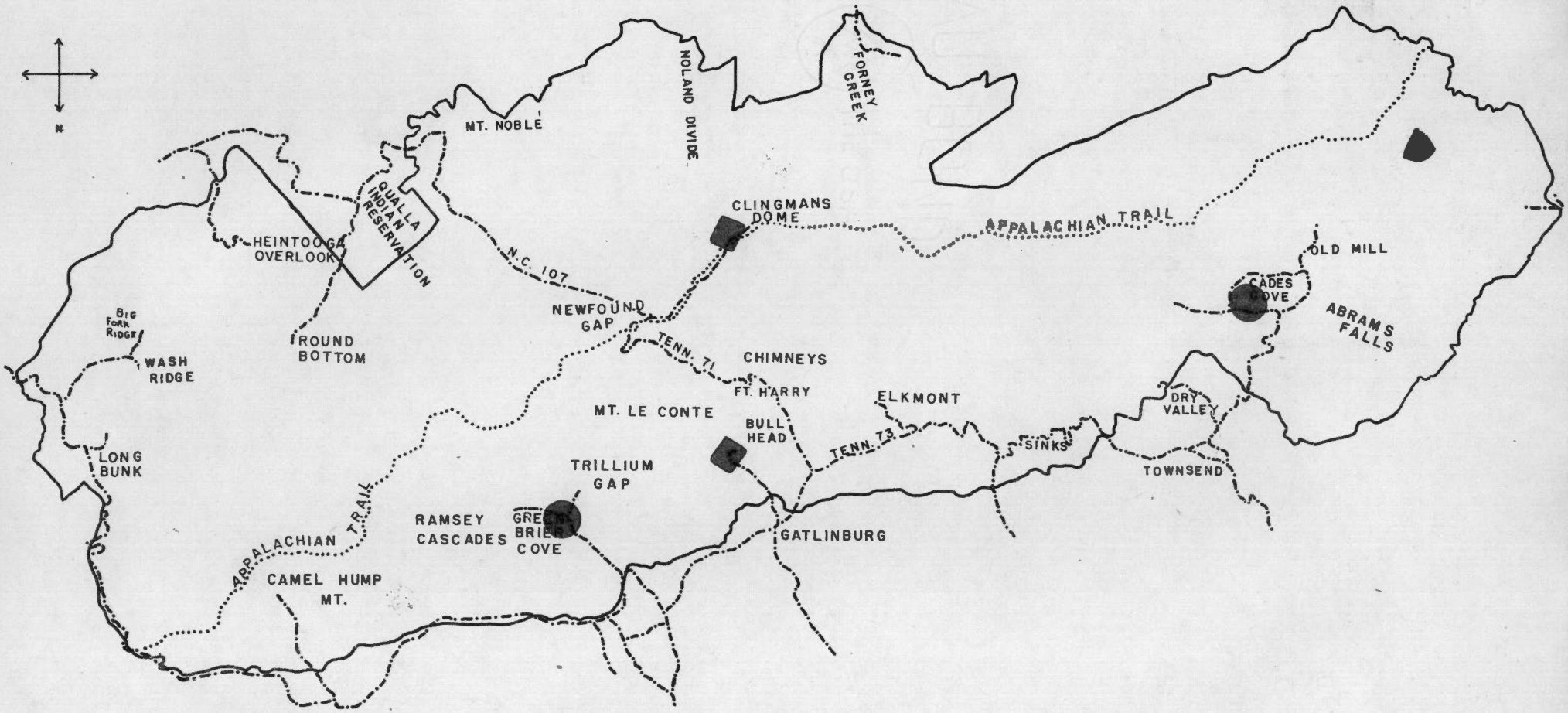
Map 6. Distribution of Cribaria aurantiaca Schrad. ●

Distribution of Cribaria purpurea Schrad. ◖



Map 7. Distribution of Cribaria rufa (Roth) Rost. ●

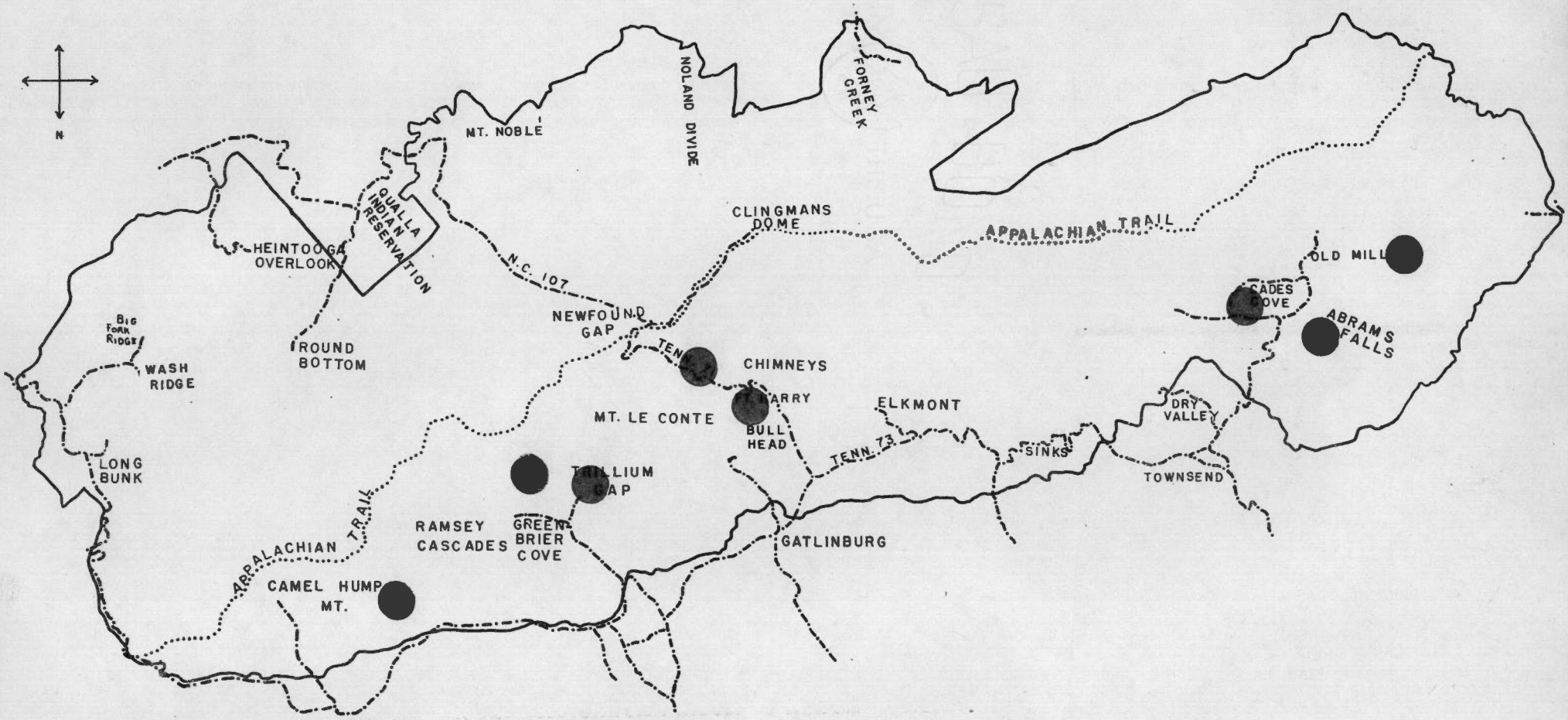
Distribution of Cribaria tenella Schrad. ●



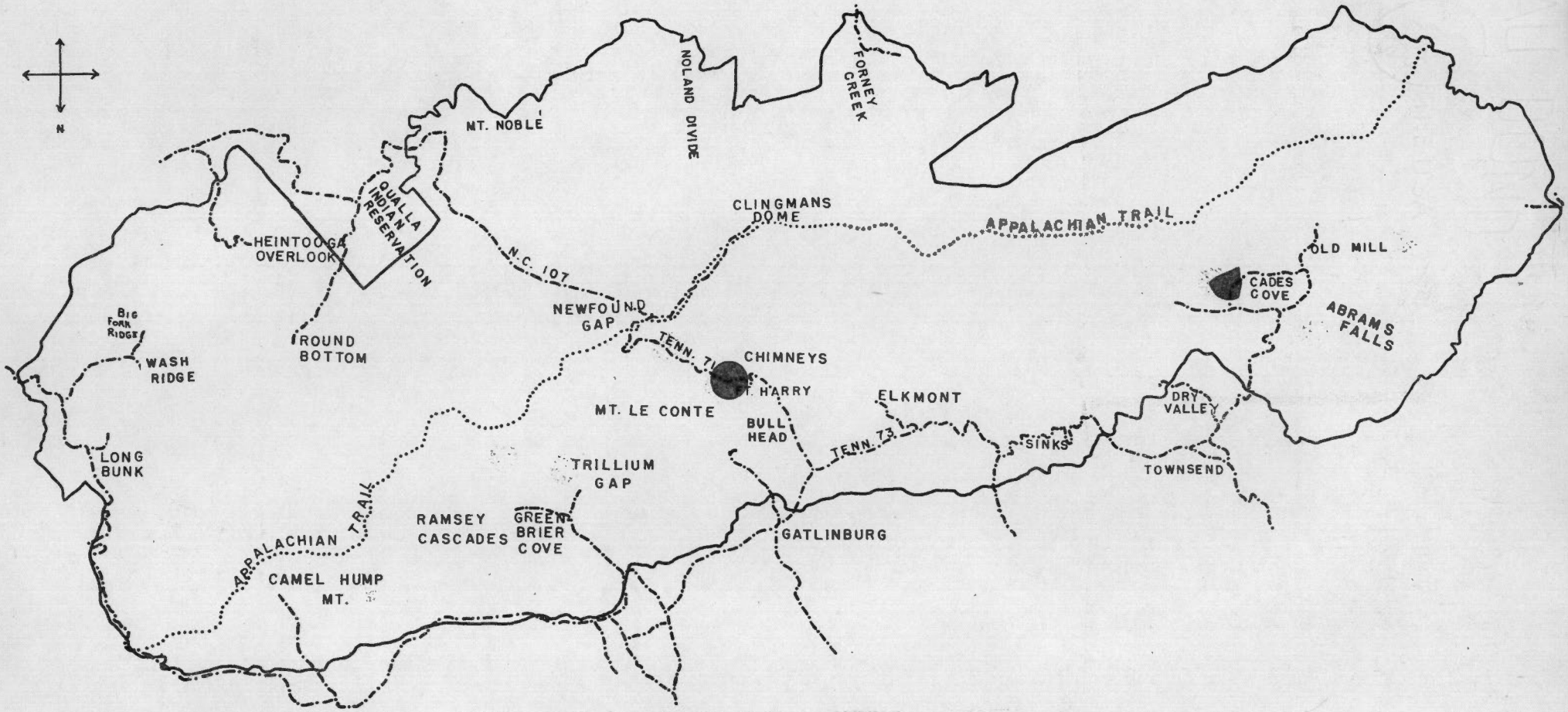
Map 8. Distribution of Cribaria macrocarpa Schrad. ▲

