

RESEARCH ARTICLE

OWLET MOTHS OF VIRGINIA, II. THE GENUS *PAPAIPEMA* (LEPIDOPTERA: NOCTUIDAE: NOCTUINAE: APAMEINI)

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ABSTRACT

Twenty-nine species in the noctuid moth genus *Papaipema* are reported from Virginia based on recent collecting, museum specimens, photographs, and literature records. Fourteen of these are recorded in the literature from Virginia for the first time, including two that will be described in a forthcoming fascicle in the *Moths of North America* (MONA) series. As many as six additional members of this genus may occur in the state. Documented county and city records, flight dates, and host plants are reported for all species.

Keywords: conservation, distribution, host plants, phenology, state records.

INTRODUCTION

This is the second paper in a planned series documenting the composition, distribution, phenology, and conservation status of the diverse moth family Noctuidae in Virginia. The first paper treated the subfamily Plusiinae (Roble, 2019). This installment treats the genus *Papaipema*, the largest endemic Nearctic genus of noctuid moths, with 48 recognized species occurring north of Mexico (Quinter, 1983; Lafontaine & Schmidt, 2010) and seven additional species awaiting formal description (Quinter & McBride, *in press*). A forthcoming fascicle in the *Moths of North America* series will treat this genus and several related genera (Quinter & McBride, *in press*).

As with much of the Nearctic moth fauna, few records of *Papaipema* have been reported in the literature from Virginia. This is largely due to the historical paucity of sampling of the state's

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native moth fauna by professional and amateur lepidopterists. Also, adults of this genus fly predominantly during the fall months and thus are missed during surveys limited to the spring and summer seasons. Consequently, no records of this genus are included in the regional faunal papers by Skinner (1921), Milne & Milne (1945), Stein (1993), Butler et al. (2001), Brown (2008), or Manderino et al. (2014). More lengthy, local studies typically include only a few species. For example, Ludwig (2009) documented six species of *Papaipema* at a site in Hanover County and Steury et al. (2007) included records for six species from two national parks in Fairfax County.

Most major museum collections contain limited Virginia moth specimens, often dominated by the efforts of a single collector (e.g., the Ellison Smyth collection at the National Museum of Natural History [NMNH], primarily from Montgomery County, ca. 1895-1910, or the John Franclemont collection at Cornell University and NMNH, the Virginia portion of which is almost exclusively from Arlington County, ca. 1948-1955) or multiple collectors at the same site (e.g., Mountain Lake Biological Station in Giles County). Partly in an effort to rectify this situation, staff and several cooperators of the Virginia Department of Conservation and Recreation's Division of Natural Heritage (VDCR-DNH), including the first author since 1992, have been sampling the moth fauna of the state for the past 35 years, relying primarily on ultraviolet light traps, with more limited use of mercury vapor lights, sugar baiting, Malaise traps, diurnal netting, larval surveys/rearing, and other methods. This trapping has included general and targeted surveys for *Papaipema* moths during the fall months using ultraviolet light traps. The second and third authors have studied this genus throughout their North American range for decades, including limited, targeted field work in Virginia as well as rearing and life history studies of many species.

Collectively, we have examined thousands of *Papaipema* specimens in museums and private collections. Compared to most other noctuid moths, species of *Papaipema* are infrequently collected and thus are generally poorly represented in museum collections. Consequently, many species in this genus are also omitted from popular field guides (e.g., Covell, 1984; Beadle & Leckie, 2012) and thus most lack common names.

The larval habits of most of our local species of *Papaipema* are well known (Hessel, 1954; Wagner et al., 2011; McBride, 2020; Quinter & McBride, *in press*), with all species being borers of stems or roots of live plants (mostly herbaceous, but also some woody), and many species utilizing only one or several host plants.

The purpose of this paper is to present a complete summary of current knowledge regarding the distribution and status of the genus *Papaipema* in Virginia.

METHODS

Most adult specimens of *Papaipema* collected by VDCR-DNH staff since 1988 have been retained, amounting to more than 1,000 specimens, many of which have been donated to the National Museum of Natural History, Smithsonian Institution, and others were added to the VDCR-DNH Virginia moth reference collection in Richmond or to Quinter's private collection (now at Yale University). These constitute the vast majority of the specimens examined for this study. Quinter's large collection of *Papaipema* includes some material from Virginia, particularly from numerous trips to the Great Dismal Swamp National Wildlife Refuge. McBride also has a private collection that includes limited Virginia material (mostly from Warm Springs Mountain, Bath County) and he has donated several reared Virginia specimens of *Papaipema* to Colorado State University (CSU). We also checked the following collections for Virginia specimens: National Museum of Natural History, Smithsonian Institution, Washington, D.C. (NMNH),

American Museum of Natural History, New York, New York (AMNH), McGuire Center for Lepidoptera, University of Florida, Gainesville, Florida (MGCL), Carnegie Museum of Natural History, Pittsburgh, Pennsylvania (CMNH), Academy of Natural Sciences of Drexel University, Philadelphia, Pennsylvania (ANSP), Cornell University, Ithaca, New York (CUIC), Peabody Museum of Natural History, Yale University, New Haven, Connecticut (YPM), Virginia Museum of Natural History, Martinsville, Virginia (VMNH), Virginia Polytechnic Institute and State University [= Virginia Tech], Blacksburg, Virginia (VT), Radford University, Radford, Virginia (RU), Virginia Military Institute, Lexington, Virginia (VMI), West Virginia University, Morgantown, West Virginia (WVU), University of Kentucky, Lexington, Kentucky (UKY), University of Kansas, Lawrence, Kansas (KU), and the University of Connecticut, Storrs, Connecticut (UConn). The private collections of Susan Felker (Floyd, VA) and the late William Grooms (Ashburn, VA), both now in the possession of VDCR-DNH, also were examined. Kelly Richers (Bakersfield, CA), Paul Dennehy (Danville, PA), and John Hyatt (Kingsport, TN) provided records from their private collections.

