Anisomeridum (Mull. Arg.) Choisy, **nom. cons.**

= Ditremis, according to Harris, 1990, but Esslinger & Egan do not accept that.

After Harris (Dissertation, and 1995, as Anisomeridium)
and Harris, 1990 (as Ditremis)

Rev. November 17, 1998

Thallus immersed, whitish or pale gray; Trentepohlia always present.

Perithecia hemisphercial to globose, simple to compound; wall composed of ± cellular hyphae without bark cells, thicker in upper part, often with well differentiated involucrellum, brown-black above, pale brown to ± colorless below; pigment K+ greenish. Hamathecium of slender, branched and anastomosed, long-celled pseudoparaphyses ca. 1 um thick; periphyses absent; gel I-. Asci cylindric-clavate, K/I-; fissitunicate, the apical dome with indistinct or short and broad ocular chamber, 8-spored (sometimes a few spores aborting); spores clavate-fusiform to ovate, 1(-3)-septate, most commonly with one half of the spore shorter and/or narrower than the other, if oval then not ornamented and uniseriate; often biseriate or irregularly arranged in the ascus; first formed septum often towards lower end of spore; colorless, smooth, without distinct perispore. Pycnidia immersed to sessile, ± globose or conical, black; conidiogenous cells cylindrical, enteroblastic, with collarettes, often percurrently proliferating; micro- and macroconidia (produced in separate pycnidia) globose to elliptical, ovoid, or bacilliform. No substances. On bark or less often rock. Temperate to tropical.

I. Growing on rock.

1. Spores becoming 4-celled, 16-22 x 6.5-8 um. Thallus epilithic, whitish to brownish, thin. Ascocarps subglobose, 0.1-0.3 mm diam. Asci narrowly elliptical or narrowly obovate, ca. 70-80 x 15-18 um; spores irregularly arranged, narrowly ovate to narrowly elliptical, not constricted at the septa. Microcniida narrowly elliptical, 4-5 x 1.5-2 um. Macroconidia elliptical, 5-5.5 x 2.5-3 um. On moist rocks but apparently not aquatic. Massachusetts; Ohio. ..... Anisomeridium distans (Syn. Ditremis distans (Willey) R. C. Harris)

1. Spores remaining 2-celled. 2

2. Spores (11-)13-18 x 5.5-7 um. More or less aquatic, on non-calcareous rock; northeastern U. S. Thallus epilithic, whitish, greenish or tan; black hypothallus not evident in some specimens, to dominant in others. Ascocarps hemispherical to subglobose, semi-immersed, 0.2-0.3 mm diam. Asci narrowly elliptical to narrowly obovate, 50-60 x 13-17 um; ascus wall thickened at tip. Spores

irregularly arranged, ovate to almost elliptical. Microconidia narrowly elliptical, 4-5 x 1.5-2 um. Along streams, probably occasionally inundated. Connecticut; Michigan. ..... A. carinthiacum (syn. D. carinthiaca (Steiner) R. C. Harris)

2. Spores 20-25 x 6.6-8.5 um. Not aquatic; on limestone. Southern Florida and West Indies. Thallus endolithic, whitish. Ascomata emrgent (immersed in Puerto Rico specimens), subglobose or with upper part of wall extended outward to form a clypeus, wall thinner below. Paraphyses branched and anstomosed, embedded in abundant hymenial gelatin. Asci cylindrical, 105-125 x 15-18 um, thickened at tip, with small ocular chamber. Spores subiseriate, narrowly ovate, lower cell usually shorter, wall smooth. Microconidia elliptical, 3-5 x 1-1.5 um. Macroconidia not known. [If growing on sandstone, see “immature” forms of A. distans]. ..... Anisomeridium finkii (R. C. Harris) ined. (syn.: Ditremis finkii R. Harris)

II. Growing on bark or wood.

1. Ascomata not known; pycnidia with hair-like beaks, to 1 cm long; macroconidia ellipsoid to narrowly ellipsoid, in ± packets surrounded by a gelatinous sheath. Florida. ..... A. sp. (Harris 1995).