Distribution of Cribaria intricata Schrad. ●

Distribution of Cribaria splendens (Schrad.) Pers. ■

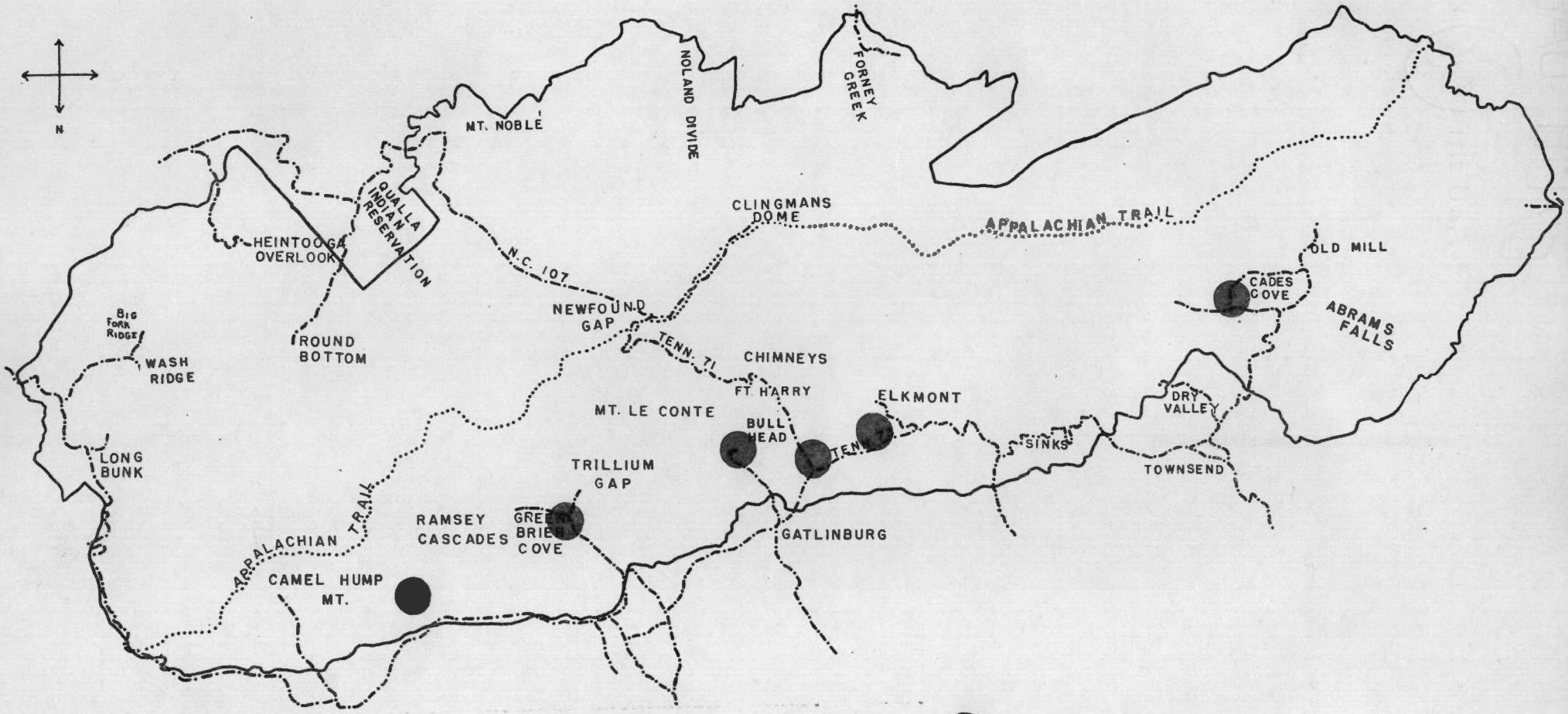


Map 9. Distribution of Dictydium cancellatum (Batsch) Macbr. ●

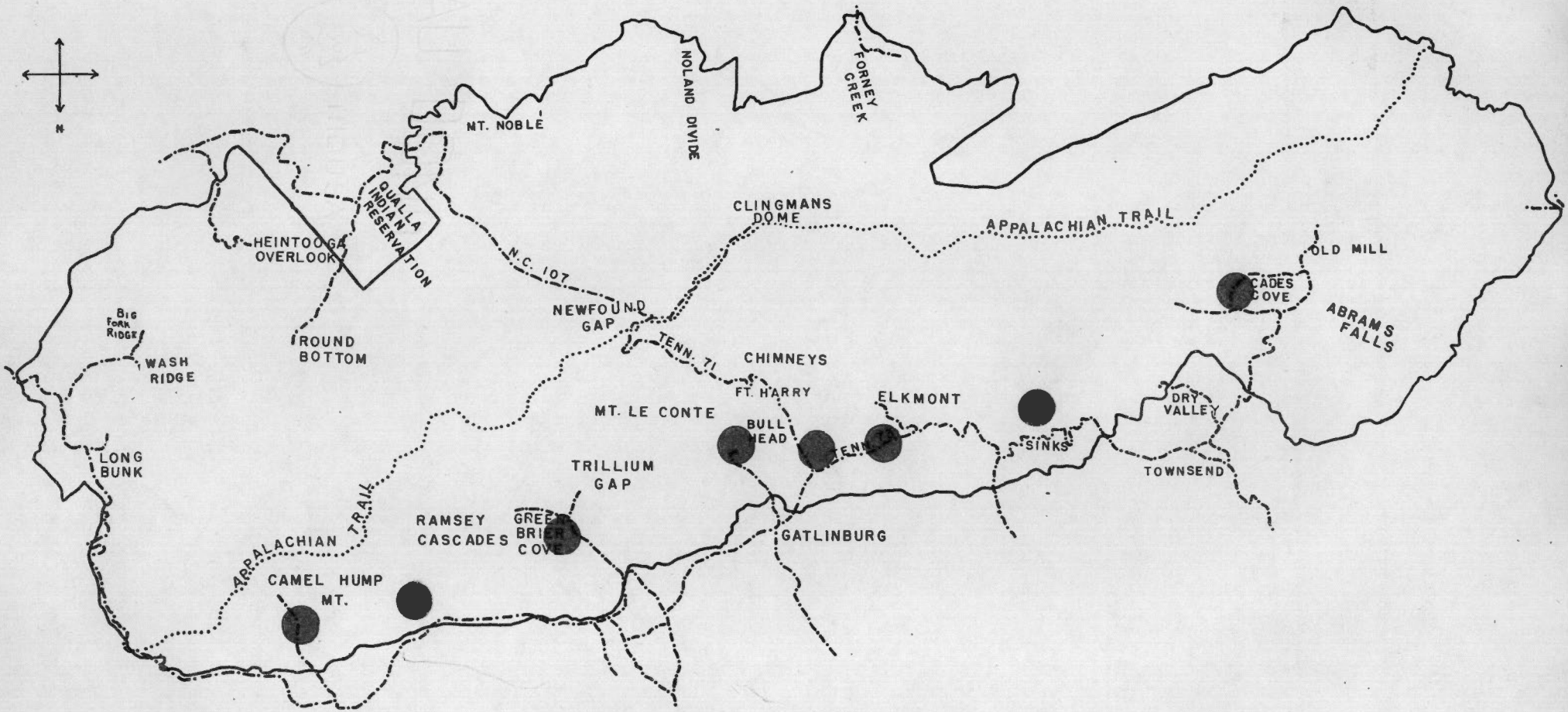


Map 10. Distribution of Perichaena chrysosperma (Currey) Lister ●

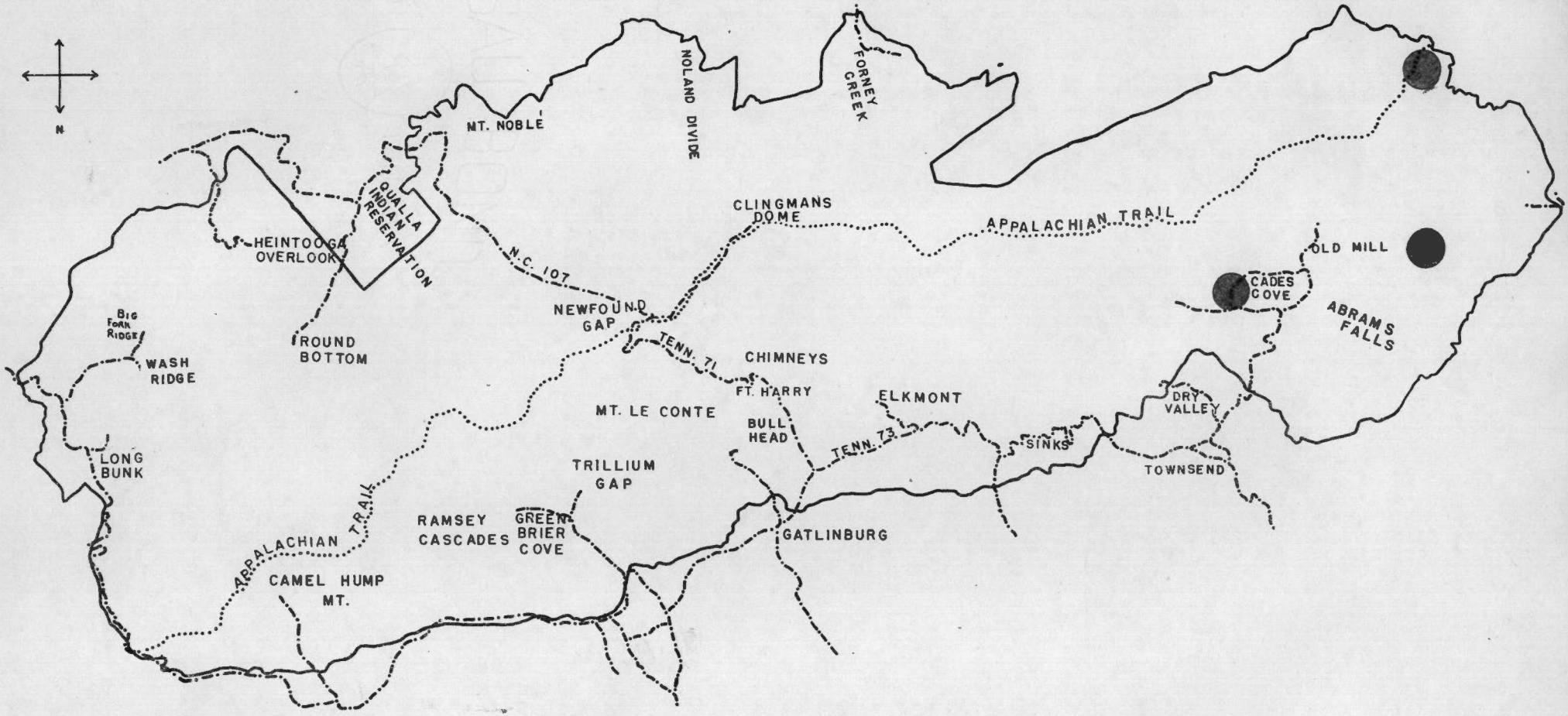
Distribution of Perichaena depressa Libert ◀



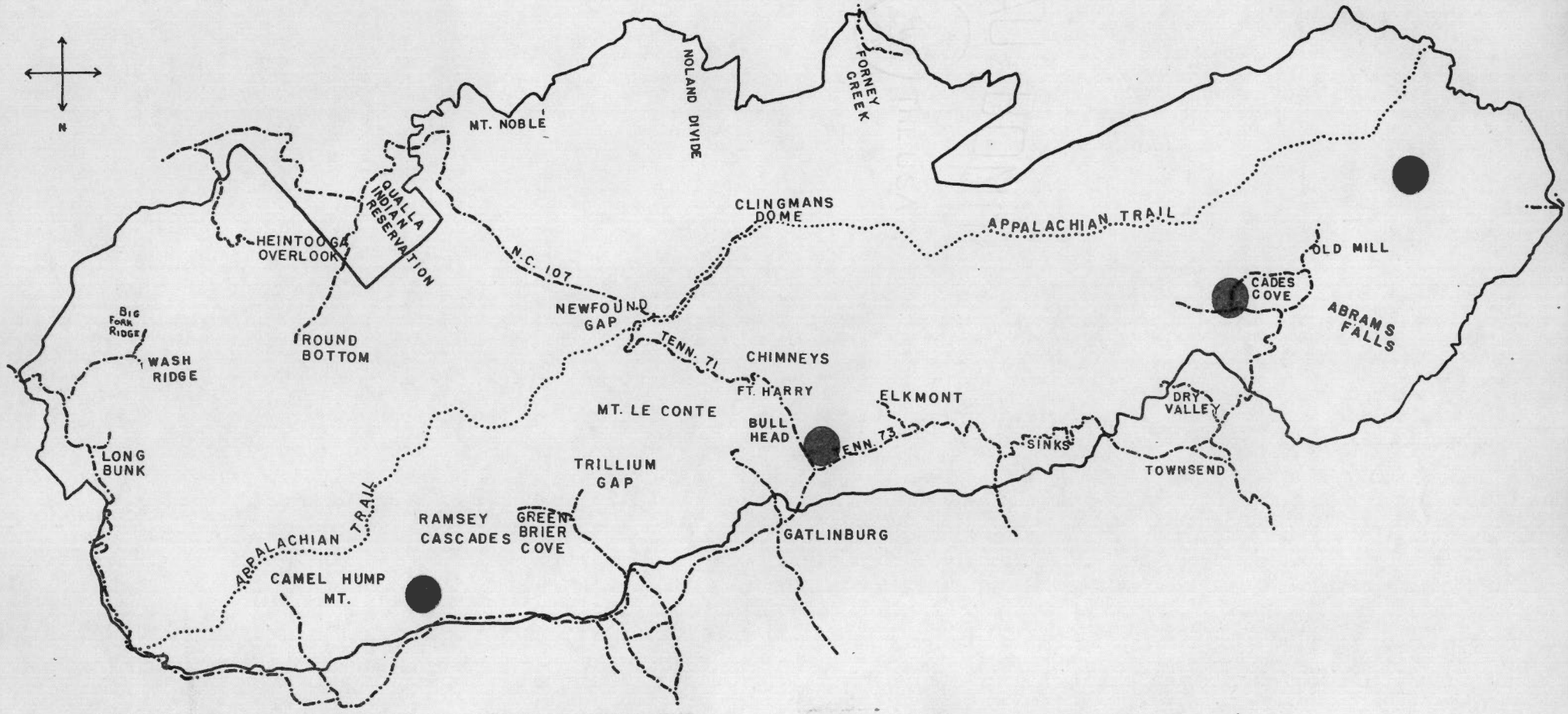
Map 11. Distribution of Arcyria incarnata (Pers.) Pers. ●



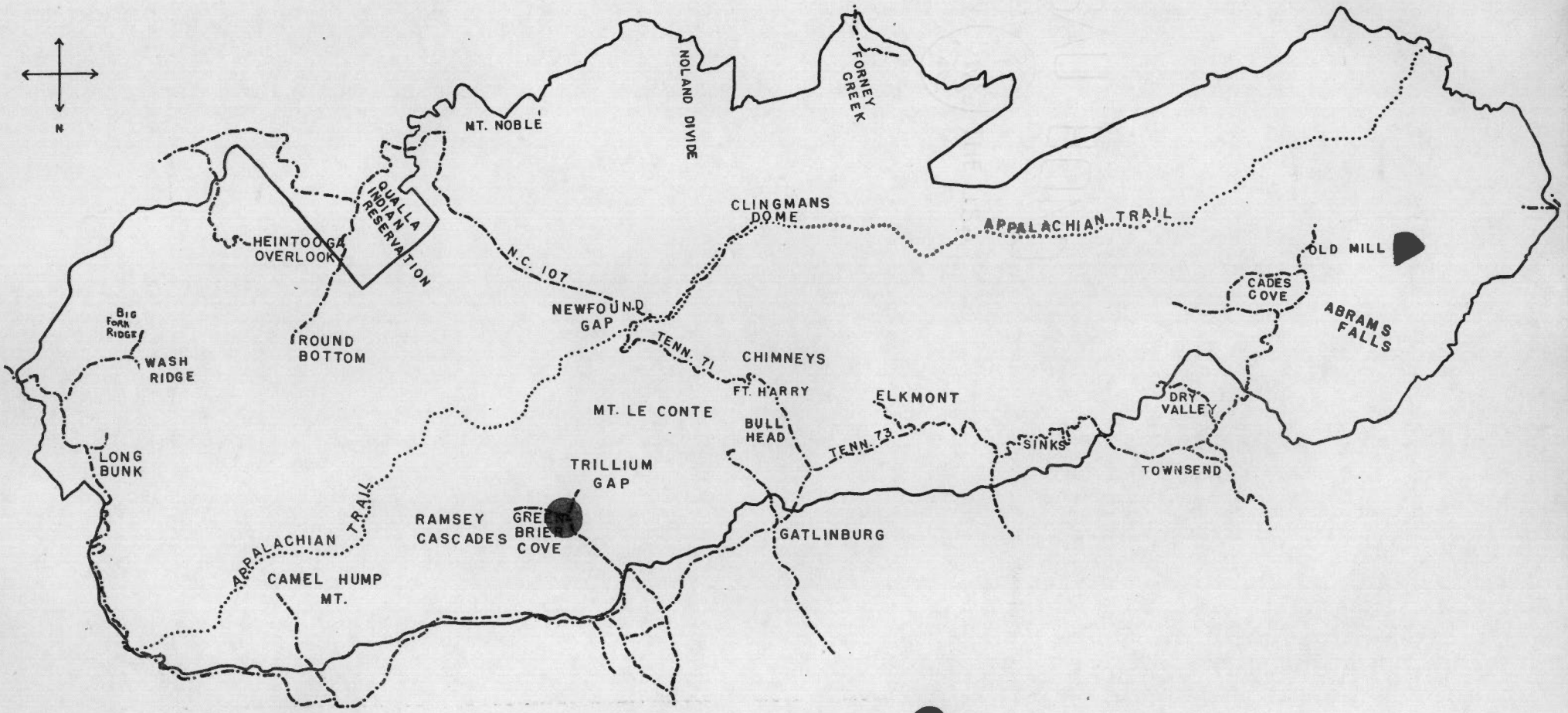
Map 12. Distribution of Arcyria cinerea (Bull.) Pers. ●



Map 13. Distribution of Arcyria insignis Kalchbr. & Cooke; Kalchbr. ●

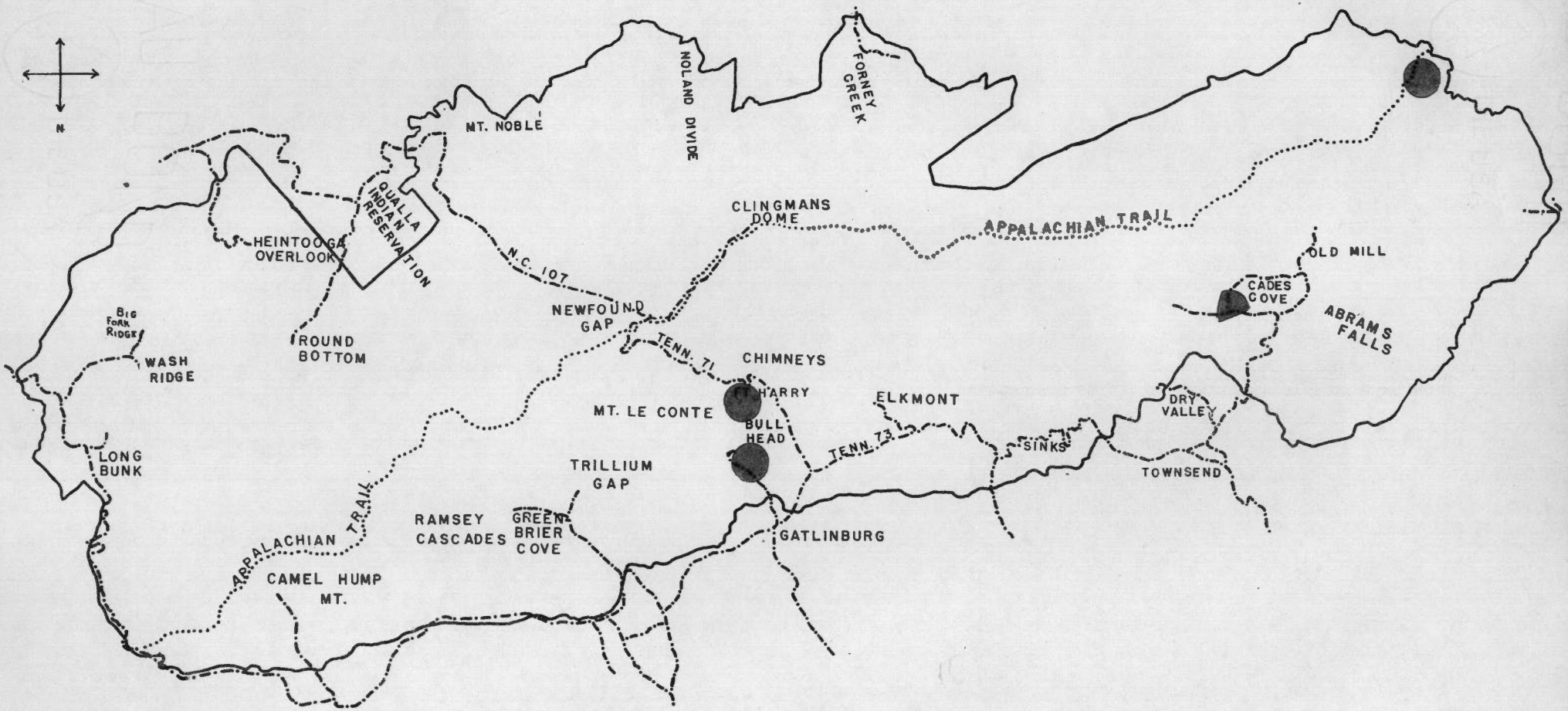


Map 14. Distribution of Arcyria denudata (L.) Wettst.



