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FIRST ACCOUNT OF THE LARVAL BIOLOGY OF *COLEOTECHNITES NIGRA* (BUSCK) (LEPIDOPTERA: GELECHIIDAE), WITH NEW HOST AND DISTRIBUTION RECORDS

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Abstract.—*Coleotechnites nigra* (Busck), **revised status** (Lepidoptera: Gelechiidae) is the correct name for the species formerly known as *C. nigrinus* Hodges. Until now, nothing has been published about this species beyond the fact that the holotype was accidentally reared from *Hypericum* (Hypericaceae) in the vicinity of Washington, DC, with unknown larval habits. This species has since been reared from leaf-mining larvae on *H. crux-andreae* (L.) Crantz, *H. hypericoides*, and *H. prolificum* L. in Florida, Maryland, North Carolina, and Virginia. We redescribe the species based on this additional material and discuss its biology, illustrating the variation in adult coloration, as well as the male and female genitalia, larva, and leaf mines. Additional tentative distribution records are given based on DNA barcoding data and photographed leaf mines. Parasitoids of *C. nigra* include *Chelonus* (*Microchelonus*) sp. (Braconidae) and *Haltichella* sp. (Chalcididae). In addition to correcting the name of this species, we clarify the status of the homonym *Recurvaria piceaella* var. *nigra* Kearfott.

Key Words: Litini, rearing, St. John's-wort

DOI: 10.4289/0013-8797.127.1.9

Coleotechnites Chambers (Lepidoptera: Gelechiidae: Gelechiinae: Litini) comprises 49 New World species, of which 48 are recognized in America north of Mexico. One species, *C. petulans* (Meyrick, 1917), was described based on several specimens collected in Colombia and Peru and compared by dissection to species classified in the genus (Lee and Brown 2008). There remain many other undescribed species, especially in western North America (Powell and Opler 2009, Lee and Landry 2023) and likely more in the New World tropics. Most of the known species are conifer needleminers constituting the *C. apictripunctella* complex, with 23 feeding on

Pinaceae and ten on Cupressaceae (Freeman 1960, 1967; Eiseman 2025). As summarized by Eiseman (2025), four of the remaining North American species are known only from caught adults, and nine others have been reared from non-leafmining larvae on dicotyledonous plants (Altingiaceae, Apiaceae, Asteraceae, Betulaceae, Ericaceae, Fagaceae, Rhamnaceae, Rutaceae, Salicaceae), feeding in buds, flowers, fruits, tied terminal shoots, tubes of silk/frass on the undersides of leaves, or galls induced by other insects. The type species, *C. citriella* Chambers, 1880, was described based on a single adult reared from a “case” found on the trunk of an orange tree

in Manatee, Florida, so its feeding habits are unclear.

The final North American species is *Coleotechnites nigrinus* Hodges, 1983. This species was originally described by Busck (1903) as *Recurvaria nigra*, but the name was replaced by Hodges because the species epithet was preoccupied in the genus by *Recurvaria nigra* Haworth, 1828. Busck's species was described from a single male reared accidentally (he was targeting a different moth) from *Hypericum* "*fruticosa*" collected at Great Falls, Virginia (reported as "District of Columbia" when published) (Busck 1903), with the larval habits not being observed. Besides the holotype, there are ten additional *C. nigrinus* specimens at the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM) reared from *Hypericum* spp. in the DC area. Nothing was published about these rearings, but our own observations have revealed that larvae of *C. nigrinus* feed as leafminers on several *Hypericum* spp., making this the only *Coleotechnites* species known to feed internally in leaves of non-coniferous plants. We have also determined that *C. nigrinus* is an unnecessary replacement name, and the correct name for this species is *Coleotechnites nigra* (Busck), **revised status**. Here we redescribe *C. nigra*, document its host plants and biology, and clarify the status of the homonym *Recurvaria piceaella* var. *nigra* Kearfott, 1903.

MATERIALS AND METHODS

CSE and TSF reared moth and parasitoid specimens from *Hypericum* spp. in Florida and North Carolina by placing sprigs containing moth larvae in airtight plastic vials or jars, along with slightly moistened pieces of toilet paper, and checking daily until adults emerged. Adult moths were refrigerated overnight, then placed in a killing jar with ammonium carbonate, and then pinned, spread, and double-mounted. The parasitoid was preserved in 95% ethanol. The Florida

specimens and the parasitoid were deposited in the Canadian National Collection of Insects, Arachnids & Nematodes, Ottawa, Canada (CNC), where the moth specimens are denoted with unique identifiers in the form CNCLEPNNNNNNNN. The North Carolina moth specimens were deposited in the National Museum of Natural History, Washington, DC, USA (USNM), and are denoted with unique identifiers in the form USNMENTNNNNNNNN (slide-mounted specimens are denoted with unique identifiers in the form USNM slide # NNNNNN).