1. Ascomata present; pycnidia present or absent, never with long, hair-like beaks. 2

2. Thallus UV+ yellow (lichexanthone) or rarely UV- in A. ambiguum). 3

2. Thallus UV-. 7

3. Spores small, under 20 um long. 4

3. Spores larger, over 25 um long; macroconidia orbicular to elliptical. 6

4. Ascospores soon dark brown, elliptical or ends slightly pointed, with septum ± median, granular oriented, uniseriate in ascus, 16-20 x 8-9 um; thallus white, UV+ yellow (lichexanthone); ostiole apical. Florida. ..... A. phaeospermum R. C. Harris

4. Ascospores colorless. 5

5. Ascospores fusiform, with slightly submedian septum, smooth, with tapered ends, (12-)15-20 x 5-6.5 um; macroconidia cylindrical, 7.5-12 x 2-2.5 um; microconidia elliptical to subglobose, 2.5-3 x 1.5-2 um or c. 2 um diam. Macroconidia occasionally 2-celled. Thallus gray or whitish. Ascocarps mostly immersed, hemispherical, 0.5-0.6 mm diam., wall often forming a shield, lacking below. Asci cylindrical, 90-115 x 10-12 um. Spores uniseriate to subbiseriate, narrowly ovate, slightly constricted at the septum. Microconidia elliptical to suborbicular, 2.5-3 x 1.5-2 um. On various barks. Florida; Louisiana. ..... A. tuckerae R. C. Harris (syn. D. tuckerae (R. C. Harris) R. C. Harris)

5. Ascospores broadly elliptical, not constricted at median septum, smooth, (10-)12-15 x (6-)7.5-9 um; macroconidia not cylindrical; microconidia broadly elliptical, 3 x 1.5-2 um. Thallus ± corticate. Florida. ..... A. biformoides R. C. Harris (syn. Ditremis sp. of Harris 1990)

6. Ostioles eccentric, ringed with orange pigment, K+ purple; ascospores biseriate, fusiform, with septum submedian, smooth, 37-52 x 12-20 um; microconidia oblong, 3-4 x 1.2-1.5 um; macroconidia broadly elliptical to ovoid, 30-45 x 15-20 um. Florida. ..... A. aureopunctatum R. C. Harris

6. Ostioles subapical, unpigmented; ascospores mostly uniseriate, ± fusiform with one end often more rounded, with septum median or submedian, smooth, 24-33 x 8-12um; microconidia elliptical, 3-5 x 1.5-2 um; macroconidia broadly ovoid to ovoid, thick-walled, 15-22 x 9-16 um. Thallus whitish or grayish. Ascocarps immersed; hymenium ovate; wall usually thick above and extending outward to form a shield (clypeus), thin or lacking below. Asci cylindrical. Spores slightly constricted at the septum. On

soft bark of various kinds of trees. Florida ..... A. ambiguum (Zahlbr.) R. C. Harris (syn. Ditremis ambigua (Zahlbr.) R. C. Harris)