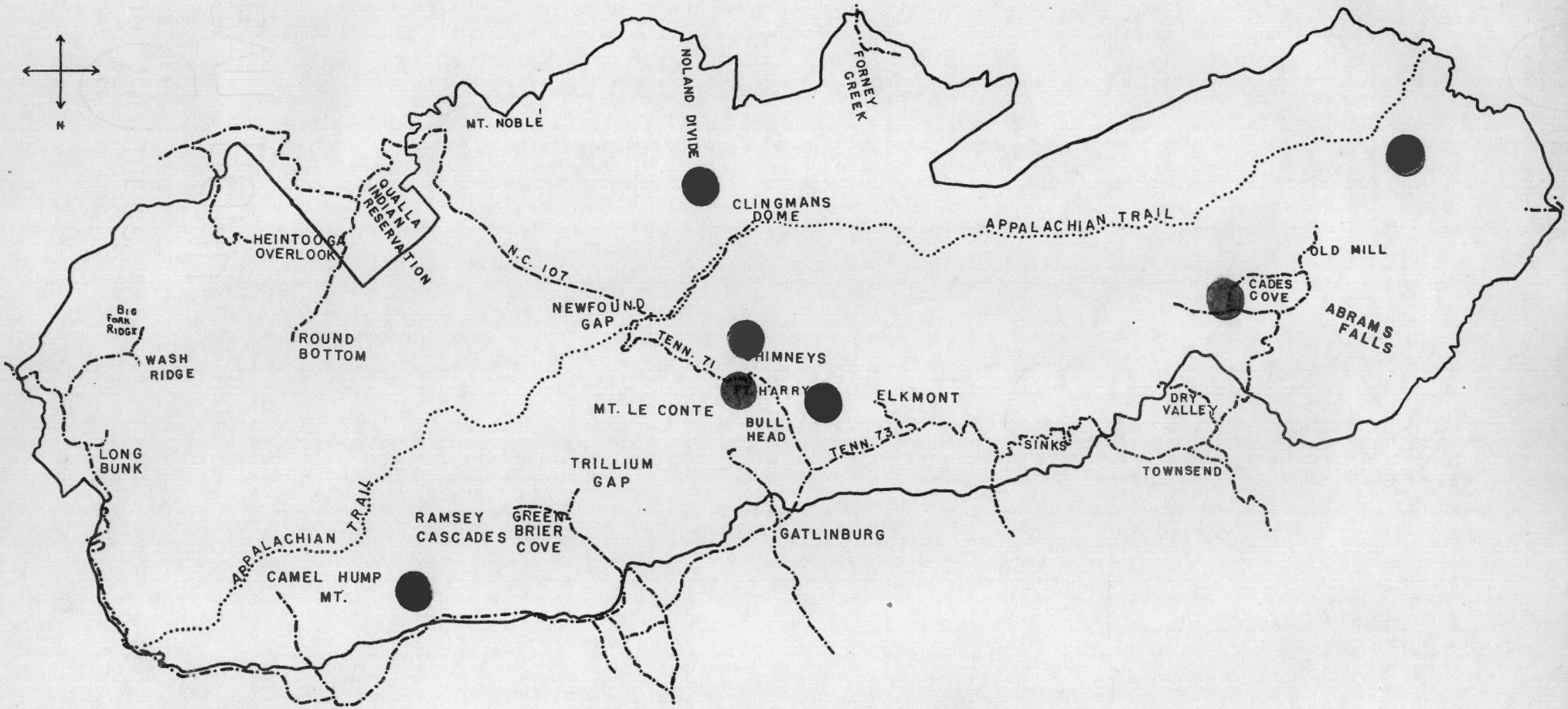
Map 15. Distribution of Oligonema flavidum (Peck) Peck ●

Distribution of Oligonema Schweinitzii (Berk.) G. W. Martin ◗

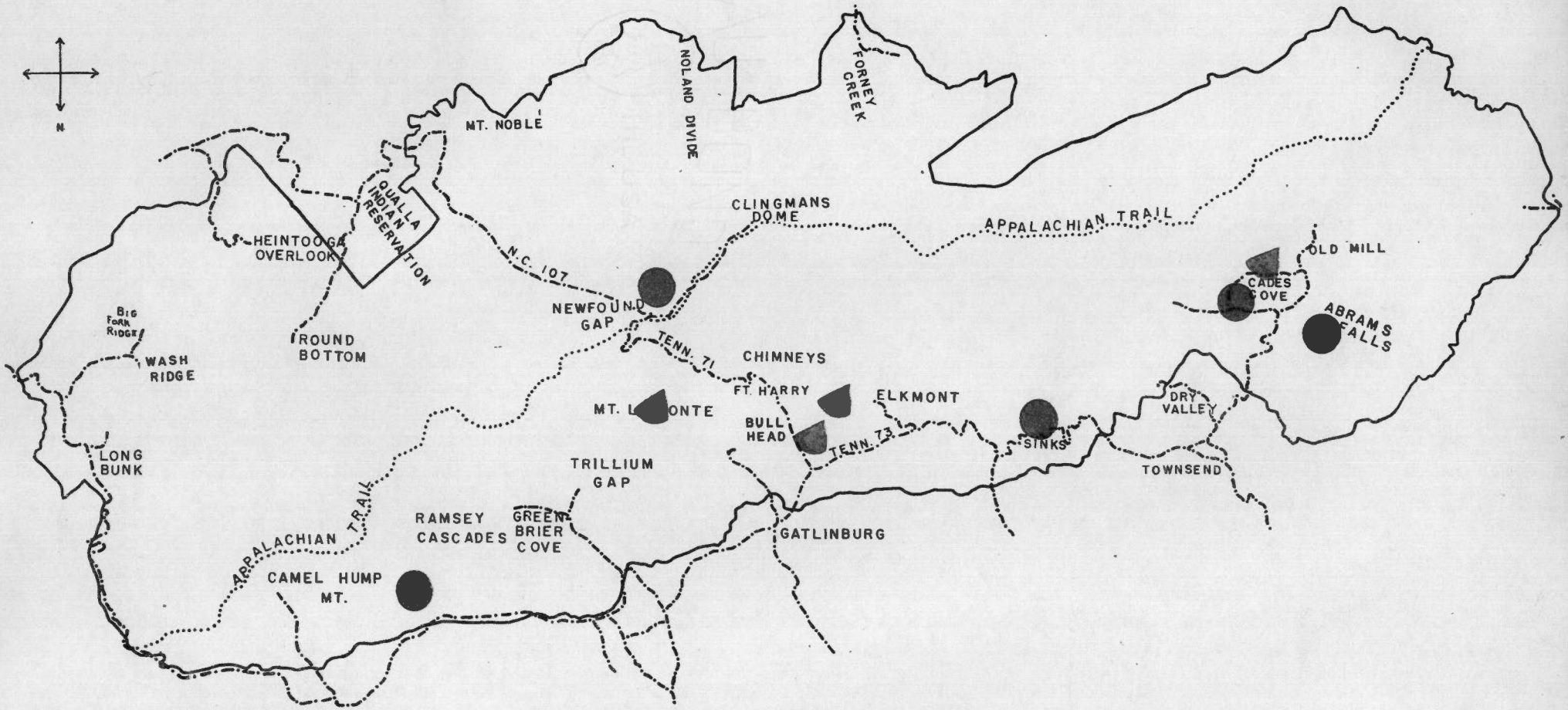


Map 16. Distribution of Trichia varia (Pers.) Pers. ●

Distribution of Trichia scabra Rost. ◗

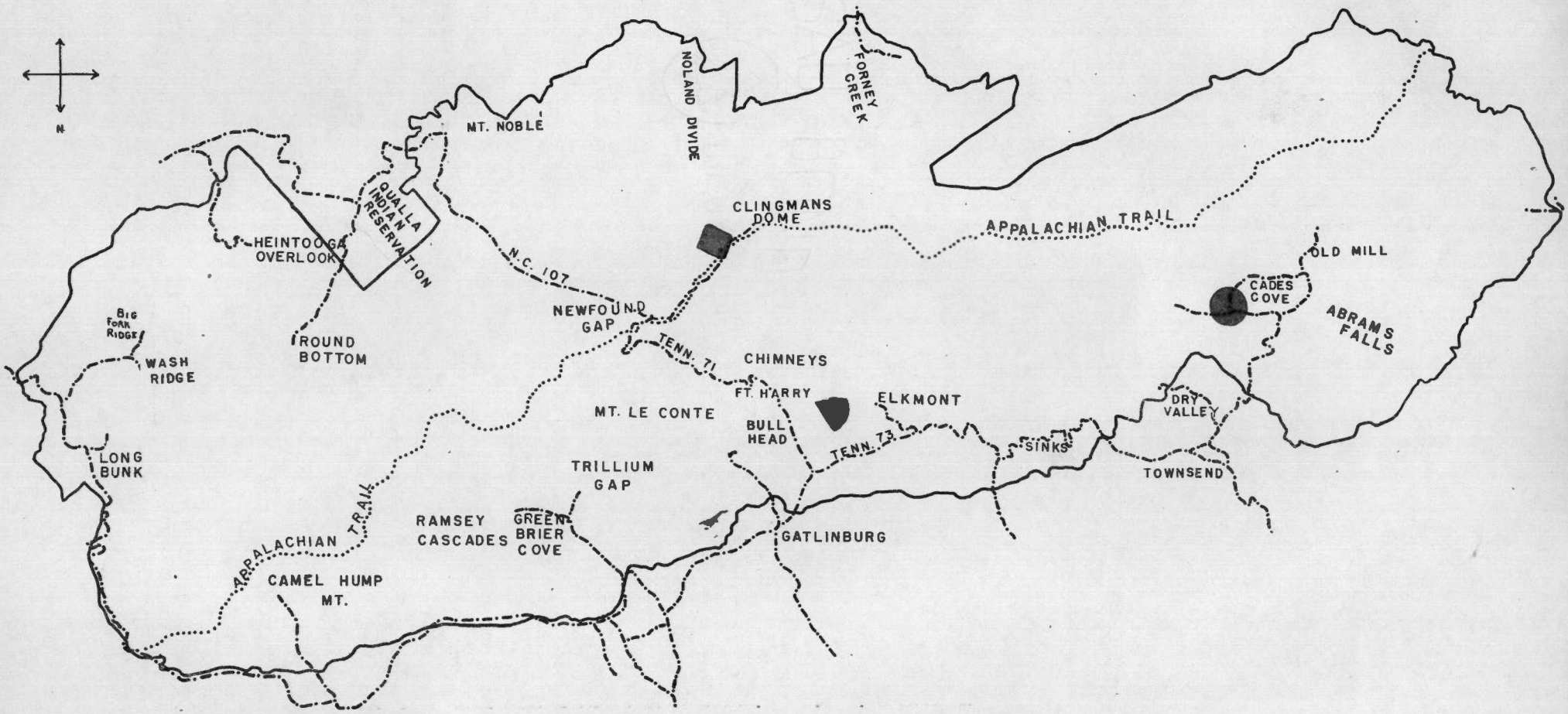


Map 17. Distribution of Trichia favoginea (Batsch) Pers.



Map 18. Distribution of Trichia affinis De Bary; Fuckel ●

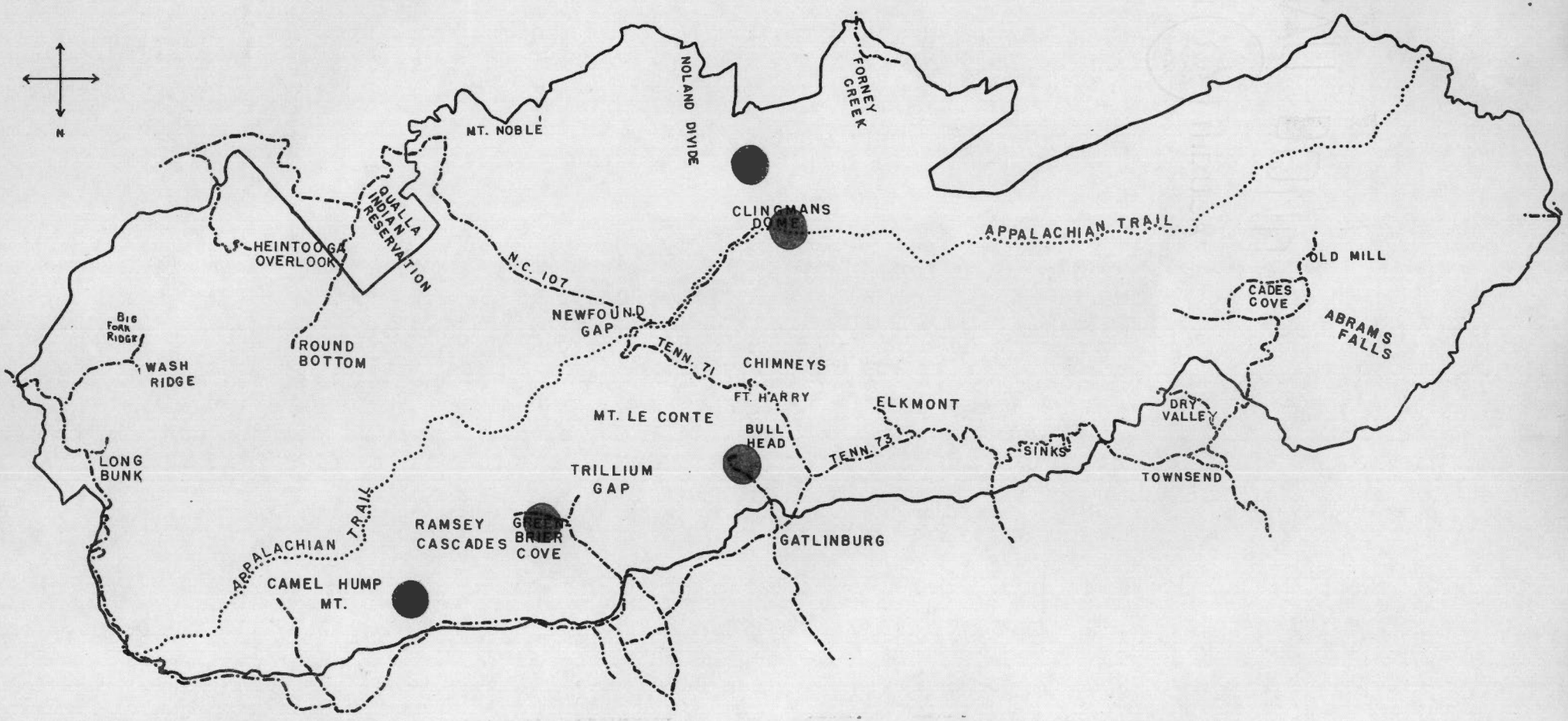
Distribution of Trichia persimilis P. Karst. ◖



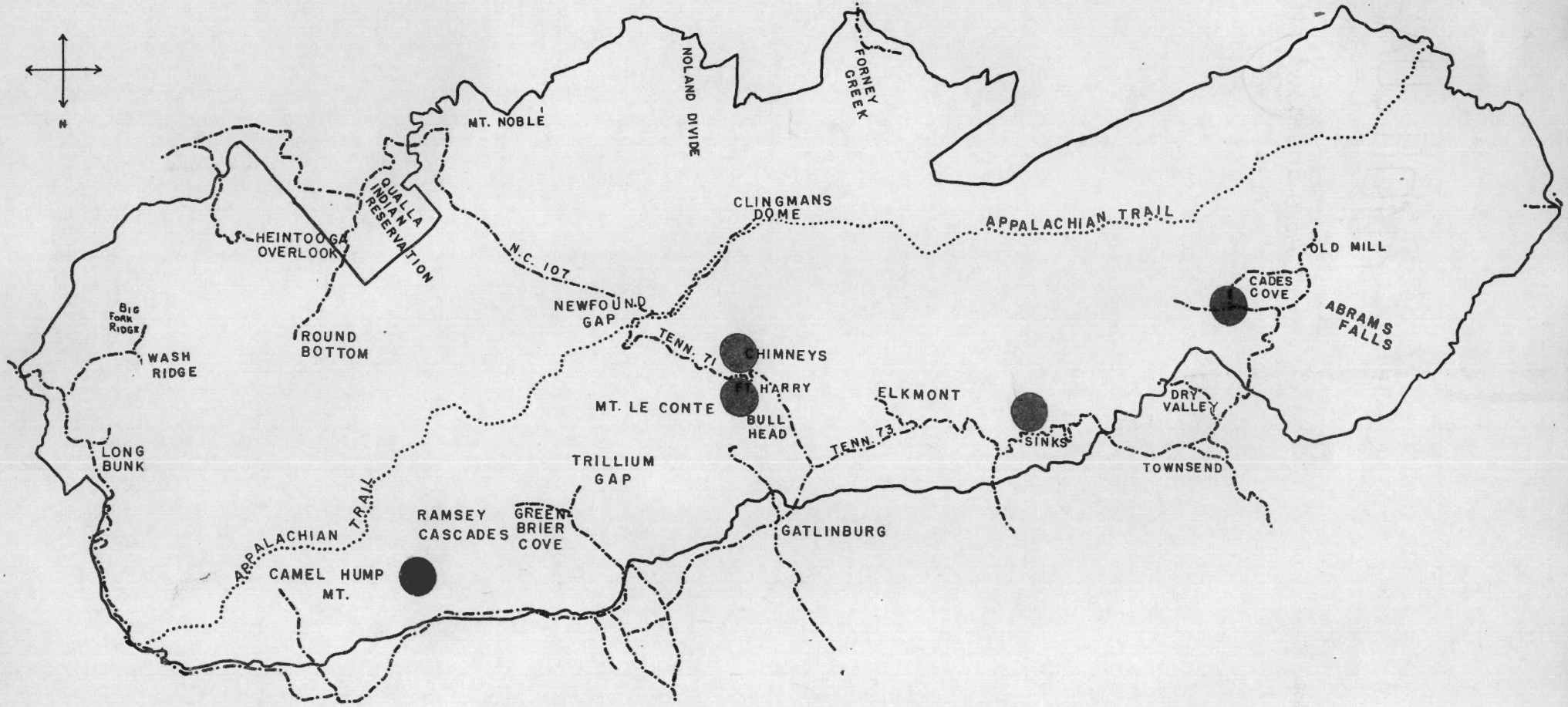
Map 19. Distribution of Trichia pusilla (Hedw.) G. W. Martin ●