MAM dissected and prepared genitalia from pinned specimens following the methods of Clarke (1941) and Robinson (1976) and used a Visionary Digital imaging station for photographing specimens, Helicon Focus for focus-stacking (heliconsoft.com), and GIMP for photo-editing (gimp.org). Moth morphological terminology follows Hodges (1986, 1998), Kristensen (2003), and Ponomarenko (2005).

RESULTS AND DISCUSSION

Coleotechnites nigra (Busck), **revised status**
(Figs. 1–18)

nigra (Busck, 1903: 814) (*Recurvaria*).

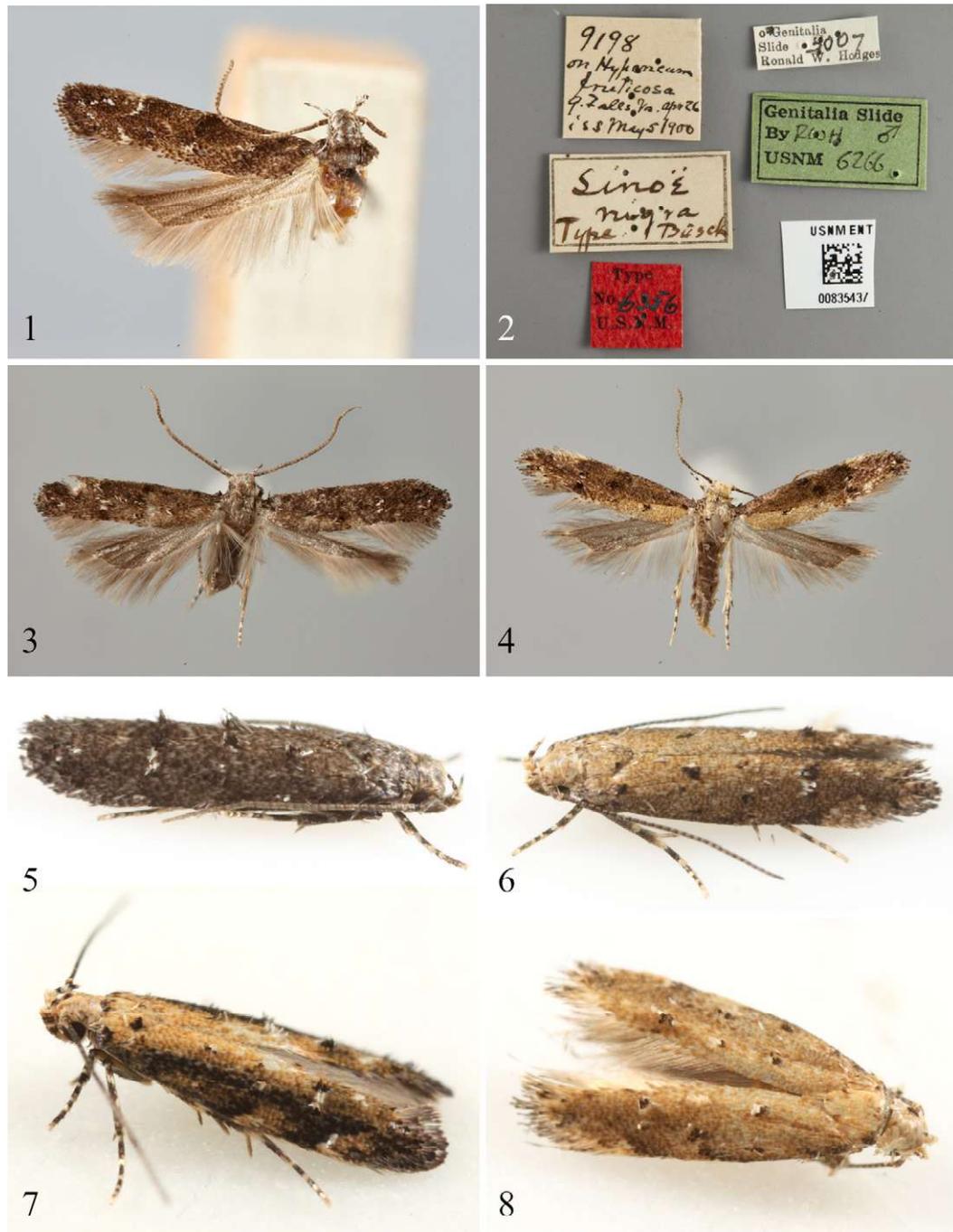
Holotype male (USNMENT00835437, <https://n2t.net/ark:/65665/35fcb7302-9103-4178-813e-735bb56c9353>) by monotypy. Type locality Great Falls, Virginia (reported as District of Columbia in original publication).