Roble also reviewed numerous published literature sources (including the season summaries of The Lepidopterists' Society and the Southern Lepidopterists Society [SLS]), selected internet websites (especially Symbiota Collections of Arthropods Network [SCAN], BugGuide [BG], Butterflies and Moths of North America [BM], and iNaturalist [iNat]), and photographs provided by several naturalists, for Virginia records of *Papaipema*.

ANNOTATED CHECKLIST

Twenty-nine species of *Papaipema* have been documented in Virginia. The checklist numbers of Lafontaine & Schmidt (2010) and Hodges et al. (1983), respectively, precede the species' names; the prefix 93 (for superfamily Noctuoidea) is omitted from the first number. ELQ and AEM refer to the private collections of the second and third authors, respectively. We report detailed collection data only for species captured in 10 or fewer counties and cities.

Family Noctuidae
Subfamily Noctuinae
Tribe Apameini

2508/9508 *Papaipema beeriana* Bird

Fig. 1; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Bath Co., Hotchkiss, 14-15 September 2016 (n=20), 26 September 2017 (5), 11 September 2019 (158), all S.M. Roble.

Other Virginia records: A.E. McBride collected three larvae at the Bath County site on 21 July 2023.

Host plants: *Liatris* (blazing star).

Comments: This is a Midwestern prairie species (Metzler et al., 1995). A highly disjunct, but apparently robust population of *P. beeriana* inhabits a remnant wet prairie in western Virginia. The site is approximately 430 km southeast of the nearest known population in Ohio (Champaign Co.; Rings et al., 1992) and approximately 550 km east of the nearest population in Kentucky

(Hardin Co.; Gibson & Covell, 2006). The host plant of the Virginia population is *Liatris spicata* (L.) Willd.

2465/9509 *Papaipema unimoda* (Smith)

Fig. 2; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: We have seen only a few Virginia specimens: Amherst Co., George Washington National Forest, Dismal Mountain Road, 1 October 2019, E.C. Orcutt (1). Bedford Co., Jefferson National Forest, Thunder Hill, 25 September 1994, S.M. Roble, E.L. Quinter, P.Z. Goldstein (ELQ, 1).

Other Virginia records: Arlington Co. (Franclemont, CUIC; 12-24 October)

Host plants: *Thalictrum* (meadow rue).

2468/9495 *Papaipema furcata* (Smith)

Fig. 3; **NEW STATE RECORD**

Literature records: District of Columbia (Forbes, 1954).

VDCR-DNH records: Cumberland Co., Bear Creek Lake State Park, 6 October 2014, S.M. Roble (1). Fairfax Co., Riverbend Park, 20 September 2021 (1), Sugarland Run Stream Valley Park, 20 September 2022 (1), both T.P. Smith. Floyd Co., Buffalo Mountain Natural Area Preserve, 27 September 2000, J.C. Ludwig (8); same but 12 September 2001, S.M. Roble (1). Halifax Co., Difficult Creek Natural Area Preserve, 4 October 2002, C.S. Hobson (1). Prince William Co., Quantico Marine Corps Base, Cedar Run, 21 September 1998, A.C. Chazal, J.C. Ludwig (2). Scott Co., Jefferson National Forest, Devils Hens Nest, 28-29 September 2021, S.M. Roble (4); Jefferson National Forest, Staunton Creek, 3 October 2023, E.C. Orcutt, S.M. Roble (1). Wise Co., Powell Mountain Karst Preserve, 22 September 2009, C.S. Hobson, W. Orndorff, S.M. Roble (5). Other Virginia records: Floyd Co., Co. Rt. 726, 1.1 km W jct. Blue Ridge Parkway, 22 September 2000, S. Felker collection (1). Rockingham Co., Mt. Olive Church, 7 October 2005 (1) and 3 October 2012 (2), both K. Richers collection. Washington Co., Mendota Trail, Wolf Run Gorge, 13 October 2023, J. Hyatt collection (1).

Other collections: Fairfax (M. Leonidov collection [BG]) and Montgomery (VT, YPM) counties
Photo records: Augusta (BG), Carroll (B. Perkins), Tazewell (BM), and Warren (iNat) counties and Radford City (BG).

Virginia flight dates: 12 September-13 October.

Host plants: primarily *Fraxinus* (ash).

Comments: The arrival of *Agrilus planipennis* Fairmaire (emerald ash borer), an exotic beetle that is responsible for the widespread mortality of ash trees, to Virginia and other areas in North America within the past two decades, is likely to adversely impact populations of this moth (Wagner, 2007), although the larva will bore in saplings which are not as commonly attacked by the beetle (A.E. McBride, pers. obs.).