7. Ascospores 4-celled; ostiole always apical. 8

7. Ascospores 2-celled; ostiole apical or eccentric. 10

8. Ascospores tardily 4-celled, ovoid, (12-)14-20(-23) x (3-)4.5-5(-6) um. Mainly northern (as far south as North Carolina). Microconidia elliptical, colorless, oblong or oval, 2-3 x 1-1.5 um. Macroconidia elliposid or ovoid, 3.5-4.5 x 1.8-2 um. Thallus endophloeodal, often inconspicuous, effuse, whitish, gray or gray-green, smooth. Trentepohlia abundant, well developed. Ascocarps rarely numerous and crowded, usually absent (only abundant macropycnidia present) or scattered, black, shiny, subconical to subglobose, initially immersed but becoming superficial, 0.15-0.25 mm diam., 0.1-0.2 mm high; wall brown-black, 30-50 um thick above, thinner and colorless below, or lacking below. Hymenium I-. Interthecial hyphae ca. 1 um thick, septate, branched and anastomosed. Asci clavate-cylindrial, not much thickened at the tip, inner surface with an indistinct indentation, 55-75(-90) x 12-15 um. Spores biseriate, narrowly ovate to fusiform or clavate-fusiform, 1-septate, often (2-)3-septate, cells unequal, the upper broader and up to twice as long as the lower. Pycnidia black, ca. 0.1 mm diam., of two types: (a): 100-150 um diam., ± sessile, conical with an ostiolar neck composed of vertically arranged, brown-walled hyphae, whtihc at the apex of the neck have free, colorless, pointed ends, with macroconidia extruded as a white cirrus 10-13 um wide, in which the conidia are bound by a gelatinous matrix, or (b) 50-100 um diam., ± immersed, globose, with microconidia. On rough bark of broad-leafed trees, most commonly Quercus alba and Ulmus americana, but also on various other types of trees (especially Sambuscus) and on old wood (rarely also on shaded rock according to Coppins & James), in humid woodland and tall scrub, tolerang of deep shade. Throughout most of the eastern U.S., from Maine to Alabama and Florida, west to the Great Lakes region and Ozarks ..... A. nyssaegena (syn. D. nyssaegena (Ellis & Everh.) R. C. Harris A. willeyanum R. C. Harris ined.)

8. Ascospores soon 4-celled. Southern. 9

9. Ascospores 21-24 x 6-8 um; microconidia elliptical, 3-4 x 1.5-2 um. Florida. ..... A. quadrococcum R. C. Harris

9. Ascospores 16-20 x 3.5-4.5 um; microconidia ± globose, c. 2 um diam.; macroconidia oblong, 5-6 x 2-3 um. Louisiana. ..... A. quaternarium (R. C. Harris) R. C. Harris

10. Ostiole eccentric. 11

10. Ostiole apical. 13

11. Ascospores granular ornamented, fusiform, with septum moderately submedian, 19-27(-30) x 5.5-7(-8) um; microconidia oblong or elliptical, 2.5-3 x 1.5-2 um; ascomata usually naked. Florida. ..... A. terminatum (Nyl.) R. C. Harris

11. Ascospores smooth, ± ovoid. 12

12. Ascospore septum distinctly submedian; ascospores 32-40(-45) x 13.5-18 um; microconidia subglobose, c. 2-2.5 um diam.; macroconidia elliptical or oblong, 5-7 x 2.5-4 um; ascomata covered by thallus. Florida. ..... A. griffinii R. C. Harris

12. Ascospore septum ± median; ascospores 17-23 x 7-9 um; pycnidia not found. Florida. ..... A. sp.

13. Ascospores small, 9-13(-15) x 4-5 um, ovoi, with septum median to slightly submedian; ascomata small, 0.2-0.3(-0.4) mm diam.; microconidia oblong or elliptical. Florida. ..... A. albisedum (Nyl.) R. C. Harris

13. Ascospores 12-24 x 4.5-8.5 um. 14

14. Asci ovate or obovate to narrowly ovate or obovate. 15

14. Asci slender, cylindrical to narrowly clavate. 18

15. Ascospores relatively narrow, 14-20 x 4.5-6 um, ovoid, with submedian septum, often becoming 4-celled; micropycnidia beaked ("Sarcinulella"); microconidia oblong or narrowly elliptical, 2-3 x 1-1.5 um. Florida. ..... A. nyssaegenum (Ellis & Everhart) R. C. Harris