nigrinus Hodges, 1983: 20 (*Coleotechnites*).

Incorrect application of secondary homonymy and rejection of *nigra* Busck, 1903. **New synonym** (ICZN Article 59.4).

niger Hodges, 1983: 20. Misspelling of *nigra* Busck, 1903.

Holotype.—The holotype specimen has a Busck label reading, "*Sinoe / nigra / Type Busck*," but also has a red type label with the correct type number, "Type / No. 6356 / U.S.N.M." and a handwritten label reading,



Figs. 1–8. *Coleotechnites nigra* (Busck, 1903). 1–2. Holotype of *Recurvaria nigra* Busck, 1903, male, (USNMENT00835437). 1, Dorsal view. 2, Labels. 3, Male, USNMENT01479720. 4, Female, USNMENT01479722. 5–8. Live habitus photographs. 5, Dark male (#CSE5314). 6, Paler female (#CSE5884, USNMENT01479716). 7, Specimen with sharply contrasting dark and pale areas (#CSE259). 8, An exceptionally pale adult (#CSE259).



Fig. 9. Genitalia *Recurvaria nigra* Busck holotype male (USNMENT00835437), USNM slide # 6266).

“9198 / on *Hypericum / fruticosum* / G. Falls Va, Apr 26 / iss May 5 1900.” At the time of publication, Busck (1903) considered the genus *Sinoe* Chambers, 1873 to be a subjective synonym of the genus *Recurvaria* Haworth, 1828.



Fig. 10. Segment VIII *Recurvaria nigra* Busck holotype male (USNMENT00835437), USNM slide # 6266).



Fig. 11. Genitalia *Coleotechnites nigra*, male (USNMENT01479721, USNM slide # 146608).

Other material.—FLORIDA: Indian River Co., Fellsmere, St. Sebastian River Preserve State Park, 27.iii.2013, em. 10.iv.2013, C.S. Eiseman, ex *Hypericum hypericoides*, #CSE259 (2 adults, CNCLEP00119477, CNCLEP00119478); same but em. 20.iv.2013, #CSE314 (1♂, CNCLEP00122891), #CSE324 (1 adult, CNCLEP00122892); same but em. 23.iv.2013, #CSE339 (1 adult, CNCLEP00122893); same but em. 28.iv.2013, #CSE380 (1♀, CNCLEP00119448; 1 adult, CNCLEP00122894);

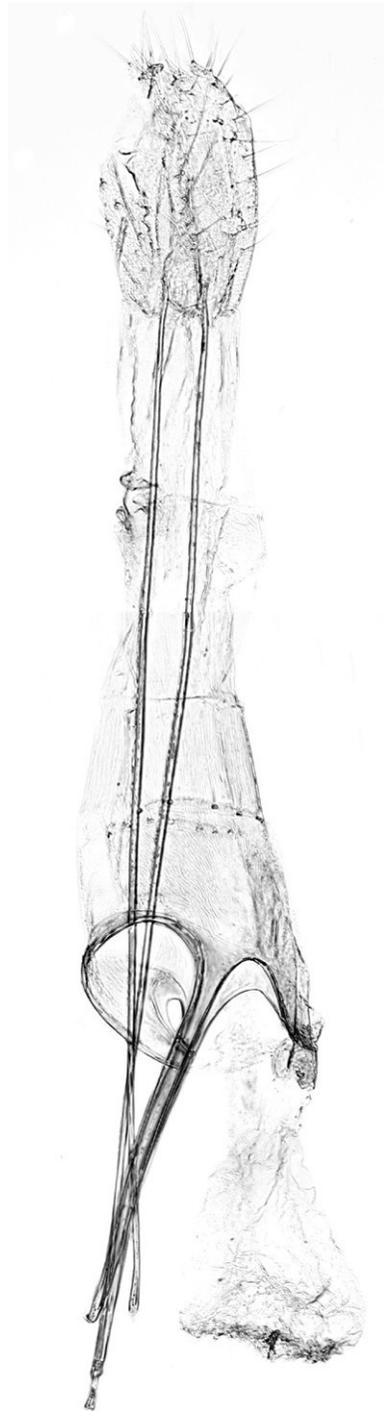


Fig. 12. Genitalia *Coleotechnites nigra*, female (USNMENT01479715, USNM slide # 146610).