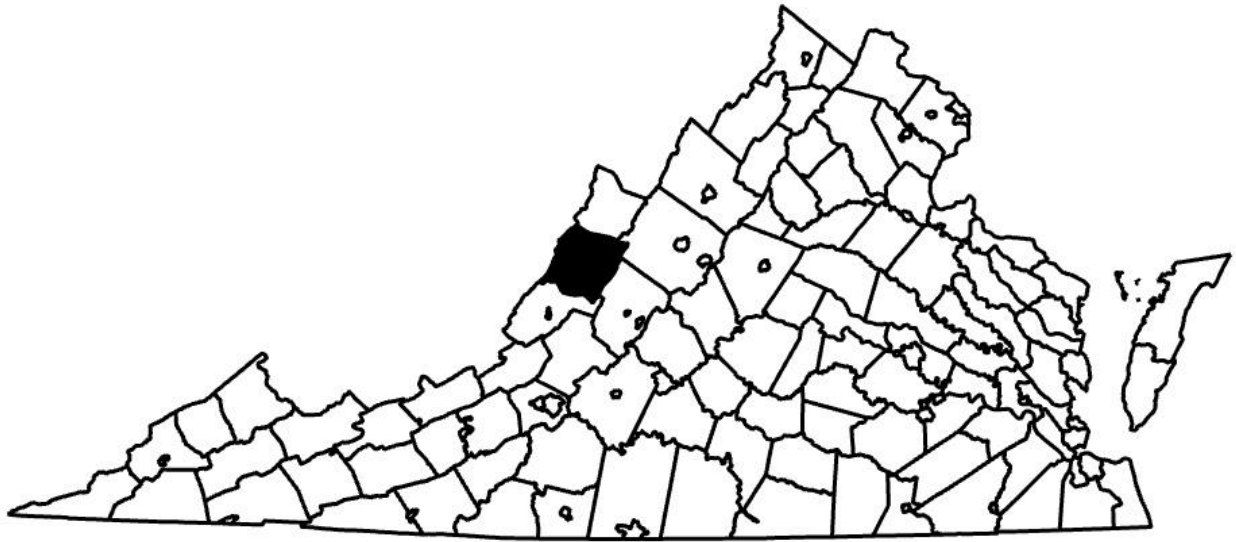


Figure 1. Virginia distribution of *Papaipema beeriana* Bird based on specimen collections.

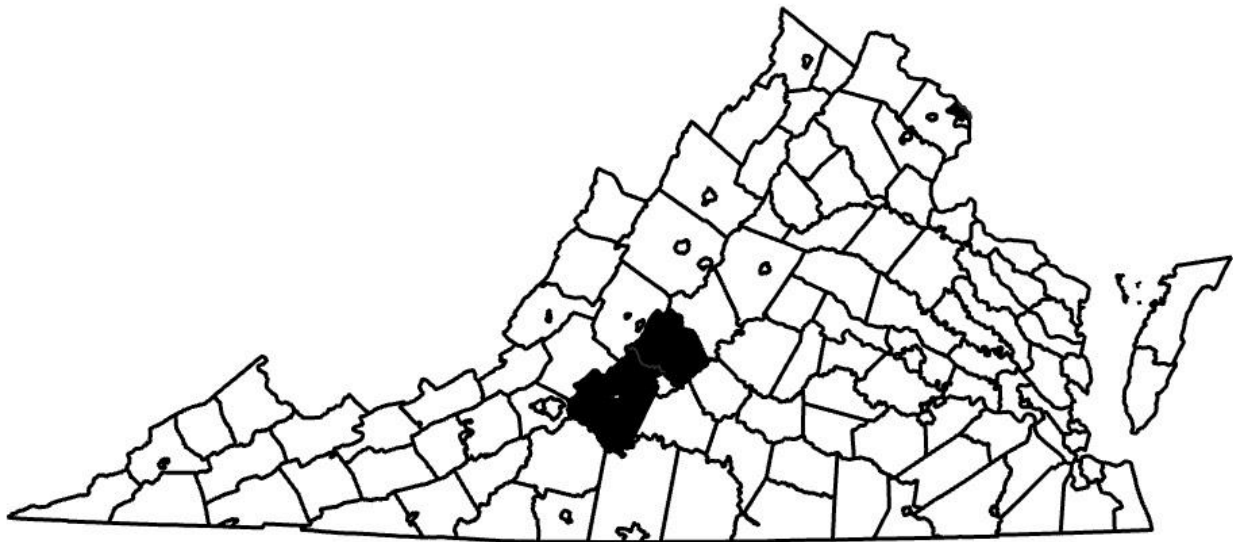


Figure 2. Virginia distribution of *Papaipema unimoda* (Smith) based on specimen collections.

2470/9505 *Papaipema cerussata* (Grote)

Fig. 4

Literature records: Virginia (Covell, 1984); Bland Co. (SLS News 22[3], 2001); Hanover Co. (Ludwig, 2009); District of Columbia (Forbes, 1954).

VDCR-DNH records: 98 specimens collected at about 25 sites in the following 18 counties – Alleghany, Augusta, Bath, Carroll, Fairfax, Floyd, Grayson, Halifax, Hanover, Lee, Montgomery, New Kent, Roanoke, Rockingham, Scott, Smyth, Stafford, and Washington.

Other Virginia records: Arlington (NMNH), Augusta (K. Richers collection), Bland (H.W. Godwin collection [SLS News]), Fairfax (NMNH), Floyd (YPM), Lunenburg (Franclemont, CUIC), Montgomery (VT, YPM), Nelson (AMNH), and Washington (J. Hyatt collection) counties and Salem City (VT).

Photo records: Botetourt (iNat), Carroll (B. Perkins), Prince Edward (iNat), and Tazewell (BM) counties and Radford City (BG).

Virginia flight dates: 12 September– 27 October.