15. Ascospores relatively broad, 5.5 um or more. 16

16. Thallus well developed, epiphloeodal; ascospores 12-18 x 5-7.5 um; macroconidia globose, c. 2 um diam.; microconidia globose, 2.5-4 um. Northern. Asci narrowly obovate, 12-18 x 5-7.5 um. Spores irregularly arranged, 12-18 x 5-7.5 um; macroconidia globose, often slightly tinted, 2.5-4 um diam. Ascus wall rather thin and uniform, ca. 1.5-3 um. Ascocarps often immersed, hemispherical to subglobose, wall lacking below, 0.2-0.3 mm diam. Spores narrowly ovate to ovate, 12-18 x 5-7.5 um. Microconidia orbicular, 2-2.5 um diam. On bark. Massachusetts, Connecticut, and as far inland as southern Ohio and Illinois. ..... Anisomeridium leucochlorum (Syn. D. leucochlora (Müll. Arg.) R. C. Harris)

16. Thallus poorly developed, endophloedal. Florida. 17

17. Ascus wall and ascospore wall thick and unevenly thickened; ascospores ovoid, with markedly submedian septum, 15-22 x 6.5-8.5 um; microconidia globse, c. 2 um diam.; macroconida oblong or ovoid, 5-7 x 2.5-3 um. Florida. ..... A. anisolobum (Mull. Arg.) R. C. Harris

17. Ascus wall and ascospore wall relatively thin and even; ascospores 18-22 x 5.5-7 um, ± fusiform, often slightly bent, with slightly submedian septum; microconidia globose or elliptical, c. 2 um diam. or 2-3 x 1.5-2 um. Florida. ..... A. excaecariae (Mull. Arg.) R. C. Harris

18. Ascospores broadly elliptical to ovoid, rarely narrowly ovoid, with septum slightly submedian or ± median, 10-18 x 4.5-7 um; microconidia oblong or elliptical, 2.5-3 x 1.5-2 um or globose, c. 2 um diam.; macroconidia elliptical or oblong, 5-7 x

3-4 um. Florida. ..... A. biforme (Borrer) R. C. Harris

18. Ascospores slender, narrowly ovate, fusiform to almost cylindrical (often slightly bent in A. tamarindi). 19

19. Microconidia elliptical; macroconidia not known; spores 12-18(-21) x 4.5-6.5 um, not bent. Ascocarps hemispherical to subglobose, 0.3-0.5(-0.6) mm diam., wall thinner or lacking below. Asci dactyloid to cylindrical, 75-125 x 9-12 um. Spores uniseriate to biseriate, narrowly ovate, often with rather pointed ends, slightly constricted at septum. On bark, especially Taxodium. S. Carolina; Florida; Louisiana. ..... A. subprostans (syn. Ditremis subprostans (Nyl.) R. C. Harris)

19. Microconidia orbicular; macroconidia elliptical, 4-7 x 2.5-3.5 um; spores 15-22(-24) x 4-5.5(-6) um, the longer ones often slightly bent. Ascocarps immersed, hemispherical, 0.4-0.6 mm diam., wall forming a clypeus, lacking below. Asci dactyloid to cylindrical, 75-110 x 10-12 um. Spores uniseriate to biseriate, narrowly ovate to ovate. On bark (often on coconut palm). Florida; Louisiana. ..... A. tamarindi (syn. Ditremis tamarindi (Fée) R. C. Harris)

ADD:

Asci ovate. Spores irregularly arranged, broadly ovate, 25-33 x 15-18 um; spore cells strongly unequal; wall strongly ornamented. Macroconidia orbicular, ca. 2 um diam. On bark. Brazil; not in N. America according to Harris, 1975. .....Anisomeridium adnexum (Müll. Arg.) R. C. Harris

Descriptions of Species

A. albisedum (syn.: D. albiseda (Nyl.) R. C. Harris)

Spores small, 9-13 x 4-5 um. Thallus whitish, endophloedal. Ascocarps hemispherical to subglobose, 0.2-0.3(-0.4) mm diam. Asci cylindrical, occasionally slightly broader toward the base, 50-75(-85) um long. Spores nearly uniseriate to subbiseriate, narrowly ovate, slightly constricted at the septum, 9-13 x 4-5 um. Microconidia narrowly elliptical to rectangular, 3.5-4.5 x 1.2-2 um. On bark, usually Quercus but occasionally on Myrica. Northern and central Florida.