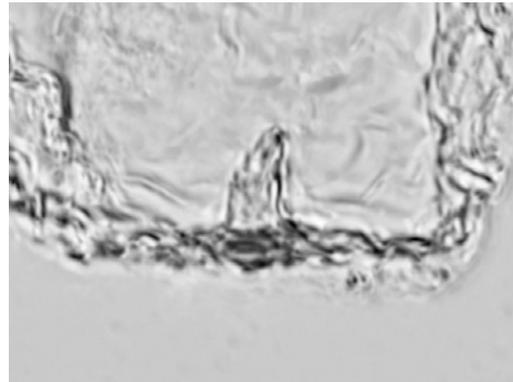
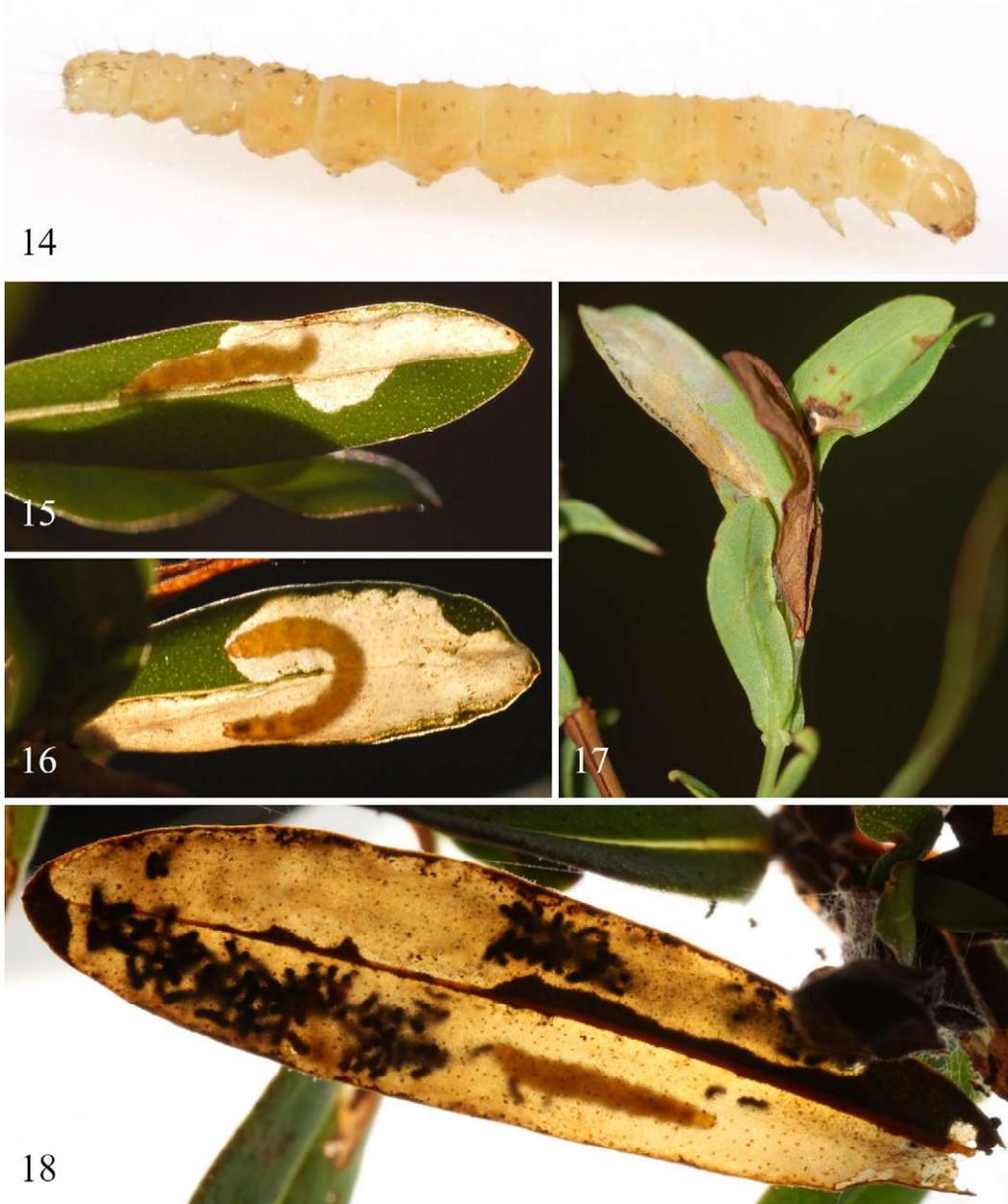


Fig. 13. Detail of signum (USNMENT01479716, USNM slide # 146607).