Host plants: *Vernonia* (ironweed).

Comments: This is one of the most common and widespread species of *Papaipema* in Virginia.

2472/9492 *Papaipema marginidens* (Guenée)Fig. 5; **NEW STATE RECORD**

Literature records: Forbes (1954) reported this species (as *P. nephrasyntheta*, a junior synonym) from the vicinity of the District of Columbia (the type specimen of *P. nephrasyntheta* was collected on Plummer’s Island, Maryland [Dyar, 1908]).

VDCR-DNH records: 87 specimens collected at about 50 sites in the following 18 counties – Alleghany, Augusta, Bath, Botetourt, Brunswick, Chesterfield, Dickenson, Fairfax, Fauquier, Floyd, Franklin, Isle of Wight, Lee, Montgomery, Prince William, Rockingham, Scott, and Sussex.

Other Virginia records: Arlington (Franclemont, CUIC), Augusta (WVU), Bath (AEM), Lancaster (P. Dennehy collection [iNat]), Montgomery (NMNH), and Washington (J. Hyatt collection) counties and City of Richmond (VMNH).

Virginia flight dates: 7 September– 26 October.

Host plants: McBride (2020) recently determined that wild yam (*Dioscorea villosa* L.) is the host plant of this species.

Comments: This species is widespread in Virginia. Although Ellison Smyth (presumably) took a specimen in Montgomery County (NMNH) around 1900 (no collector name or date on the label), this species apparently has not been reported previously from Virginia in the published literature.

2473/9490 *Papaipema nepheleptena* (Dyar)Fig. 6; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Augusta Co., Blue Ridge Parkway, Humpback Rocks Visitor Center, 15 October 1992, S.M. Roble (2). Bedford Co., Jefferson National Forest, Thunder Hill, 25 September 1994, S.M. Roble, E.L. Quinter, P.Z. Goldstein (VDCR-DNH, 1; ELQ); same site but 10 October 2001, S.M. Roble (1).

Other Virginia records: Brunswick Co. (ELQ).

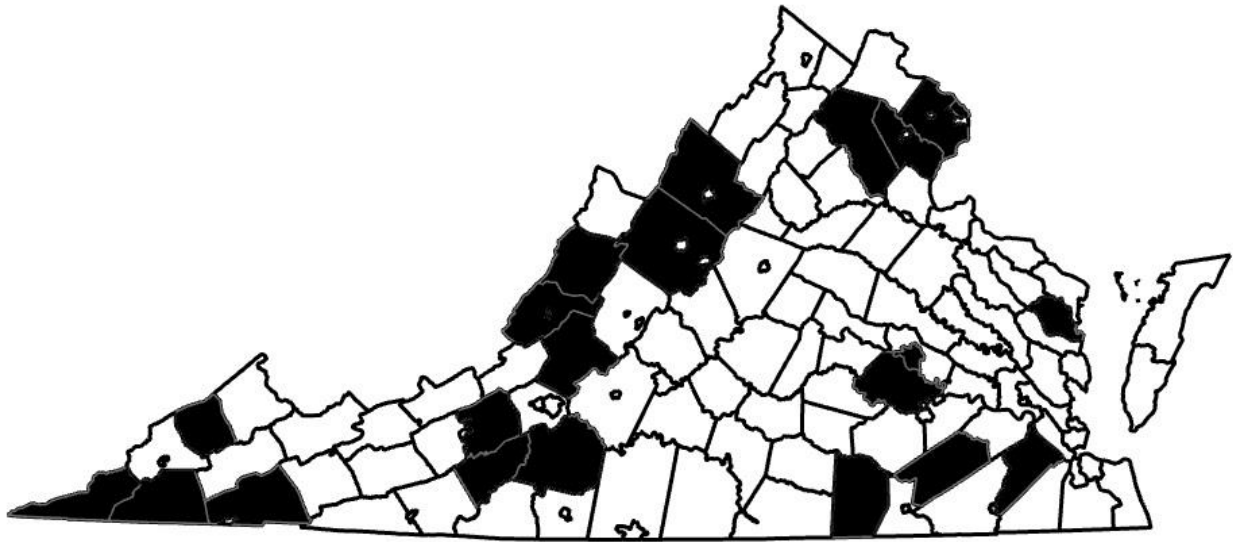


Figure 5. Virginia distribution of *Papaipema marginidens* (Guenée) based on specimen collections.