Distribution of Trichia erecta Rex ◔

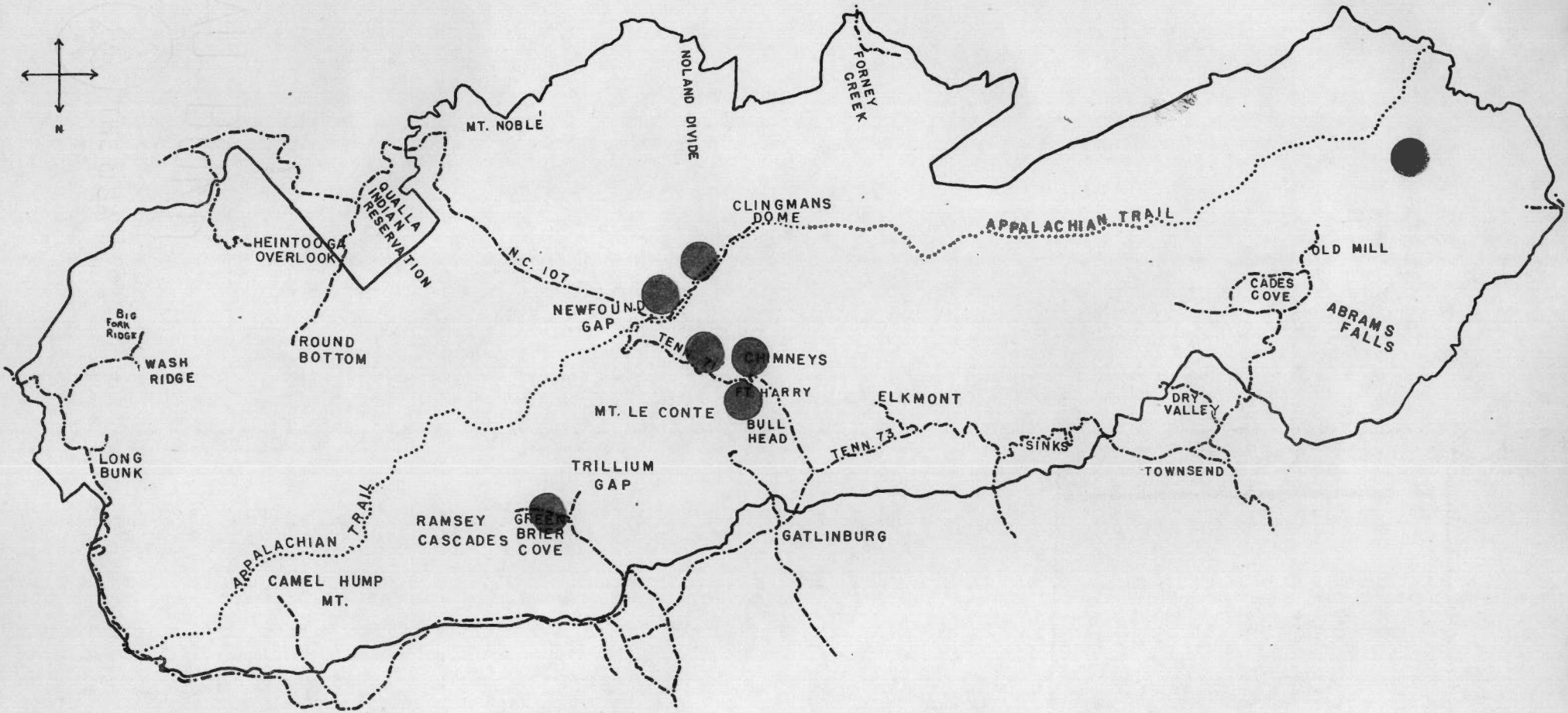
Distribution of Trichia subfusca Rex ◕



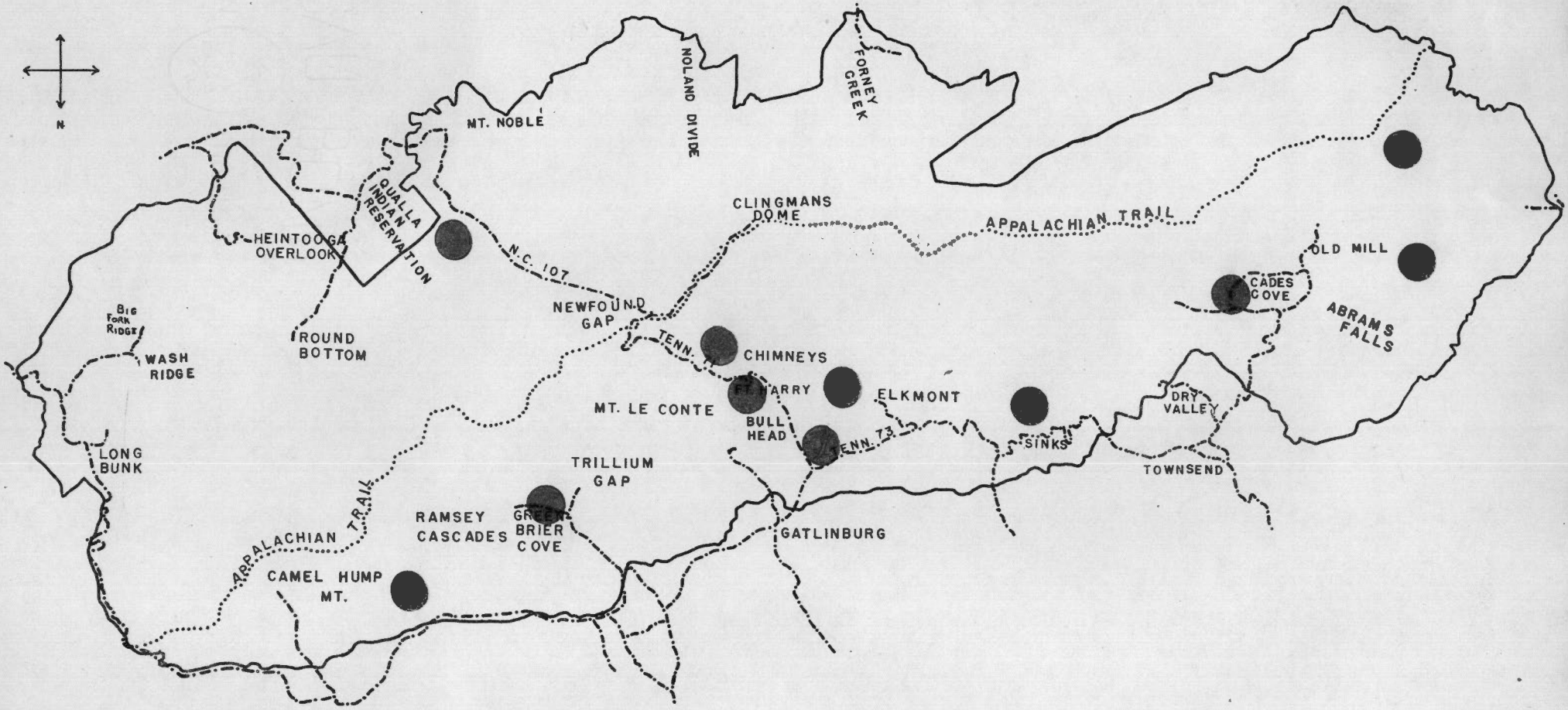
Map 20. Distribution of Trichia Botrytis (J. F. Gmel.) Pers. ●



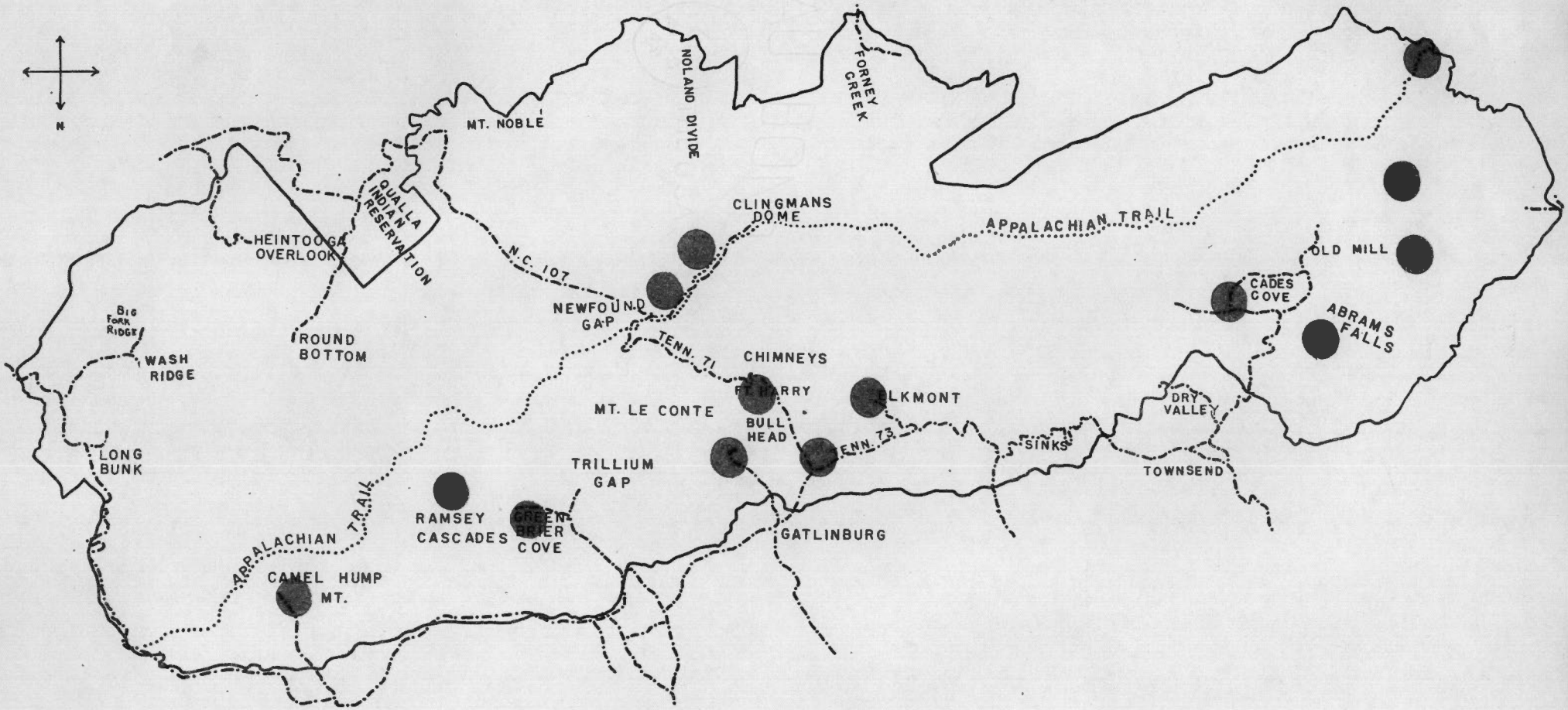
Map 21. Distribution of Hemitrichia serpula (Scop.) Rost.; Lister



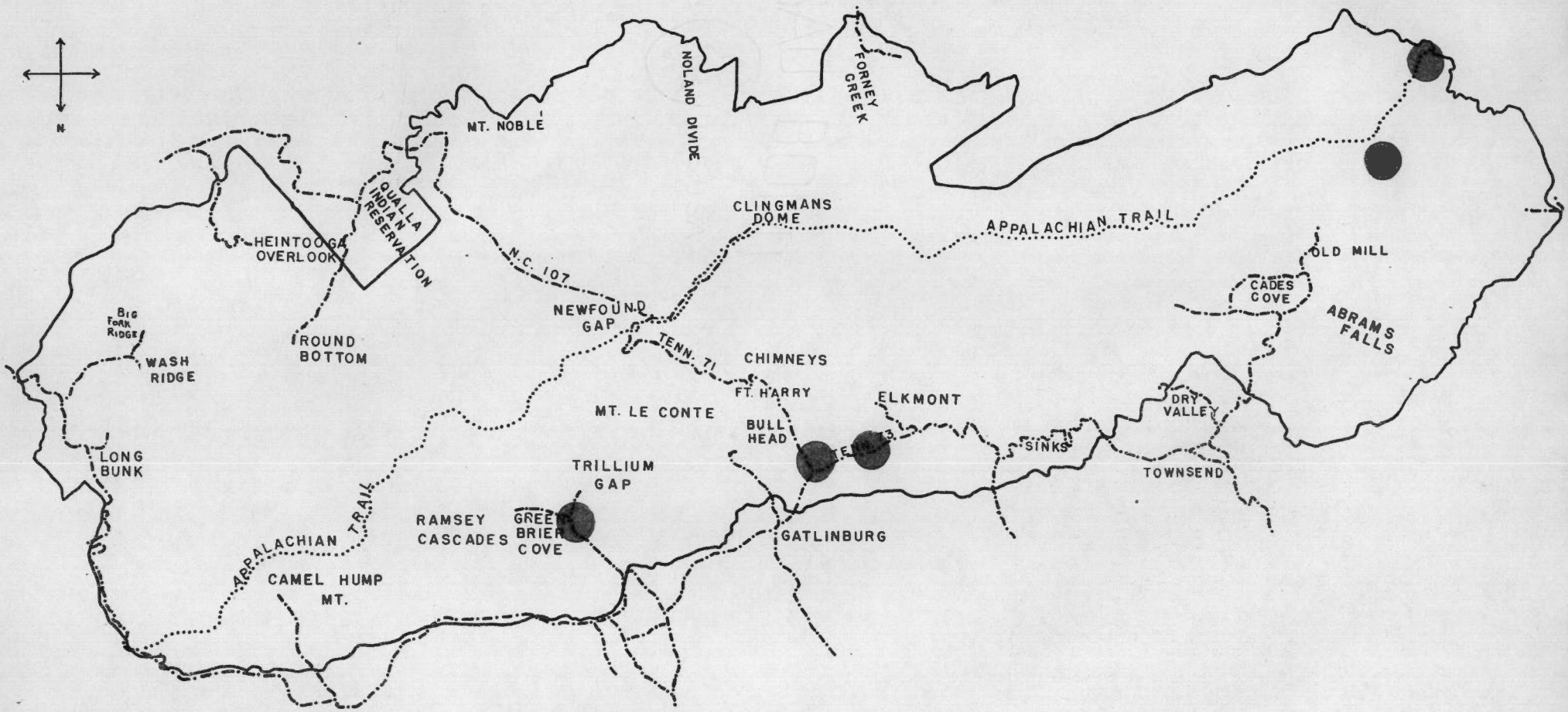
Map 22. Distribution of Hemitrichia clavata (Pers.) Rost.; Fuckel ●