MARYLAND: Montgomery Co., Great Falls, C. R. Ely, 16.v.1909 (1 ♂, USNMENT 01756736); same but em. 20.v.1910 (1 ♂, USNMENT01756721); same but em. 22.v.1909 (1 ♀, USNMENT01756740); same but em. 29.v.1909 (1 ♀, USNMENT01756978); same but em. 03.vi.1909 (1 adult of unknown sex, USNMENT01756781); Plummers Island, J. C., ex *Ascyrum hypericoides* (2 ♂♂, USNMENT01756957, USNMENT01756725; 1 ♀, USNMENT01756946); NORTH CAROLINA: Durham Co., Durham, Eagle Spur Trail, Stagecoach Rd., 19.vii.2021, em. 21.viii.2021, T.S. Feldman, ex *Hypericum crux-andreae*, #CSE7070 (1 ♂, USNMENT01479717); same but em. 4.ix.2021, #CSE7089 (1 ♀, USNMENT01479718); Scotland Co., St. Andrews University, 8.v. 2019, em. 2.vi.2019, T.S. Feldman, ex *Hypericum hypericoides*, #CSE5314 (2 ♂♂, USNMENT01479720, USNMENT01479723); same but 10.xii.2019, em. 8.i.2020, #CSE 6011 (1 ♀, USNMENT01479715); same but em. 20.i.2020, #CSE6018 (1 ♂, USNMENT01 479724); Wake Co., Morrisville, Lake Crabtree County Park, 30.vii.2019, em. 23.viii.2019, T.S. Feldman, ex *H. hypericoides*, #CSE5844 (1 ♂, USNMENT01479721); same but em. 3.ix.2019, #CSE5874 (1 ♀, USNMENT01479722); same but em. 5–9.ix.2019, #CSE5884 (1 ♀,



Figs. 14–18. *Coleotechnites nigra* larvae and mines. 14, Larva. 15, Backlit photograph of a larva in a mine without frass; leaf not tied. 16, Same, but leaf tied to other leaves. 17, Tied leaves, with leaf from previous photograph at upper left. 18, Larva removing frass from mine (head at left).

USNMENT01479716); VIRGINIA: Fairfax Co., Great Falls, C. R. Ely, 27.v.1910, ex *Hypericum prolificum* (2 ♂♂, USNMENT 01344545, USNMENT01756985).

DNA barcoding.—DNA barcodes were obtained from all seven of the Florida specimens, which are assigned to BIN BOLD:ABA 4759 (Ratnasingham and Hebert 2007, 2013).

Of these, one male (CNCLEP00122891) was dissected by J.-F. Landry, and based on the images he provided, its genitalia are consistent with those of the holotype and the dissected North Carolina male (USNMENT01479721). Two other specimens have been assigned to BIN BOLD:ABA4759. One was collected on 16 April 1993 at a mercury vapor lamp in Alabama (Baldwin Co., Bon Secour National Wildlife Refuge, CNCLEP00086074) by J.-F. and B. Landry. The other was collected on 11 August 2018 in Ontario (Lambton Co., Port Franks) by K.H. Stead. These specimens have not been examined but we presume they represent *C. nigra*. One of the specimens collected by Ely (USNMENT01344545, BOLD Proc. ID LNAUW2307-17) was sent for barcoding (Project Title: Lepidoptera of North America and World - USNM 2017), but the limited number of base pairs obtained will not faithfully match this specimen to any identified taxon and it is the only specimen in BOLD identified as *C. nigrinus*.