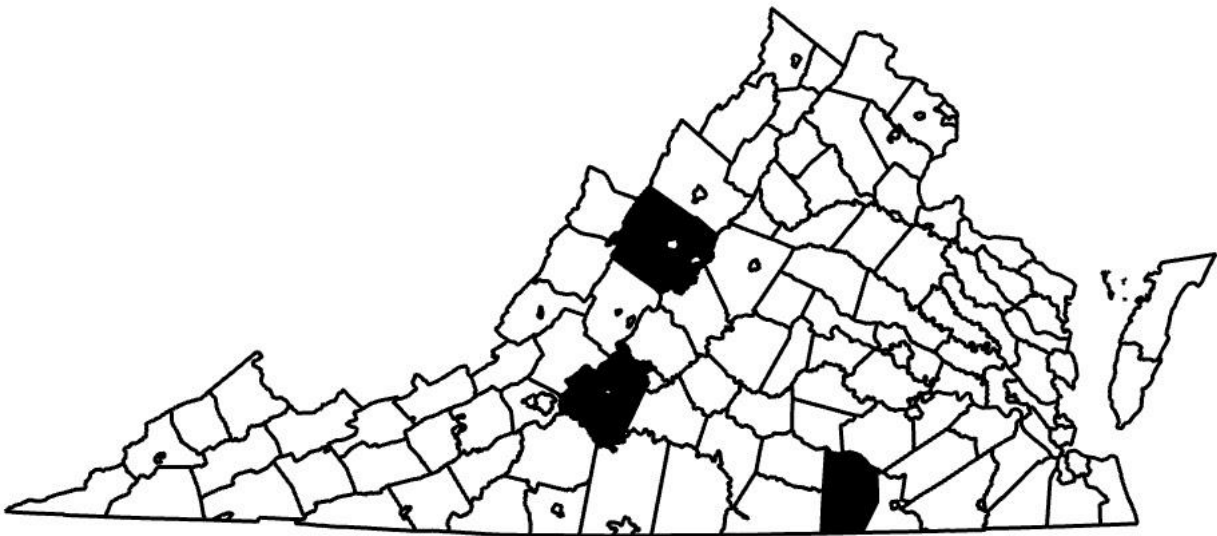


Figure 6. Virginia distribution of *Papaipema nepheleptena* (Dyar) based on specimen collections.

Virginia flight dates: 25 September-15 October.

Host plants: *Chelone* (turtlehead); also uses *Verbena hastata* L. (blue vervain) in the Midwest.

Comments: Known in Virginia only from three sites.

2474/9481 *Papaipema stenocelis* (Dyar)

Fig. 7; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Accomack Co., Chincoteague National Wildlife Refuge, Assateague Island, 29 September 1998, S.M. Roble (1); same but 13 October 1998, A.C. Chazal (1).

Other Virginia records: City of Suffolk, Great Dismal Swamp National Wildlife Refuge, Williamson Ditch, 16 September 2000, E.L. Quinter, J.E. O'Donnell (ELQ, 1).

Virginia flight dates: 16 September-13 October.

Host plants: *Anchistea virginica* (L.) Presl (= *Woodwardia virginica* (L.) Sm.) (Virginia chain fern).

Comments: Known in Virginia only from collections made at two national wildlife refuges.

2475/9482 *Papaipema speciosissima* (Grote & Robinson)

Fig. 8; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Accomack Co., Chincoteague National Wildlife Refuge, Assateague Island, 29 September 1998, S.M. Roble (1). Fairfax Co., Fort Belvoir Military Reservation, 18 October 2012, C.S. Hobson, J. Pilcicki (1), same but 24 October 2012 (1). New Kent Co., Quinton, 23 October 2011, C.S. Hobson (1). Northampton Co., Magothy Bay Natural Area Preserve, 22 October 2024, E.C. Orcutt (1). Prince George Co., Cherry Orchard Bog Natural Area Preserve, 1 November 2024, S.M. Roble (1). Scott Co., Jefferson National Forest, Devils Hens Nest, 28 September 2021, S. M. Roble (1). Sussex Co., Cherry Orchard Bog Natural Area Preserve, 23 October 2024, S.M. Roble, S.O. Lockett (4), same but 1 November 2024, S.M. Roble (2). City of Virginia Beach, North Landing River Natural Area Preserve, 28 September 2022, E.C. Orcutt, S.M. Roble (1).

Other Virginia records: [City of Richmond] University of Richmond campus, 20 October 1935, C.C. Walton (VMNH, 1 [ex. University of Richmond collection]).

Photo records: Giles Co. (iNat).

Virginia flight dates: 28 September-1 November.

Host plants: primarily *Osmunda spectabilis* Willd. (royal fern), but also uses *Osmundastrum cinnamomeum* (L.) C. Presl (cinnamon fern) and *Claytosmunda claytoniana* (L.) Metzgar & Rouhan (interrupted fern).

2476/9483 *Papaipema inquaesita* (Grote & Robinson)

Fig. 9

Literature records: Fairfax Co. (Steury et al., 2007); District of Columbia vicinity (Forbes, 1954)

VDCR-DNH records: 33 specimens collected at 24 sites in the following 13 counties: Amherst, Augusta, Bath, Chesterfield, Cumberland, Fairfax, Fauquier, Floyd, Halifax, Highland, Lee, Prince William, and Stafford.