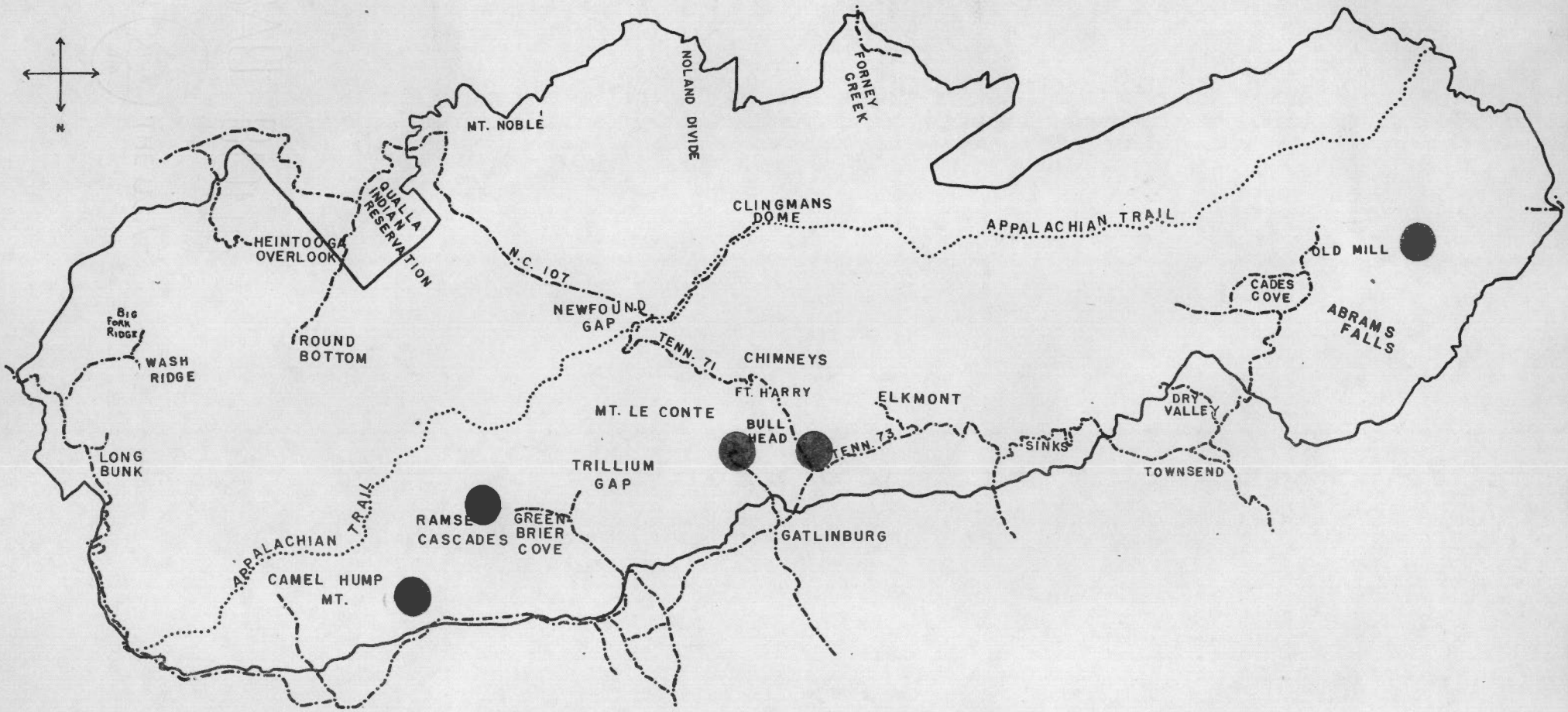
Map 23. Distribution of Hemitrichia stipitata (Masse) Macbr. ●



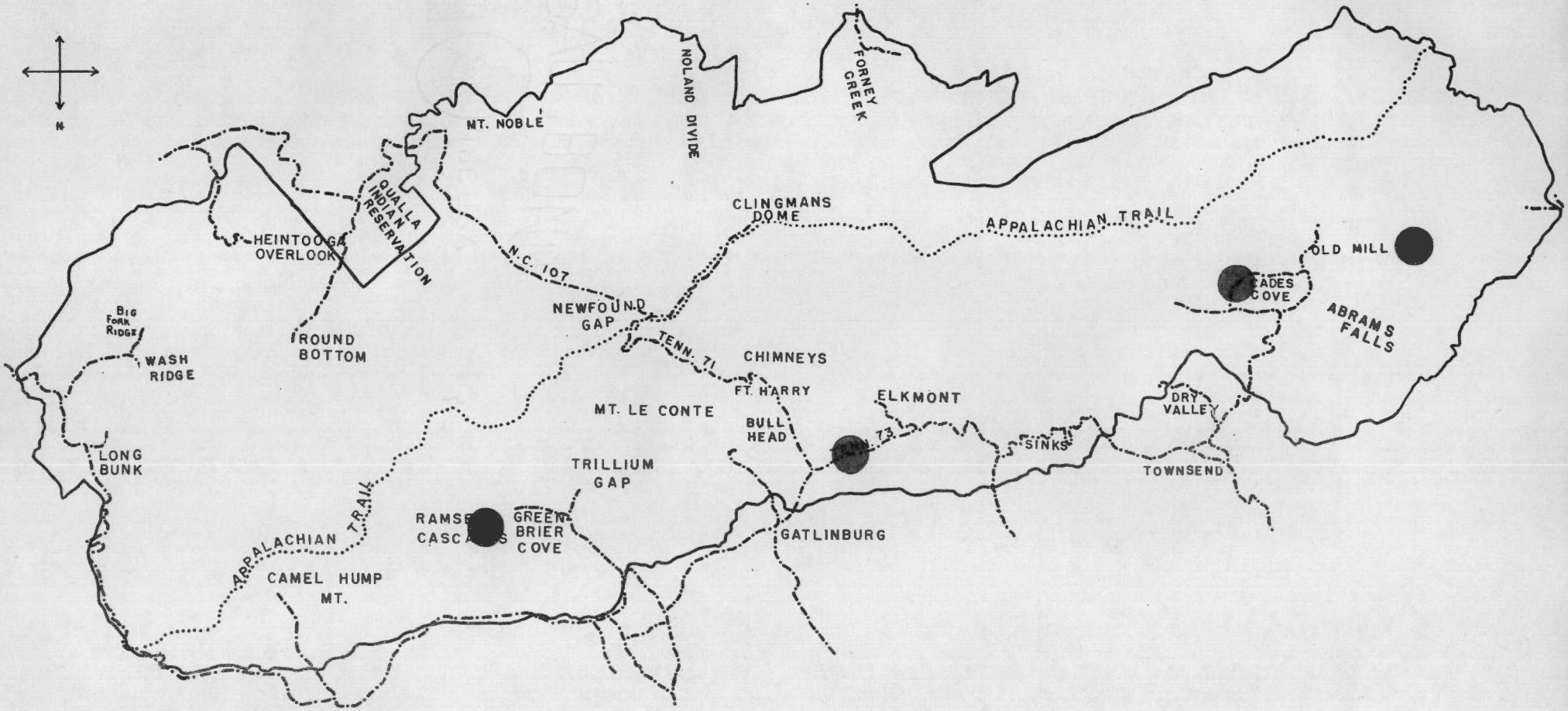
Map 24. Distribution of Hemitrichia vesparium (Batsch) Macbr. ●



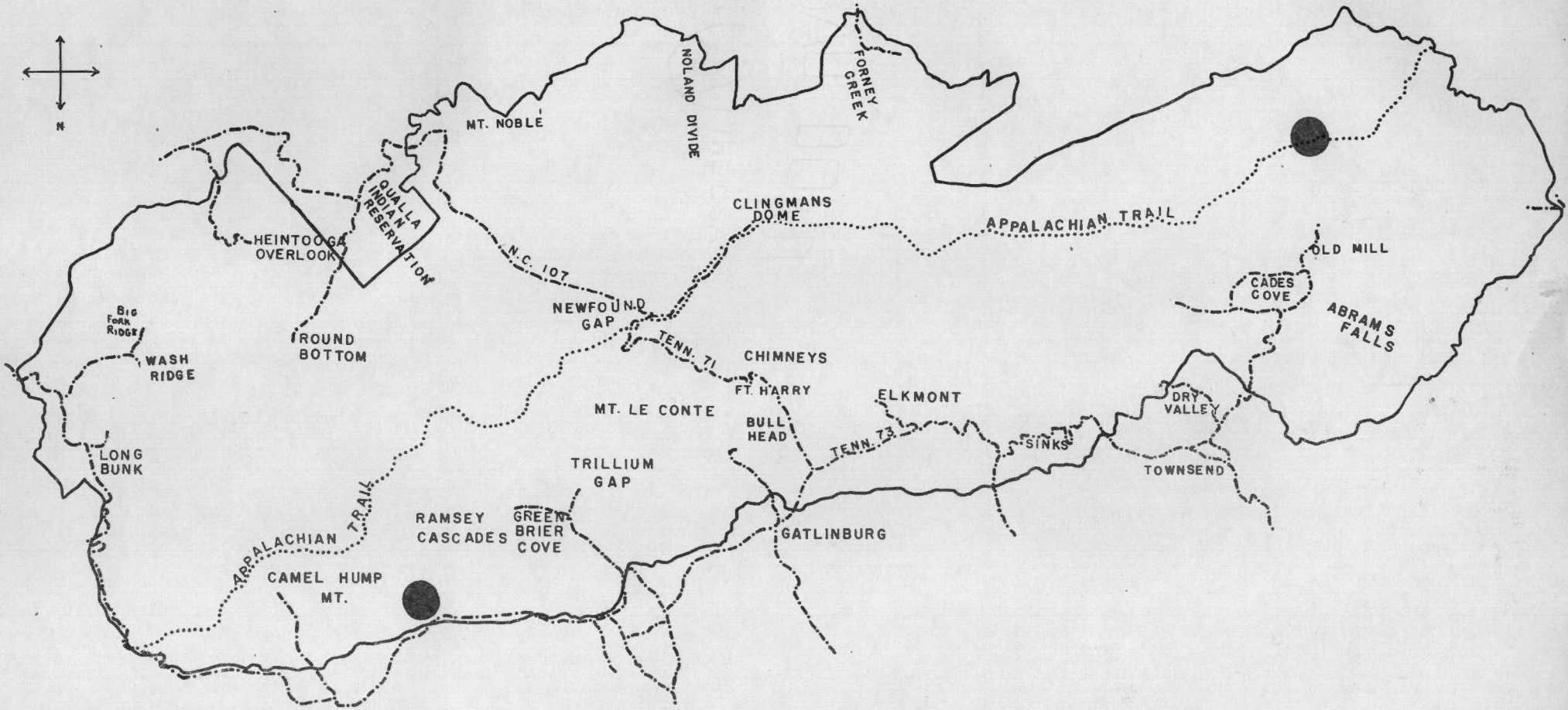
Map 25. Distribution of Stemonitis fusca Roth. ●



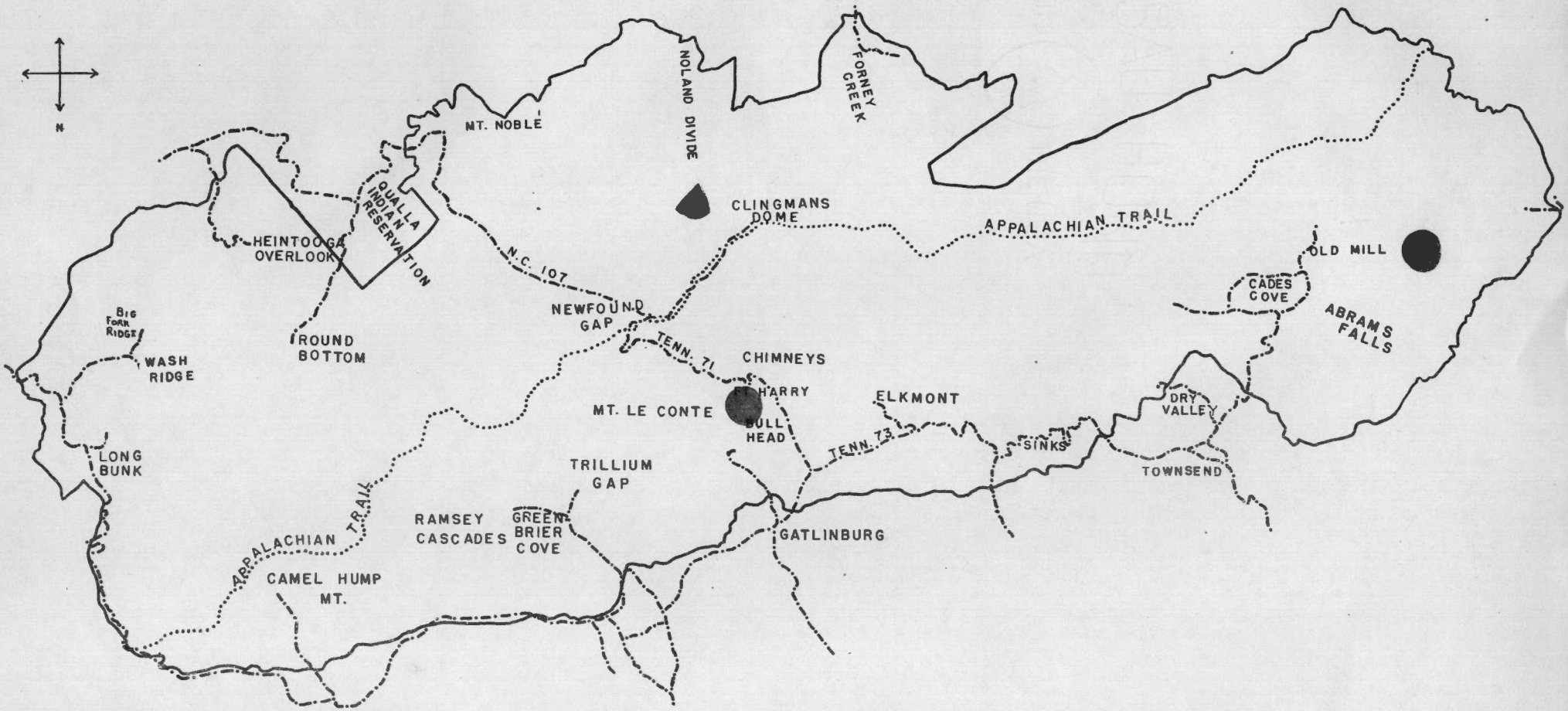
Map 26. Distribution of Stemonitis axifera (Bull.) Macbr. ●