Photographed leaf mines.—The following records are all of full-depth, primarily linear mines found on *Hypericum prolificum*, with the frass expelled from the entrance holes. Photographs for each observation can be viewed by adding the “iNat” number following each record to the end of this link: <https://www.inaturalist.org/observations/>. ALABAMA: DeKalb Co., Mentone, 34.548283, -85.594963, 9.vii.2023, D.J. Ringer, occupied mines (iNat 172270173); NORTH CAROLINA: Burke Co., MST [Mountains to Sea Trail] to Shortoff Mountain, 6.x.2022, J. Petranka, occupied mines (iNat 137900968); OHIO: Vinton Co., Swan Township, 39.344659, -82.501168, 9.xi.2024, bunnymom20, vacated mines (iNat 251063024).

Taxonomic remarks.—Busck (1903) described *Recurvaria nigra* based on a single male specimen he reared from *Hypericum “fruticosum”* while he was expecting the emergence of a different “Tineid.” Both Dyar et al. (1903) and McDunnough (1939) retained *nigra* Busck in *Recurvaria* with Hodges

(1965) placing it for the first time in combination with *Coleotechnites*. Hodges (1983) proposed a replacement name, *Coleotechnites nigrinus*, for Busck’s species (Hodges calls it “niger (Bsk. 1903)”) citing that it was preoccupied by *Recurvaria nigra* Haworth, 1828. Hodges (1965) did not propose this in his treatment of the *Recurvaria* group despite including *nigra* Busck in the list of species to be combined with *Coleotechnites* Chambers. Zeller (1839) described *Gelechia cautella* and sub-listed Haworth’s *nigra* under his new name, hypothesizing they were the same taxon and giving his own name priority. This placed Haworth’s *nigra* in combination with *Gelechia* Hübner approximately 64 years prior to Busck describing his species. This classification seems to have been consistent and remains to the present. Douglas (1849) corrected the priority of the names and listed Haworth’s *nigra* as valid with *G. cautella* Zeller as a junior synonym. This classification is repeated by Stainton (1854), Walker (1864), and ultimately Huemer and Karsholt (2020). Busck (1939) was also aware of Haworth’s *nigra* being combined with *Gelechia* and made no reference to homonymy with his *R. nigra*. Therefore, Hodges’s rejection of *nigra* Busck was unwarranted because it was never in homonymy with *nigra* Haworth, so we correct this and make *nigrinus* Hodges a junior objective synonym.

Redescription.—Scales throughout body and upper surface of forewing variable, but generally brownish gray, forewing pattern usually obscured, hardly visible, scales on head peppered, labial palpus with lighter and darker scales in annulated pattern (Figs. 1, 3, 4–8); legs with annulations of lighter and darker scales, some females tending towards gold colored scales on head, thorax, and anal area of forewing (Fig. 4). Scales ventrally typically lighter.

Thorax: Forewing length 3.5–4.5 mm, scales predominantly dark brown, with black scales forming a bar, or disconnected spots, at base on costal margin, at midlength of wing

on anterior half of wing starting at costa, at end of cell, and at costal apex. Tufts of erect black scales with some white behind fold, at $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ wing length, a similar tuft above fold at just beyond $\frac{1}{2}$ wing length, a narrow line of white scales forms an arrow-shape (pointing at wing apex) just beyond $\frac{3}{4}$ wing length, area between this line and termen with radiating spots of black scales with some white scales, females sometimes with lighter brown forewings and more obvious pattern, anal area and area anterior of arrow shaped line at forewing apex with golden scales (Fig. 4). Hindwing upper surface scales brown, sparse, somewhat reflective.

Male genitalia (Figs. 9–11): Typical for the genus. Tergite VIII (Fig. 10, 11) triangular, tapering posteriorly to blunt apex. Sternite VIII (Fig. 9) mostly quadrate, wider in middle and slowly tapering to anterior and posterior margins, with emarginate posterior margin. Tegumen roughly triangular in dorsal view, anterior margin deeply emarginate, posterior margin blunt and same width as base of uncus, lateral margins lacking any processes or projections. Vinculum typical for many species in the tribe, inverted so that articulation with tegumen is anterior to ventral apex, therefore there is no saccus and the posterior margin forms an asymmetrical bulbous process posterad connection to membrane of posterior margin of sternite VIII. Juxta completely fused with bulbous posterior of vinculum, composed mostly of an asymmetrical pair of posterodorsally directed processes, right process larger and more strongly curved, processes sinuate in lateral view and ribbon-like, slightly helical, dorsoventrally flattened at base and laterally flattened near apices, apices acutely pointed, sparsely setose laterally. Uncus dorsoventrally flattened, lateral edges turning ventrally, thickness similar throughout, shaped like a blunt shovel in dorsal view, ventrally concave and pointed dorsally, so that it looks emarginate at a posteriorly oblique angle, sparsely setose, setae fine, not bristle-like. Subscaphium in ventral