A. americanum (syn. Ditremis americana (Massal.) R. C. Harris)

Spores 27-37 x 7.5-11 um, granular oriented. Ascomata usually naked. Not yet known from N. America.

A. anisolobum (Syn.: D. anisoloba (Müll. Arg.) R. C. Harris s. lato, A. feeanum)

Ascus wall thick, unevenly thickened; spores 15-22 x 6.5-8.5 um. Ascocarps hemispherical to subglobose, semi-immersed to immersed; wall sometimes extended outwards above to form a clypeus, thin or lacking below. Asci narrowly obovate or rarely narrowly elliptical, 60-80 x 13-20 um. Spores irregularly arranged, ovate, lower cell markedly shorter, occasionally slightly constricted at the septum, 15-22 x 6.5-8.5 um. Microconidia in some specimens orbicular, ca. 2.5 um diam., in other specimens elliptical, ca. 3 x 1.5-2 um. Macroconidia elliptical, 5-6 x 2.5-3.5 um. On various barks. Florida; Tennessee.

A. aureopunctum R. C. Harris (syn.: Ditremis macrospora R. C. Harris)

Spores 37-52 x 12-20 um; macroconidia elliptical, 30-45 x 15-20 um. Ostioles surrounded by a small ring of orange anthraquinone pigment (K+ purple). Thallus white. Asocarps mostly immersed, hemispherical to subglobose, 0.5-0.8 mm diam.; wall often extended to form a clupeus, thinner or lacking below; ostioles mostly excentric. Asci cylindrical, 150-200 x 20-30 um, with a distinct ocular chamber. Spores subbiseriate to biseriate, narrowly ovoid, often with rather pointed ends, lower cell markedly shorter, wall not ornamented. Microconidia ellipsoidal, 2.5-4 x 1.2-2 um. Southern Florida.

A. biforme s. lato (syn.: D. biformis (Borrer) R. C. Harris s. lato)

Asci dactyloid to cylindrical, 65-130 x 10-15 um. Spores subbiseriate to uniseriate, 10-18 x 4.5-7.5 um. Thallus usually conspicuous, whitish or pale grayish, effuse or delimited by a thin, blackish hypothallus. Ascocarps usually numerous, hemispherical to globose, immersed or emergent (to 3/4 superficial), 0.3-0.4(-0.6) mm diam.; upper wall with usually well differentiated involucrellum (clypeus), 50-100 um thick; lower wall pale or colorless. Spores narrowly obate to elliptical, sometimes slightly constricted at septum; septum 1/2-1/3 from upper end. Pycnida of two types: (a) 100-

200 um diam., with macroconidia relatively rare, orbicular to elliptical or ovate, 3-5 um diam. or (2.3-)3.5-5 x (1.8-)2.5-3 um, extruded as a white blob, (b) 40-100 um diam., ± immersed, hemispherical to globose, with microconidia orbicular, (1-)1.5-2(-3) um diam. On smooth or rough bark of broad-leaved trees in woodland or sheltered open situations, or on old wood. Common on both coasts, mainly temperate, rarer in the South, Maine to Florida (rarer inland to the Great Lakes area), British Columbia to S. California. A variable species; one population (mainly eastern) has spores almost always elliptical and uniseriately arranged in the ascus (as in Acrocordia, but the spore walls lack ornamentation).

A. biformoides

Thallus pale gray, endophloeodal, UV+ yellow (lichexanthone). Ascomata immersed, tip exposed, subglobse, c. 0.3-0.5 mm diam.; clypeus apical and shield shaped to hemispherical, occasionally slightly laterally expanded. Asci cylindrical, c. 120-135 x 12-15 um, with eight uniseriate spores. Ascospores broadly elliptical, not constricted at median septum, smooth, (10-)12-15 x (6-)7.5-9 um; microconidia elliptical, 3 x 1.5-2 um; macroconidia not found. Florida; Georgia.