Map 27. Distribution of Stemonitis Smithii Macbr. ●

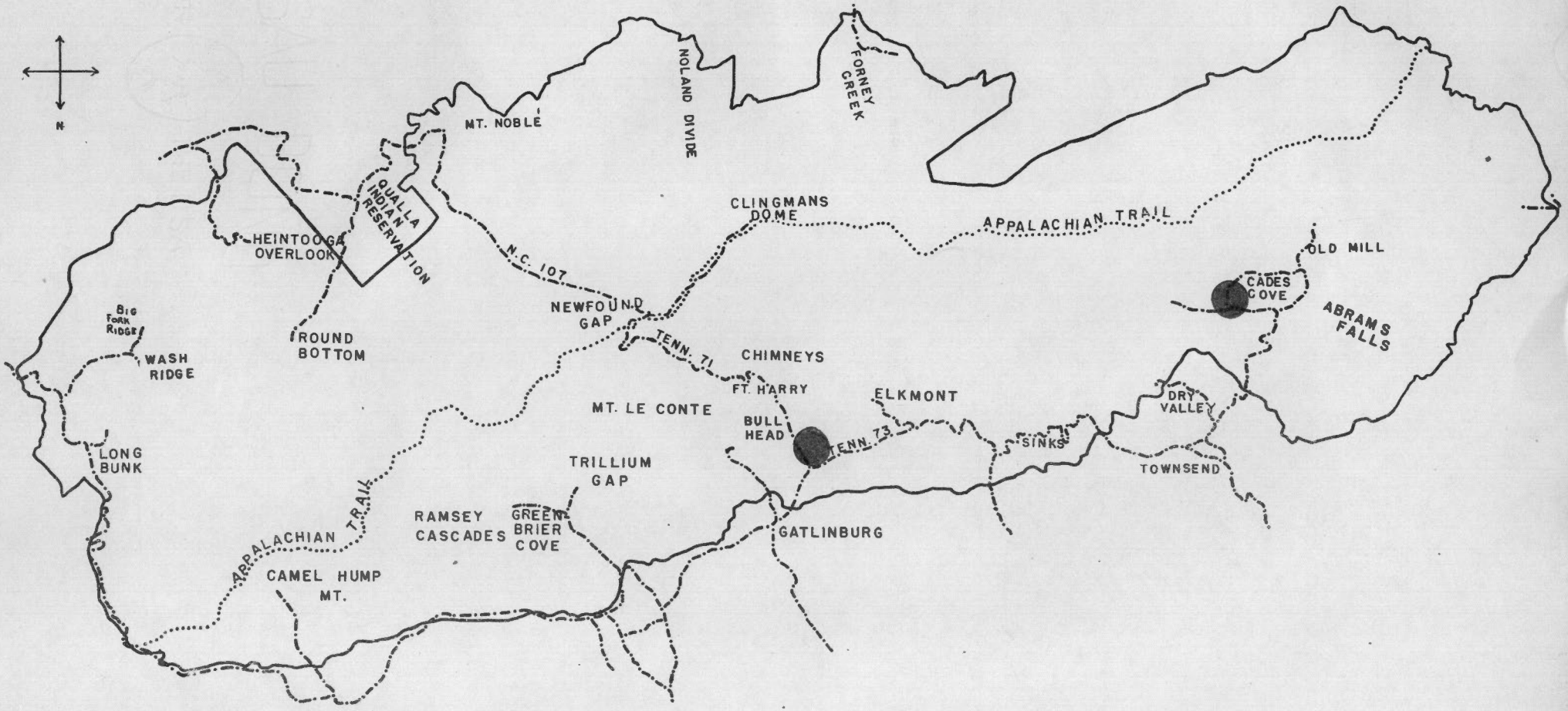


Map 28. Distribution of Stemonitis splendens Rost. ●

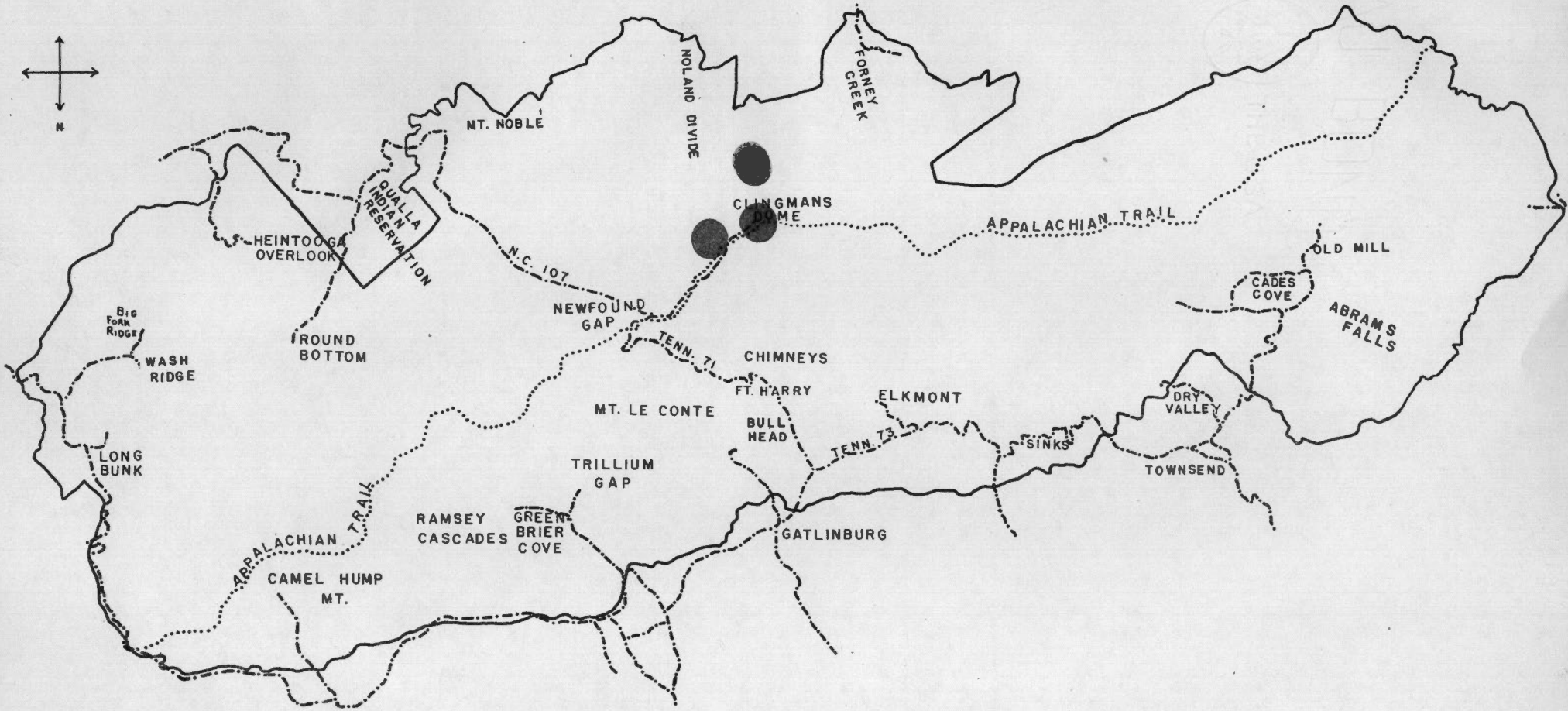


Map 29. Distribution of Stemonitis virginiensis Rex ●

Distribution of Stemonitis favoginata Jahn ◢

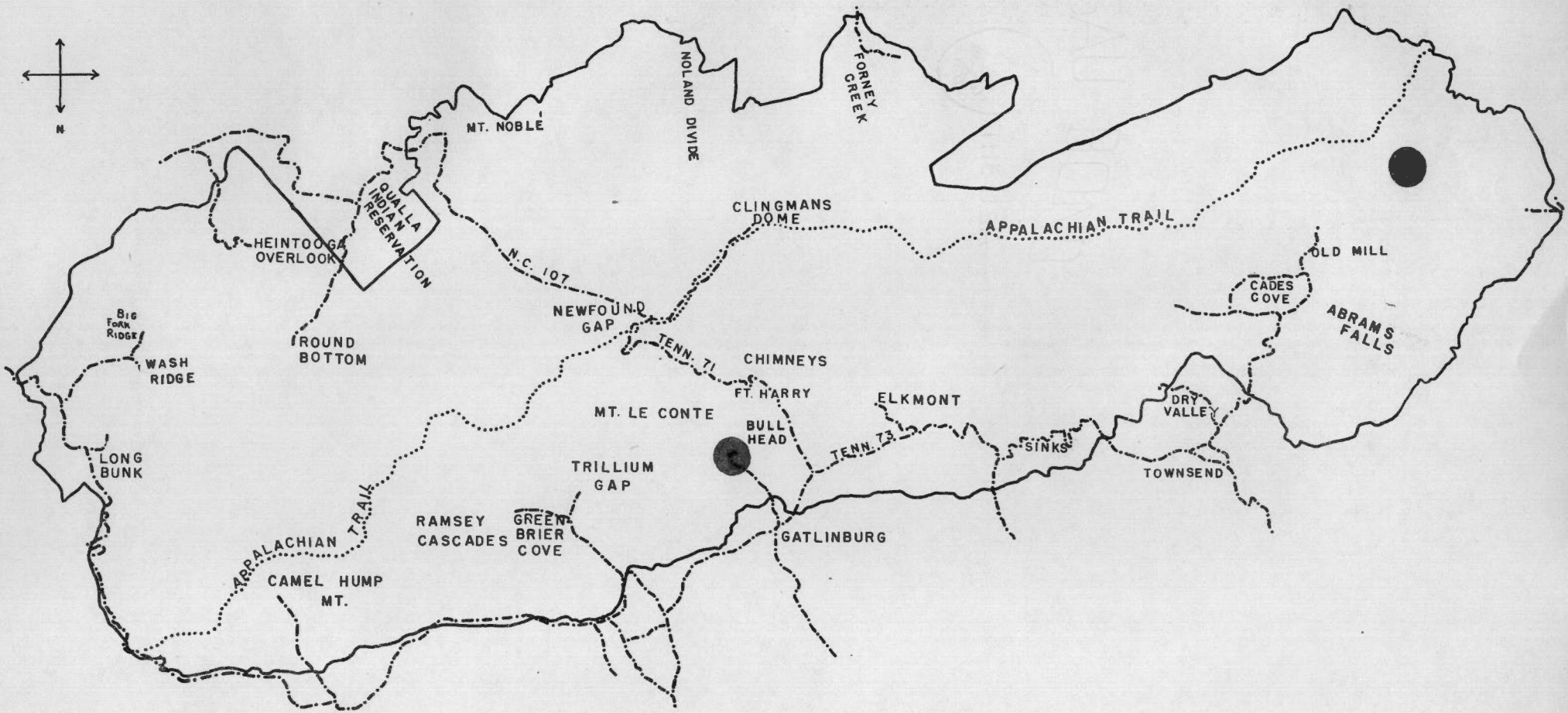


Map 30. Distribution of Comatricha tyhoides (Bull.) Rost. ●

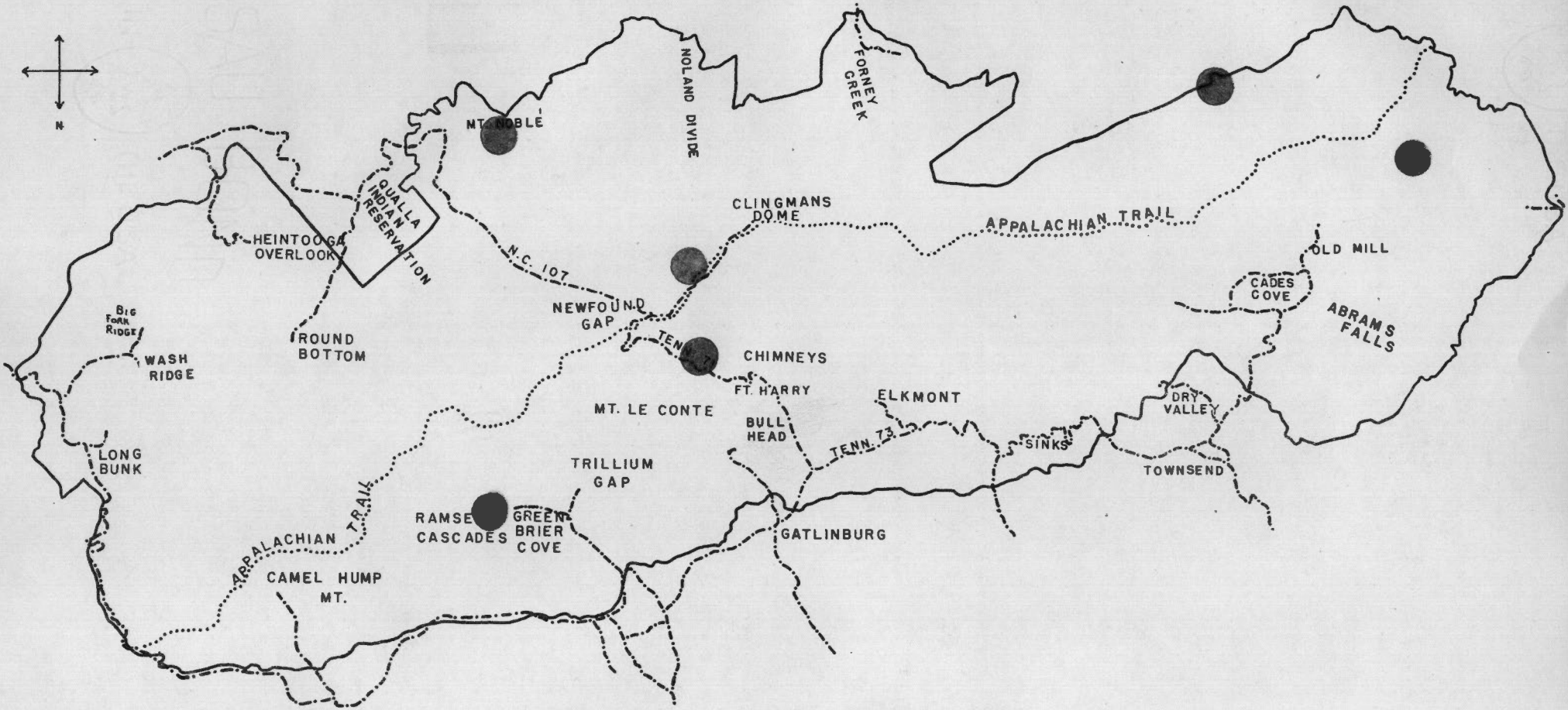


Map 31. Distribution of Lamproderma Arcyrionema Rost. ▲

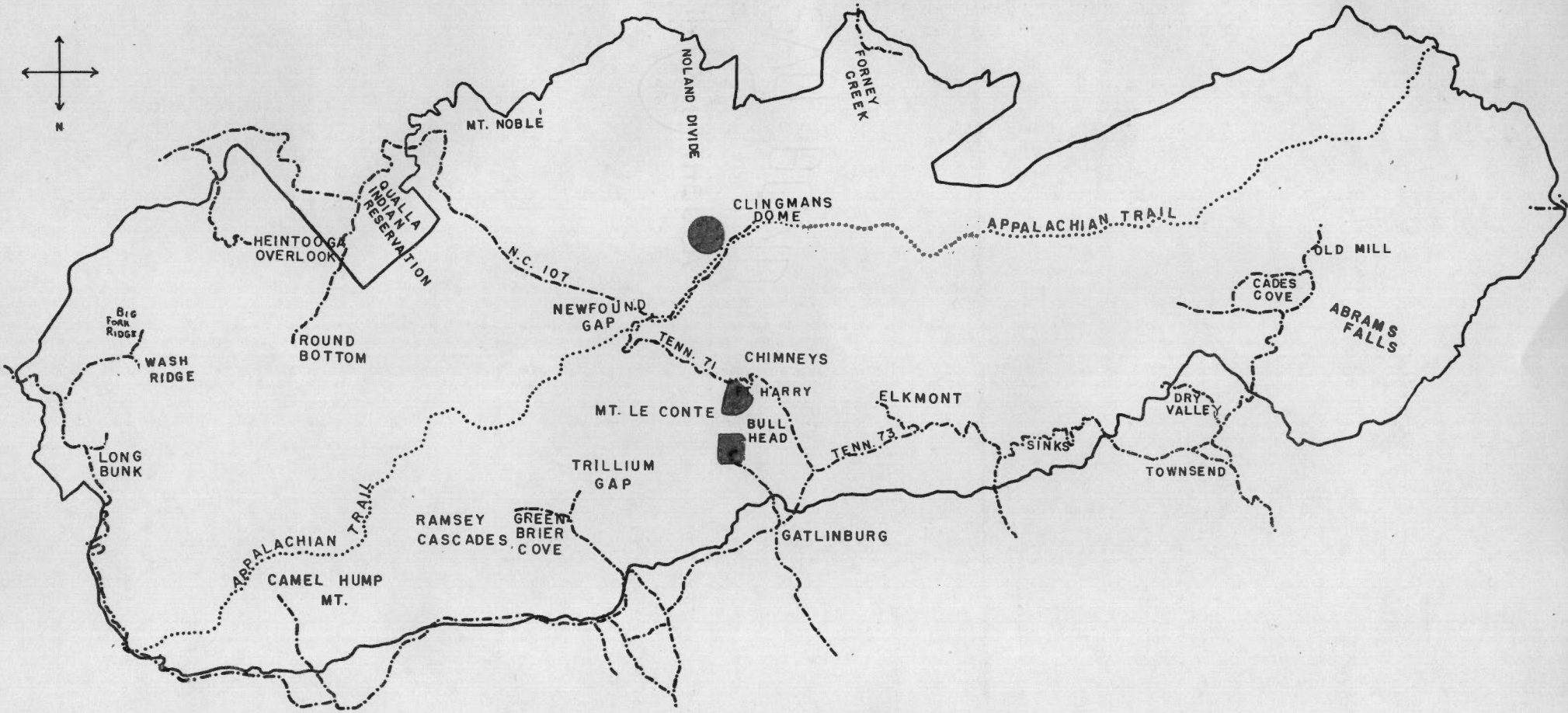
Distribution of Lamproderma columbinum (Pers.) Rost.; Fuckel ●