view an isosceles triangle, sides longer than base, posterior apex acute, but blunt. Gnathos lateral sclerite with thin, finger-like process articulating with tegumen that flattens into a foot-shaped disc lateral to median sclerite and as long as median sclerite, median sclerite laterally flattened and hooked at apex, anterior to posterior depth significant relative to length, roughly $\frac{1}{3}$ length, inner curve of hook shallow and outer curve of hook extended, so median sclerite looks like a single-pointed cheese knife in lateral view. Valvae reduced to glanductors, right glanductor with large base, as large as uncus or larger, oblong spheroidal, with median face widely open at diaphragm, length of glanductor along longitudinal axis longer than tegumen, sharply tapering to acute point, with internal channel clearly visible, initially directed to left side of genital capsule then turning medially approximately 70 degrees, then gently arcing to the right so that apex is pointed to the animal's right side, left glanductor much shorter, $\frac{1}{2}$ length of vinculum, half cylindrical, base wider than apex, slightly sinuate, terminating near fusion of phallus base and juxta, holotype open to diaphragm just at base, other males open along entire length. Phallus about as long as vinculum, dorsal surface entirely membranous, slightly narrower at apex than at base, directed ventrally almost 90 degrees at about $\frac{1}{2}$ length, base ventral surface fused to juxta, with no visible cornuti.

Female genitalia (Figs. 12, 13): Segment VIII length in ventral view slightly greater than wide at anterior margin, generally trapezoidal, slightly wider anteriorly, anterior margin of tergite VIII asymmetrical and discontinuous (i.e., with a membranous gap), left side at typical position, but margin travels anteriorly as it moves to the right and terminates ventral of base of right apophysis anterioris, so that there is a projection, which is where the margin gap occurs, of the tergite ventrad of the right apophysis anterioris that forms an oval opening between the tergite and the right apophysis anterioris, sternite

VIII membranous medially forming a channel the length of the segment continuous with ostium bursae, anterior margin of sternite produced anteriorly about $\frac{1}{2}$ length of sternite VIII, forming a triangular shape in ventral view with a blunt apex, apophysis anterioris length $2\times$ length of segment VIII, straight and thick. Antrum membranous, as narrow as ostium bursae. Ductus bursae length approximately $2.5\times$ greater than length of segment VIII, diameter throughout only slightly wider than ostium bursae, with a colliculum approximate to antrum with a length approximately $2.5\times$ greater than diameter of ductus bursae. Ductus ejaculatorius exiting ductus bursae just anterior to colliculum, completely membranous, diameter approximately equal to diameter of ductus bursae. Corpus bursae oblong spheroidal, length approximately $1.25\times$ greater than width, signum small, blade-like with no discernible teeth, apex blunt, base width and blade length approximately equal in size to the width of the ductus bursae (Fig. 13). Pheromone gland sac present, but small, a transverse mound spanning no more than half the width of the membranous ovipositor, higher in middle, maximum height in middle approximately as great as thickness of apophysis anterioris. Apophysis posterioris thin, approximately $0.25\times$ thickness of apophysis anterioris, straight, length approximately $3\times$ length of apophysis anterioris. Papillae anales length approximately $1.5\times$ greater than height, parallel-sided, hind margin broadly rounded, sparsely setose laterally and posteriorly.

Hosts.—Hypericaceae: *Hypericum crux-andreae* (L.) Crantz (St. Peter's-wort), *H. hypericoides* (L.) Crantz (St. Andrew's Cross), *H. prolificum* L. (shrubby St. John's-wort). The holotype was reared from *Hypericum* "fruticosa," which has never been an available name, valid or invalid, for a plant species, but has been included in at least one plant checklist (Muehlenburg Botanical Society, <https://sites.google.com/site/muehlenbergbotanic/plant-lists/new-texas-serpentine-barrens>)

and was in a list of plant stock available for purchase from Lamb Nurseries 1938–1940 (e.g., <https://www.biodiversitylibrary.org/item/282942#page/3/mode/1up>), so may have been a "common" name from a popular plant identification guide from the late 19th or early 20th century. The name possibly refers to *H. prolificum*, since this species is commonly known as "shrubby St. John's-wort," and *fruticosa* means "shrubby." At Plummers Island, where specimens were reared from *H. hypericoides*, five additional species of *Hypericum* are listed—*H. prolificum*, *H. gentianoides* (L.) Britton, Sterns, and Poggenb., *H. mutilum* L., *H. perforatum* L., and *H. punctatum* Lam. (Shetler et al. 2006)—but we have seen no indication that *C. nigra* uses any of the latter four plants.