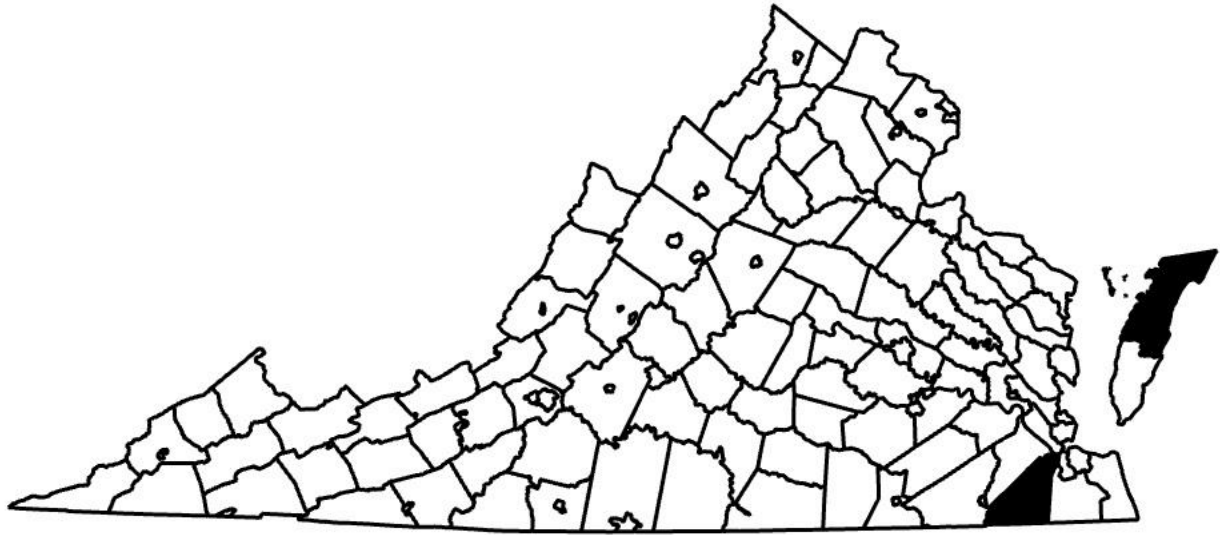


Figure 7. Virginia distribution of *Papaipema stenocelis* (Dyar) based on specimen collections.

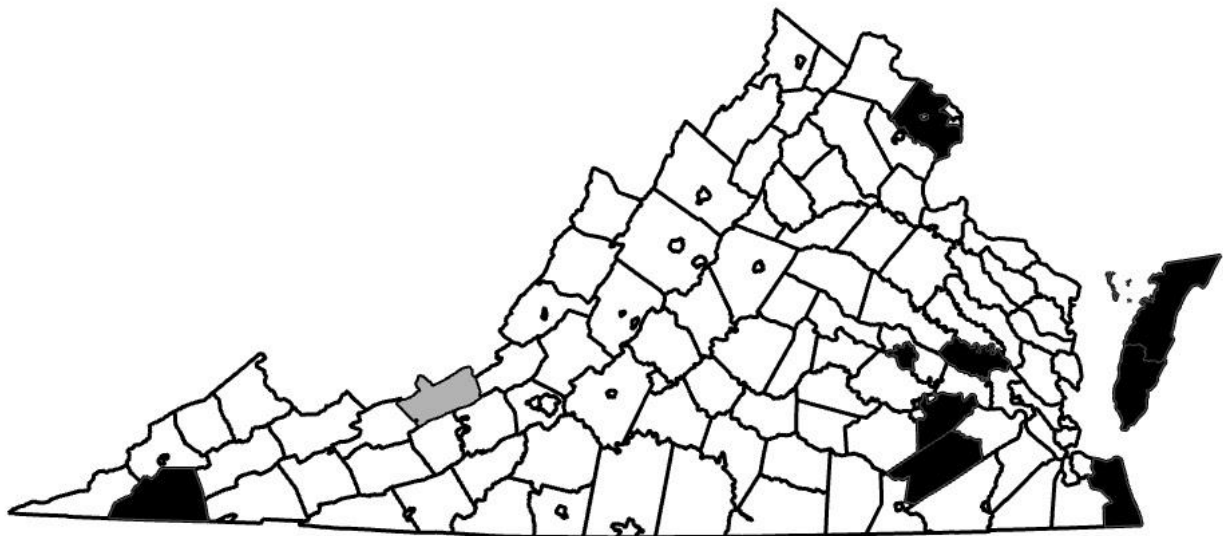


Figure 8. Virginia distribution of *Papaipema speciosissima* (Grote & Robinson) based on specimens (dark shading) and photographs (light shading).

Other Virginia records: Arlington (Franclemont, CUIC), Bath (NMNH), Essex (VMNH), and Lunenburg (Franclemont, CUIC) counties.

Photo records: Carroll (B. Perkins), Fairfax (iNat), and Powhatan (iNat) counties.

Virginia flight dates: 15 August- 27 October.

Host plants: *Onoclea sensibilis* L. (sensitive fern).

2478/9486 *Papaipema birdi* (Dyar)

Fig. 10

Literature records: The report by Steury et al. (2007) of *P. birdi* from Turkey Run Park in Fairfax County is based on a misidentified specimen of *P. baptisiae* (iNat 2637529).

VDCR-DNH records: Brunswick Co., Fort Pickett Military Reservation, Rocky Run, 9 August 1999, A.C. Chazal, A.K. Foster (2). Chesterfield Co., Scotford Road, 26 September 2007 (1) and 11 September 2009 (1), both S.M. Roble. Craig Co., Jefferson National Forest, Potts Mountain, 23 September 1994, M.W. Donahue (1). Prince William Co., Prince William Forest Park, South Fork Quantico Creek, 21 September 1988, C.B. Knisley (1). City of Richmond, Laburnum Avenue, 17 September 2022, E.C. Orcutt (1).

Other Virginia records: Arlington (Franclemont, CUIC), Louisa (VMNH), Rockingham (K. Richers collection), and Shenandoah (NMNH) counties.

Photo records: Page (iNat) and Powhatan (iNat) counties.

Virginia flight dates: 9 August- 6 October.

Host plants: *Cicuta maculata* L. and other umbellifers.

Comments: This species was treated as a junior synonym of *P. insulidens* (Bird) by Lafontaine & Schmidt (2015) and Pohl & Nanz (2023). However, we recognize *P. birdi* as a distinct species following Quinter (1983) and Quinter & McBride (*in press*).

2482/9477 *Papaipema astuta* Bird

Fig. 11

Literature records: Virginia (Schweitzer et al., 2011).