Map 32. Distribution of Clastoderma Debaryanum A. Blytt ●



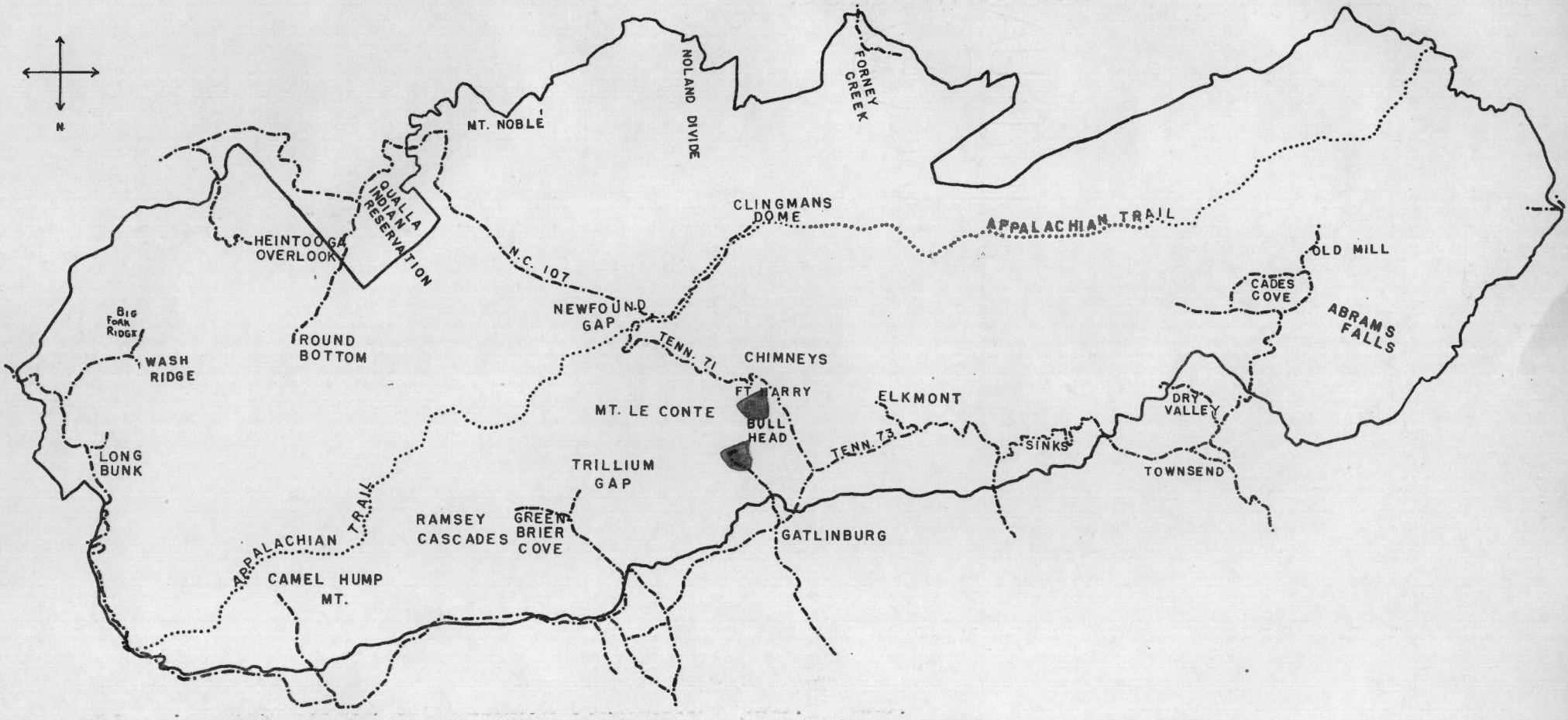
Map 33. Distribution of Fuligo septica (L.) Weber; Wiggers



Map 34. Distribution of Physarum leucophaeum Fries ●

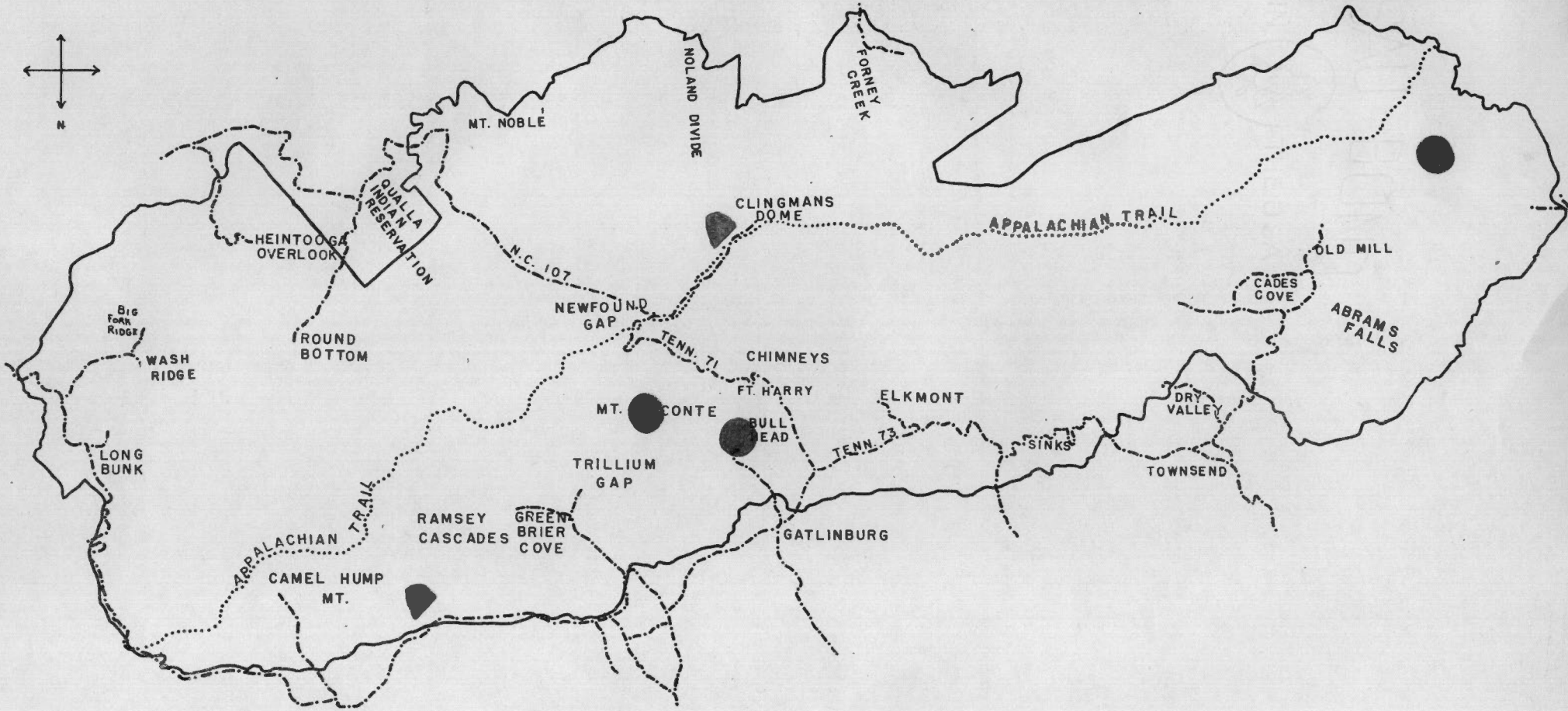
Distribution of Physarum stellatum (Massee) G. W. Martin ◖

Distribution of Physarum globuliferum (Bull.) Pers. ■



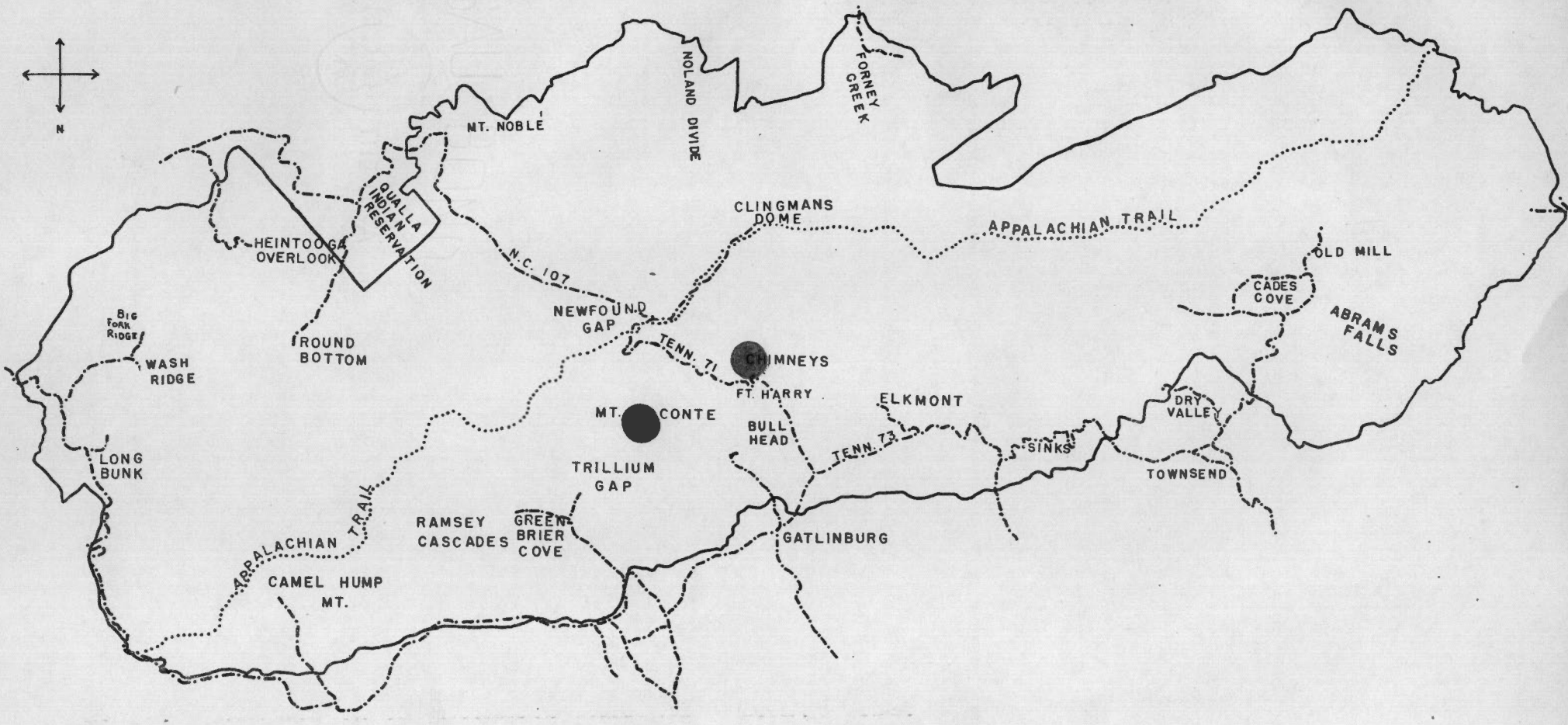
Map 35. Distribution of Physarum contextum (Pers.) Pers. ●