Biology.—Larvae of *Coleotechnites nigra* are uniformly pale brown (Fig. 14). They form full-depth mines, which may be linear initially but ultimately develop into blotches, which typically contain no frass (Figs. 15, 16). In one instance, CSE observed a captive larva removing fecal pellets one at a time from a leaf that had a considerable accumulation of frass inside (Fig. 18). It did so with its mouth, despite possessing an anal fork, a structure typically associated with frass removal (Weiss 2003). As with most gelechioid leafminers (Eiseman 2021), the larvae are able to exit their mines and establish new ones in fresh leaves. In some cases several leaves are tied together (Fig. 17), but we have never seen evidence of external feeding. Pupation is within the last mined leaf, and the pupal exuviae remain in place when the adult emerges.

The only other known *Hypericum* leafminers in eastern North America are lepidopterans whose mines are easily distinguished, in part because no frass is expelled. The mine of *Fomoria hypericella* (Braun) (Nepticulidae) begins with a very narrow, frass-filled linear portion, then expands to a blotch in which the dense, flat, ~ 2 mm cocoon is ultimately spun. The mine of *Caloptilia hypericella* (Braun) (Gracillariidae) is at least partly confined to

one leaf surface (rather than being full-depth), and later instars feed as leafrollers instead of as miners (Eiseman 2025).

Coleotechnites nigra is clearly multivoltine. Larvae collected in late March in Florida emerged as adults in early to late April. The holotype emerged on 5 May from a plant collected at Great Falls, Virginia in late April, and specimens were subsequently reared from the same area (collection dates unknown) between mid-May and early June. In North Carolina, larvae have been collected in early May, mid- to late July, and early December, emerging as adults in early June, late August to early September, and early to mid-January.

Distribution.—We have seen specimens from Florida, Maryland, North Carolina, and Virginia. Specimens with matching DNA barcodes have been collected in Alabama and Ontario. Leaf mines consistent with *C. nigra* have been found in Alabama and Ohio.

Parasitoids.—A single parasitoid wasp (Chalcididae: *Haltichella* sp.; #CSE5840, CNC) appeared in one of our rearing vials containing leaves mined and tied by larvae of *Coleotechnites nigra*. It emerged on 21 August 2019 from *Hypericum hypericoides* leaves collected on 30 July 2019 at Lake Crabtree County Park. One of the USNM specimens from Plummers Island (USNMENT01756725) has included on the same double-mount a male *Chelonus* (*Microchelonus*) sp. (Braconidae). This specimen keys to *C. (M.) paradoxus* McComb, 1968 using McComb (1968), but that key is based on females and there are no identified males of *C. (M.) paradoxus* at the USNM for comparison (R. R. Kula, in litt.).

Coleotechnites piceaella (Kearfott)

piceaella (Kearfott, 1903: 155) (*Recurvaria*).

Type locality Montclair, New Jersey.

nigra Kearfott, 1903: 156 (as *Recurvaria piceaella* var. *nigra*). Type locality Montclair, New Jersey. Preoccupied by *nigra* Busck, 1903.

obscuraella (Kearfott, 1907: 4) (*Recurvaria*). Replacement name for *nigra* Kearfott, 1903.

niger Hodges, 1983: 20. Misspelling of *nigra* Kearfott, 1903.

Remarks.—Kearfott (1903) described *Recurvaria piceaella* and *R. piceaella* var. *nigra* based on several specimens “bred from black spruce, *Picea mariana* Mill.,” giving the latter name to “three almost black specimens.” He then (Kearfott 1907) created the name *R. obscuraella* for his var. *nigra* stating “the latter is preoccupied.” McDunnough (1939) considered *obscuraella* Kearfott a form of *piceaella* Kearfott and this synonymy was repeated in Hodges (1983) and Lee et al. (2009). We propose that Kearfott’s reference in 1907 was to being preoccupied by *R. nigra* Busck, 1903 and not *Gelechia nigra* (Haworth, 1828) as annotated by Hodges (1983). We provide the updated synonymy for this species above with the annotation of the correct preoccupied name.

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information and does not imply recommendation or endorsement by the USDA; USDA is an equal opportunity provider and employer.

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