A. excaecariae (syn. A. sanfordense; D. sanfordensis (Zahlbr.) R. C. Harris)

Ascus wall relatively thin (1-2 um) and even; spores 18-22 x 5.5-7 um. Ascocarps subglobose, 0.15-0.2 mm diam. Asci obovate, 50-63 x 16-23 um. Spores irregularly arranged, narrowly ovate with rather pointed ends. Microconidia orbicular, ca. 2 um diam. On bark (Diospyros). Florida. Similar to A. leucochlorum but with broader asci and longer spores.

A. griffinii

Thallus white, endophloedal, UV-. Ascomata covered by thin layer of thallus, ± lageniform, c. 0.5-0.6 x 0.4 mm; ostiole eccentric to lateral; wall entirely melanized or only to base of hamathecium. Asci cylindrical to subclavate, 150-210 x 30-40 um, with eight biseriate spores. Ascospores ovoid or somewhat fusiform, slightly constricted at the markedly submedian septum, smooth, 32-40 x 12-18 um; microconidia subglobose, c. 2 um diam.; macroconidia ovoid, 5-7 x 2.5-4 um. Florida.

A. leucochlorum (Syn. D. leucochlora (Müll. Arg.) R. C. Harris)

Asci narrowly obovate, 12-18 x 5-7.5 um. Spores irregularly arranged, 12-18 x 5-7.5 um; macroconidia globose, often slightly tinted, 2.5-4 um diam. Ascus wall rather thin and uniform, ca. 1.5-3 um. Ascocarps often immersed, hemispherical to subglobose, wall lacking below, 0.2-0.3 mm diam. Spores narrowly ovate to ovate, 12-18 x 5-7.5 um. Microconidia orbicular, 2-2.5 um diam. On bark. Massachusetts, Connecticut, and as far inland as southern Ohio and Illinois.

A. phaeosporum

Thallus white, endophloeodal, UV+ yellow (lichexanthone). Ascomata mostly immersed, tip exposed, subglobose, sometimes with clypeus laterally expanded, c. 0.5 mm diam. Asci cylindrical, c. 140-150 x 15-16 um, with eight uniseriate spores. Ascospores brown, elliptical, slightly constricted at the ± median septum, granular oriented, 16-20 x 8-9 um; conidia not found. Florida.

A. quadrococcum

Thallus pale gray, endophloeodal, UV-. Ascomata ca. 1/2-3/4 immersed, globose, c. 0.2-0.25 mm diam.; ostiole apical; melanized wall entire or lacking at base; clypeus not expanded laterally. Asci cylindrical to subclavate, 180-220 x 45-55 um, with eight uniseriate spores. Ascospores 4-celled, end cells smaller, fusiform, not constricted at septa, smooth, 21-26 x (5.5-)6.5-8 um; microconidia oblong, 3-4 x 1.5 um; macroconidia not found. Florida; Georgia.

A. quaternarium (syn. Ditremis quaternaria R. C. Harris)

Spores 16-20 x 3.5-4.5 um. Southern (Louisiana). Thallus thin, gray. Ascomata subglobose, ca. 0.5 mm diam., wall lacking below. Asci clavate-cylindrical, ca. 70-80 x 10 um. Spore biseriate, fusiform, straight to somewhat curved, smooth. Microconidia globose to ellipsoid, 2 um diam. or 2 x 1 um. Macroconidia oblong, 5-6 x 2-3 um. On bark. Florida.

A. terminata (syn.: D. terminata (Fée) R. C. Harris)

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subprostans (Nyl.) R. C. Harris Syns.: Arthopyrenia subprostans, Ditremis subprostans.
tamarindi (Fée) R. C. Harris Syn.: Ditremis tamarindi.
terminatum (Nyl.) R. C. Harris (Harris 1995a) Syn.: Ditremis terminata
tuckerae R. C. Harris Syn.: Ditremis tuckerae.

feeanum (Müll. Arg.) R. C. Harris = A. anisolobum.
juistense (Erichsen) R. C. Harris = A. nyssigenum
sanfordense (Zahlbr.) R. C. Harris = Anisomeridium excaecariae

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