VDCR-DNH records: Bath Co., Warm Springs Mountain, 9 September 1999, S.M. Roble (1), George Washington National Forest, Blowing Springs, 5 October 2024, D.A. Hennen (1). Scott Co., Jefferson National Forest, Devils Hens Nest, 13-14 September 2021, S.M. Roble, C.S. Hobson (4), same but 28 September 2021, S.M. Roble (2). Wise Co., Powell Mountain Karst Preserve, 22 September 2009, S.M. Roble, C.S. Hobson (1).

Other Virginia records: Rockingham Co., Mt. Olive Church, 7 October 2005, K. Richers collection (1).

Virginia flight dates: 9 September-7 October.

Host plants: Primarily *Collinsonia canadensis* L. (stoneroot, horse balm) but also uses *Angelica triquinata* Michx. (filmy angelica).

Comments: The report by Schweitzer et al. (2011) of a Virginia record of *P. astuta* is based on the Bath County specimen listed above.

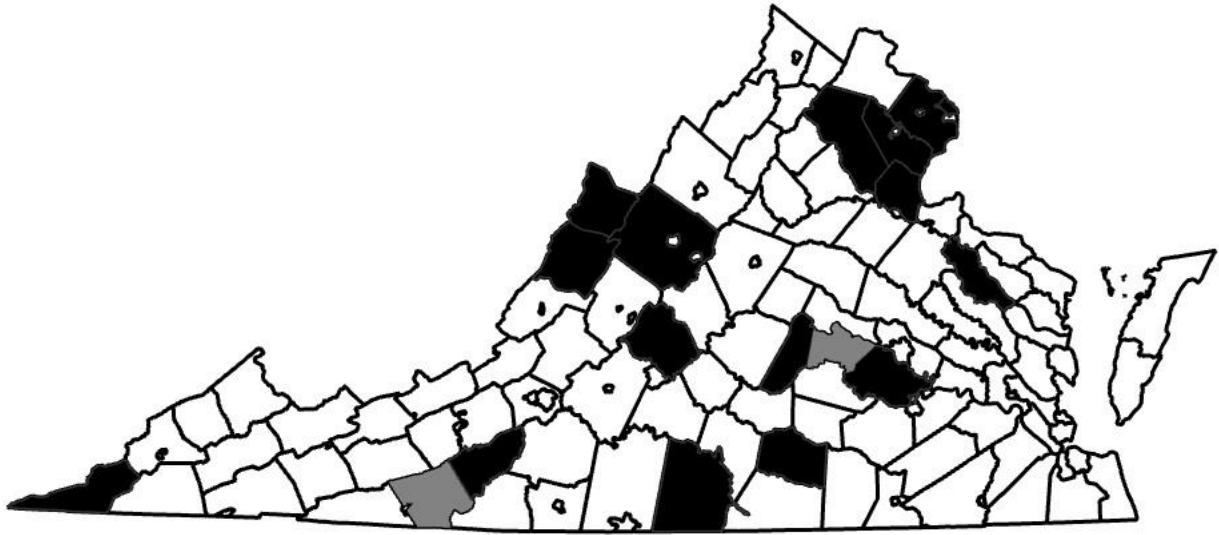


Figure 9. Virginia distribution of *Papaipema inquaesita* (Grote & Robinson) based on specimens (dark shading) and photographs (light shading).

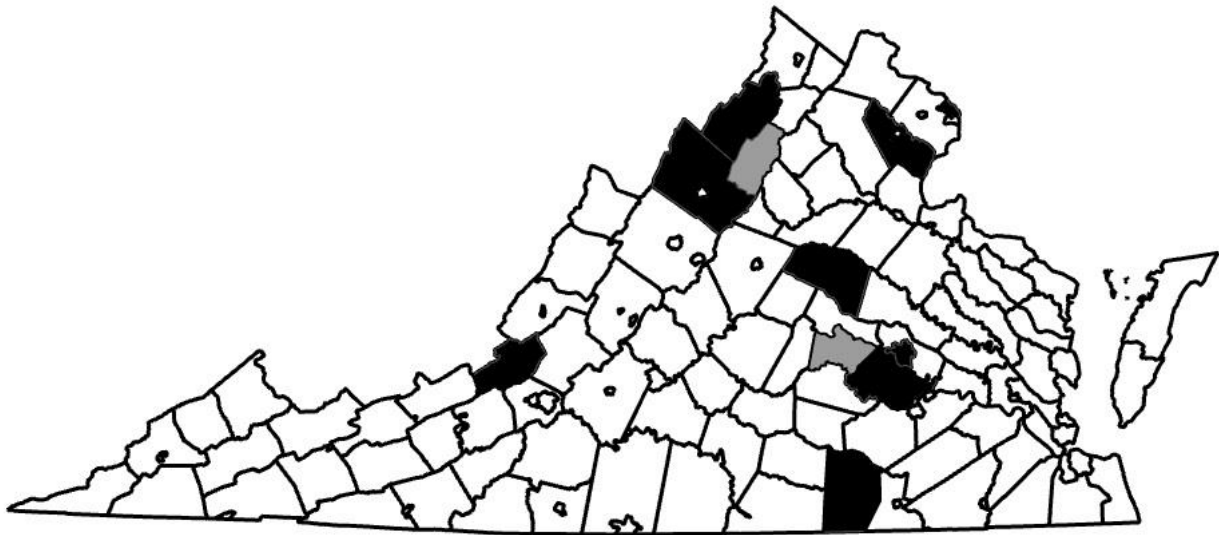


Figure 10. Virginia distribution of *Papaipema birdi* (Dyar) based on specimens (dark shading) and photographs (light shading).