Distribution of Physarum viride (Bull.) Pers. ◕

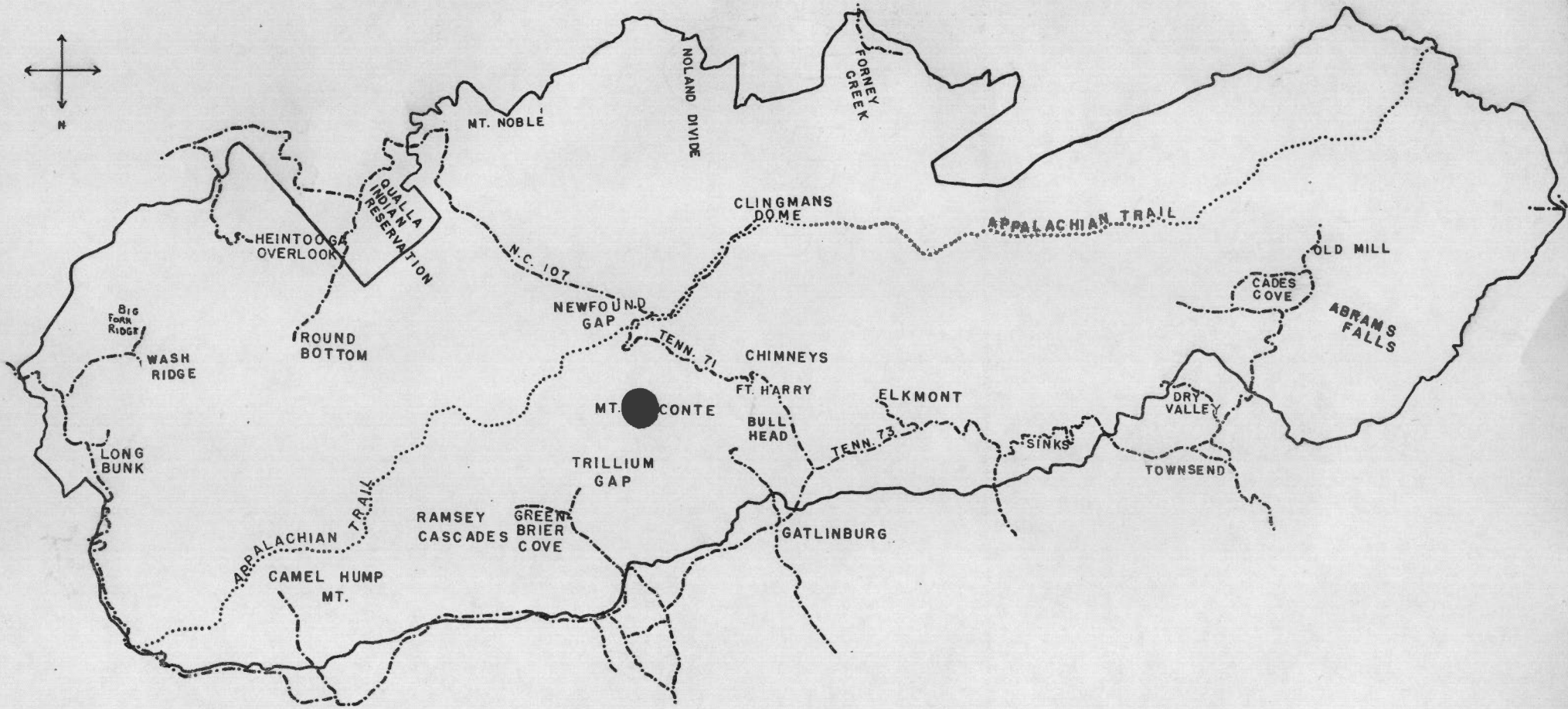


Map 36. Distribution of Physarum nutans Pers. ●

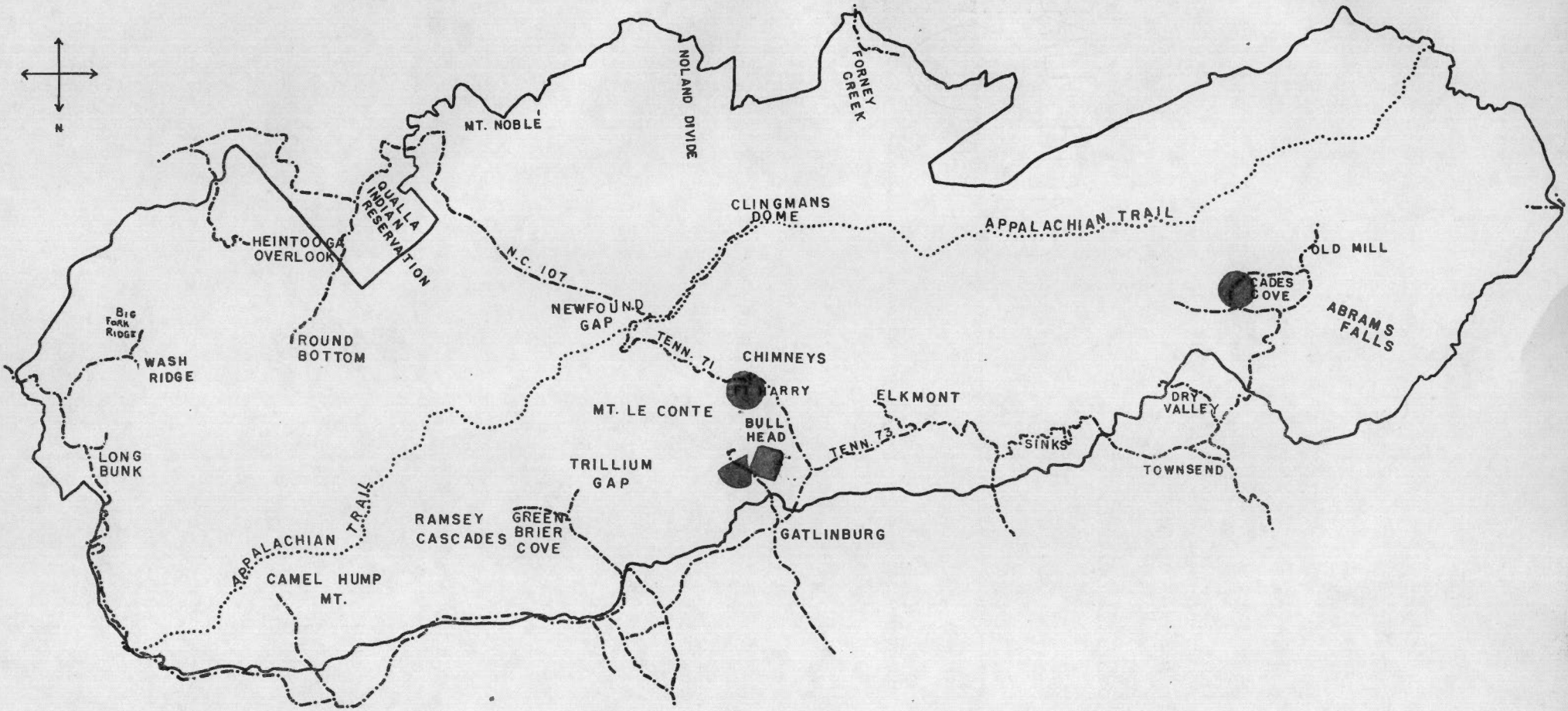
Distribution of Physarum tenerum Rex ●



Map 37. Distribution of Leocarpus fragilis (Dicks.) Rost. ●



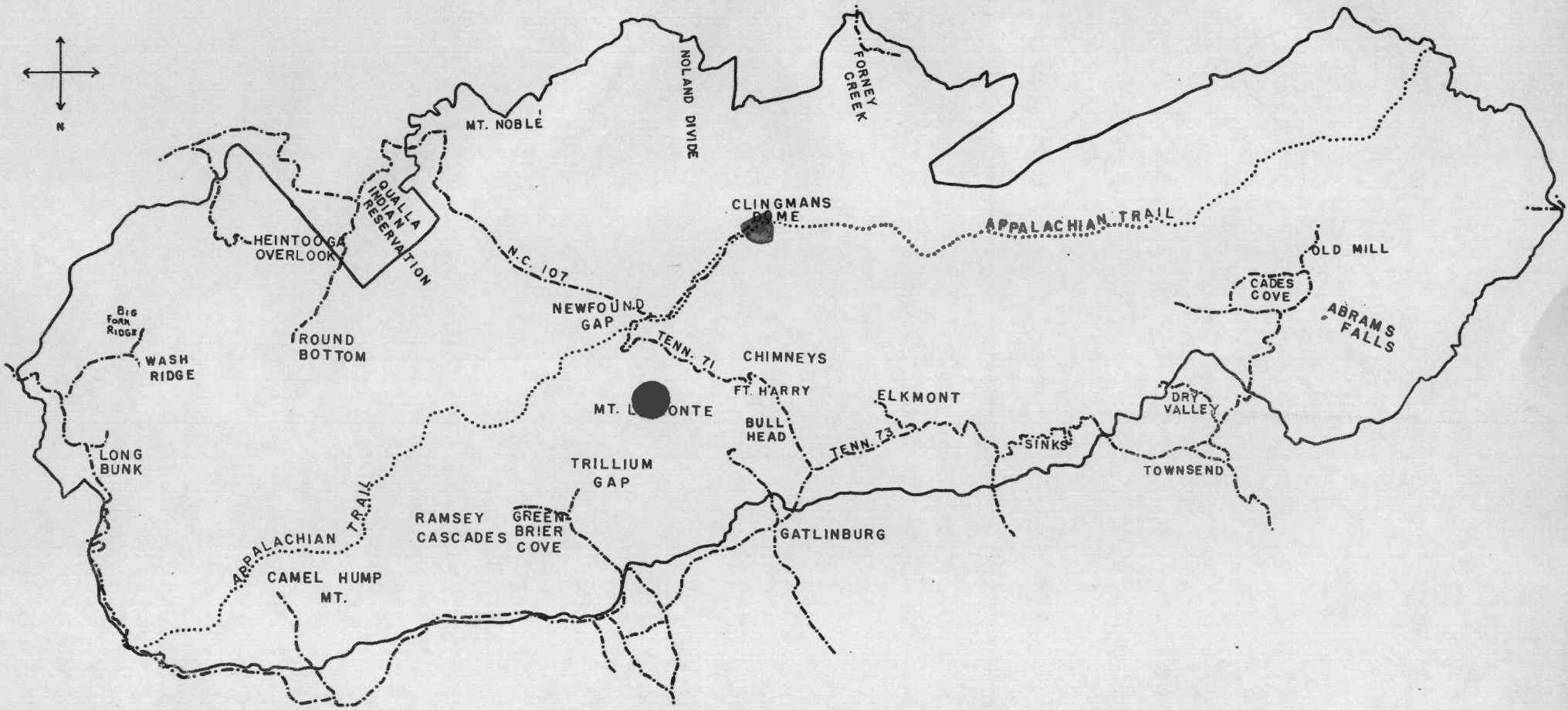
Map 38. Distribution of Badhamia Curtisii (Berk.) Rost. ●



Map 39. Distribution of Diderma testaceum (Schrad.) Pers. ●

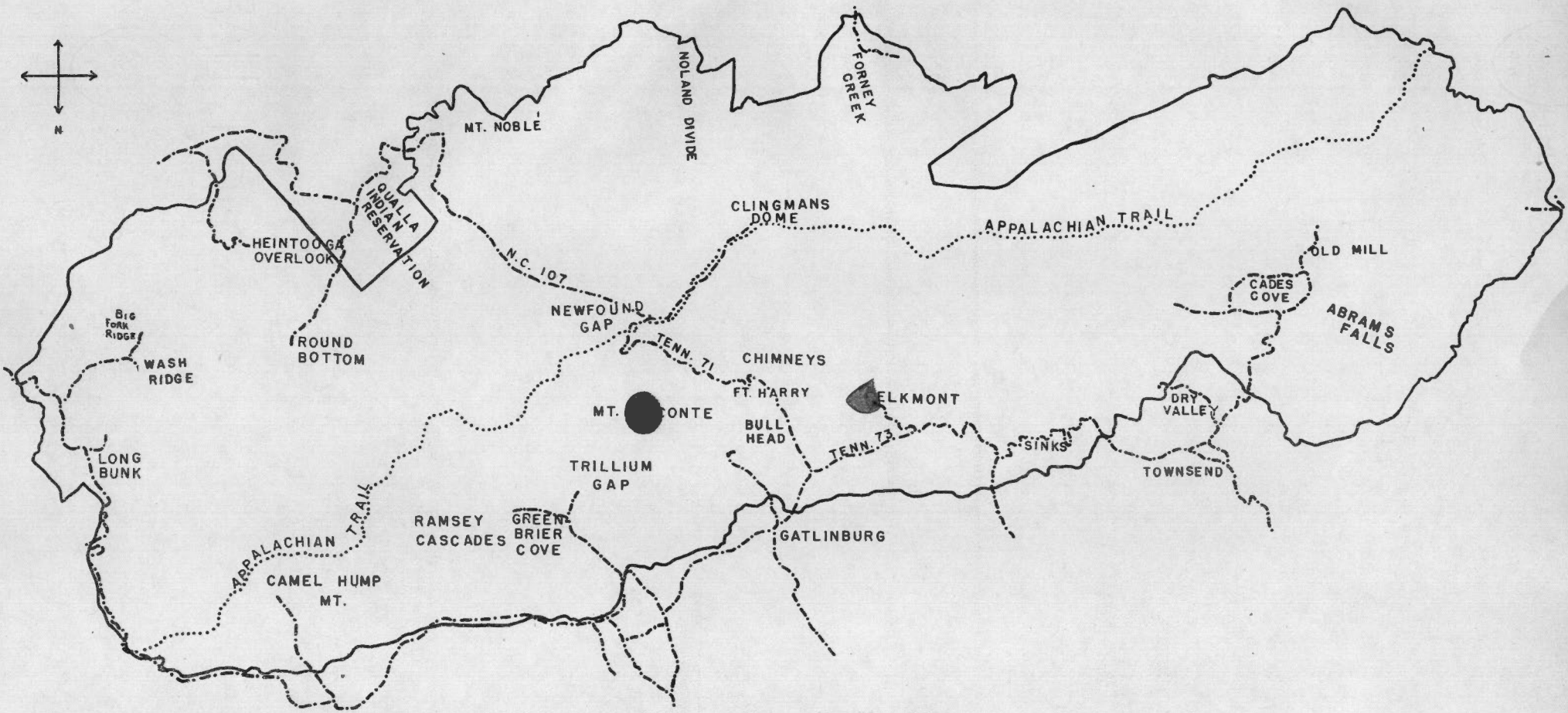
Distribution of Diderma effusum (Schw.) Morgan ◢

Distribution of Diderma rugosum (Rex) Macbr. ■



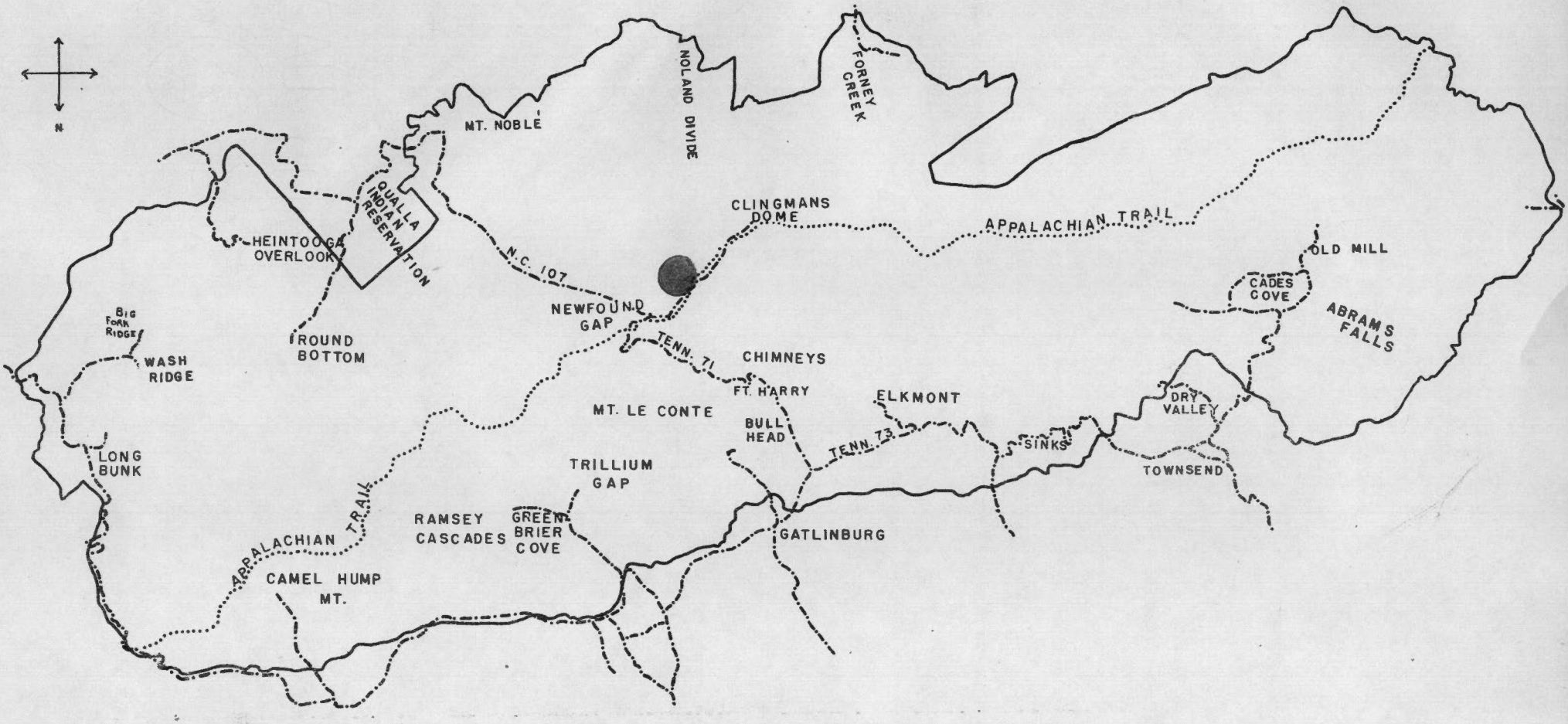
Map 40. Distribution of Didymium crustaceum Fries ●

Distribution of Didymium minus (Lister) Morgan ◖

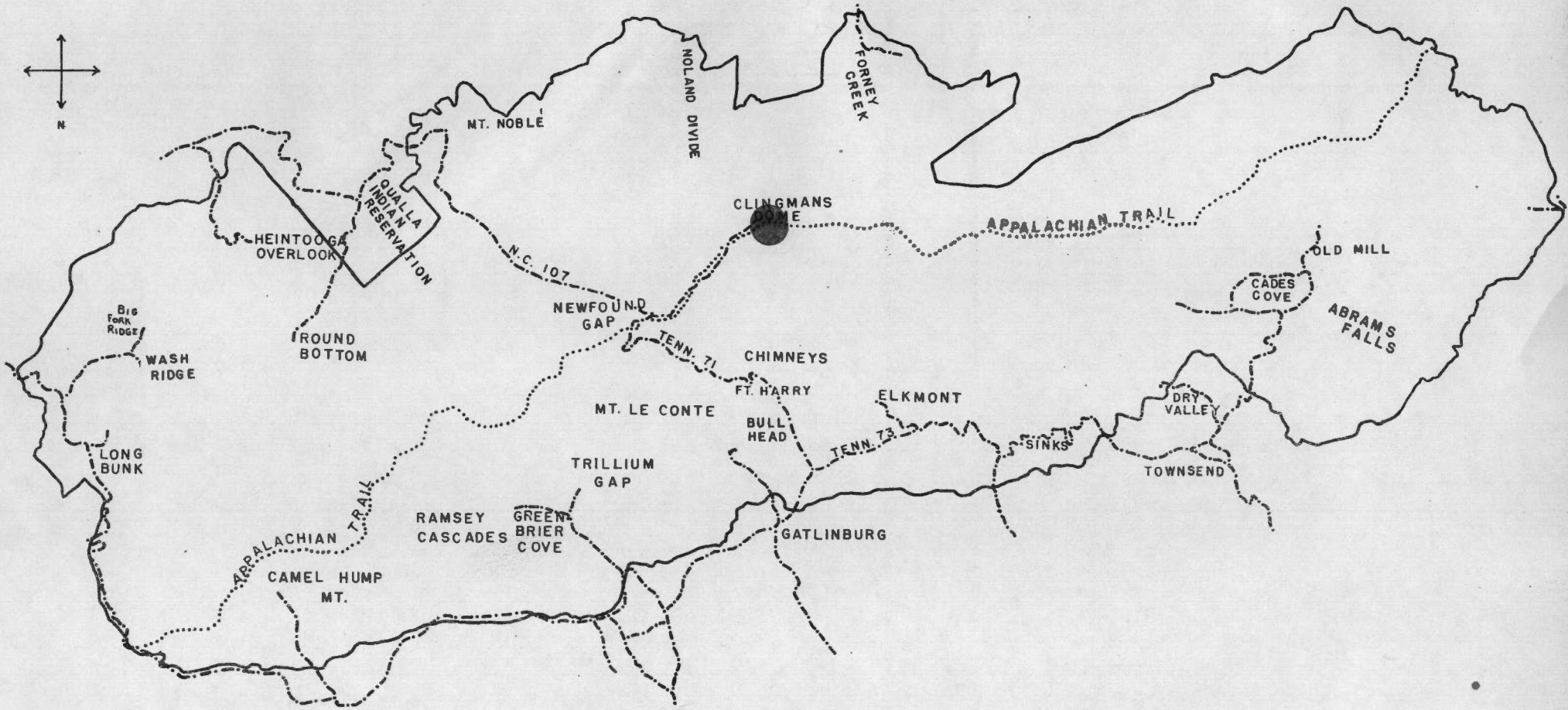


Map 41. Distribution of Didymium nigripes (Link) Fries

Distribution of Didymium Iridis (Ditmar) Fries



Map 42. Distribution of Lepidoderma tigrinum (Schrad.) Rost.; Fuckel ●



Map 43. Distribution of Lindbladia effusa (Ehrenb.) Rost.; Fuckel ●

GLOSSARY

Aethalium . . . . . A type of fructification in which the plasmodium becomes aggregated into a continuous mass and fruits as a whole.

Capillitium . . . . . Sterile, thread-like tubes or fibers occuring among the spores.

Columella. . . . . . Persistent, sterile, central axis in a fructificaion.

Hypothallus . . . . . The horny base which occurs at the base of the fructification.

Plasmodic granules. . Microscopic, dark-colored granules, scattered, clustered or in lines on the outside of the peridium or net and often on the spores in the CRIBARIACEAE.

Plasmodiocarp. . . . .. A type of fructification in which the protoplasm becomes concentrated within the main veins of the plasmodium and fruits, giving a vein-like, sessile appearance.

Pseudoaethalium. . .. A type of fructification in which the sporangia are so densely clustered that they resemble an aethalium.

Pseudocapillitium. . .Plate, tubes, or thread-like bodies in a fructification apparently not developed in direct connection with sporogenous protoplasm but representing the outer region of plasmodial veins or the walls of confluent sporangia in a pseudoaethalium.

Swarm cell. . . . . . Motile cell from a spore and functions with or without division as an isogamete.