2487/9479 *Papaipema lysimachiae* Bird

Fig. 12

Literature records: Fairfax Co. (Steury et al., 2007); Virginia (Schweitzer et al., 2011); District of Columbia (Forbes, 1954).

VDCR-DNH records: Bath Co., Warm Springs Mountain, 18 August 1999, S.M. Roble (1), same but 20 September 1999 (2), same but 9 September 2023, S.M. Roble, A.E. McBride (VDCR-DNH, 1; AEM, 1). Carroll Co., Blue Ridge Parkway milepost 209, 16 September 1992, S.M. Roble, K.A. Buhlmann (1). Grayson Co., Grayson Highlands State Park, 15-16 September 2020, S.M. Roble (9). Prince William Co., Prince William Forest Park, 21 September 1988, C.B. Knisley (1).

Other Virginia records: Floyd Co. (YPM).

Photo records: Carroll Co. (W. Cook; B. Perkins).

Virginia flight dates: 21 August-27 September.

Host plants: *Lysimachia* (loosestrife).

Comments: A.E. McBride collected larvae in *Lysimachia quadrifolia* L. (whorled loosestrife) at the Bath County site on 11-12 July 2008.

2489/9480 *Papaipema pterisii* Bird

Fig. 13

Literature records: Virginia (Schweitzer et al., 2011).

VDCR-DNH records: Augusta Co., Blue Ridge Parkway milepost 4, 11 September 1992, S.M. Roble (1). Bath Co., Warm Springs Mountain, 18 August-9 September 1999, S.M. Roble (17); same but 10-11 August 2010 (2) and 3 September 2008 (2), same but 9 September 2023, S.M. Roble, A.E. McBride (VDCR-DNH, 3; AEM, 1). Craig Co., Jefferson National Forest, Potts Mountain, 23 September 1994, M.W. Donahue (2). Grayson Co., Grayson Highlands State Park, 15-16 September 2020, S.M. Roble (6). Highland Co., George Washington National Forest, Bearwallow Run, 6 September 1994, S.M. Roble (1).

Other Virginia records: Augusta Co. (WVU).

Virginia flight dates: 10 August-23 September.

Host plants: *Pteridium aquilinum* (L.) Kuhn (bracken fern).

Comments: The report by Schweitzer et al. (2011) of Virginia records of *P. pterisii* is based on some of the specimens listed above. A.E. McBride collected larvae at the Bath County site on 11-12 July 2008. All Virginia records of *P. pterisii* are restricted to the western mountains, where this species is near the southern end of its range. There are no Kentucky records of *P. pterisii* (Covell, 1999; Kentucky Butterfly Net website), but it is known from Great Smoky Mountains National Park (Lambdin et al., 1991) and three counties in the mountains of western North Carolina (NC Biodiversity Project website).

2490/9469 *Papaipema polymniae* Bird

Fig. 14

Literature records: Bird (1917); type specimens (NMNH) from Rosslyn [Arlington Co.], Virginia were reared on *Smallanthus uvedalia* (L.) Mackenzie ex Small (= *Polymnia uvedalia* (L.) L) and emerged on 8 September 1916.

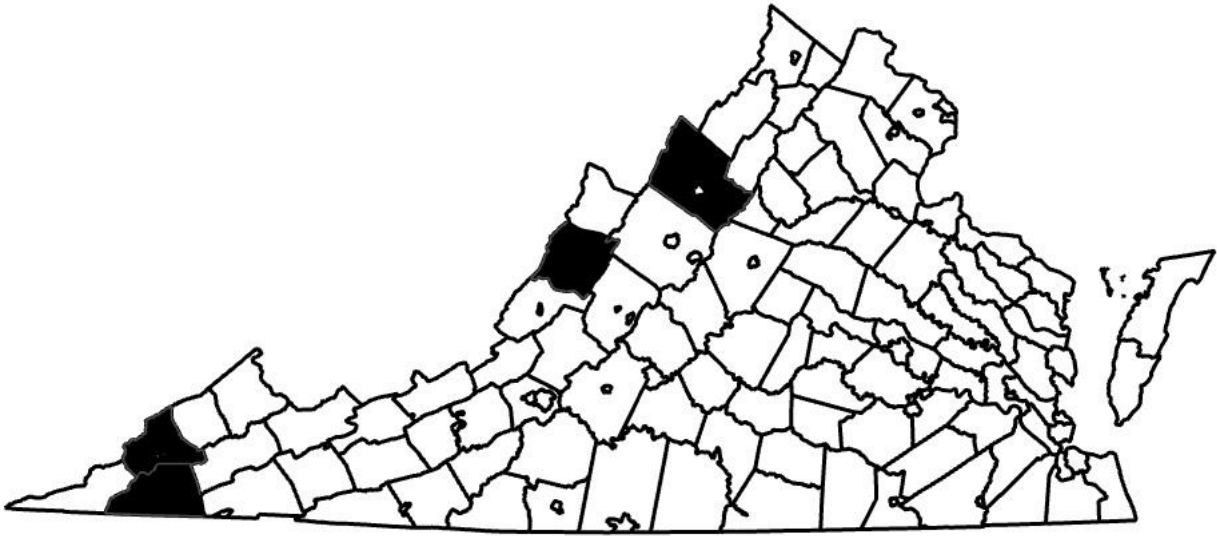


Figure 11. Virginia distribution of *Papaipema astuta* Bird based on specimen collections.

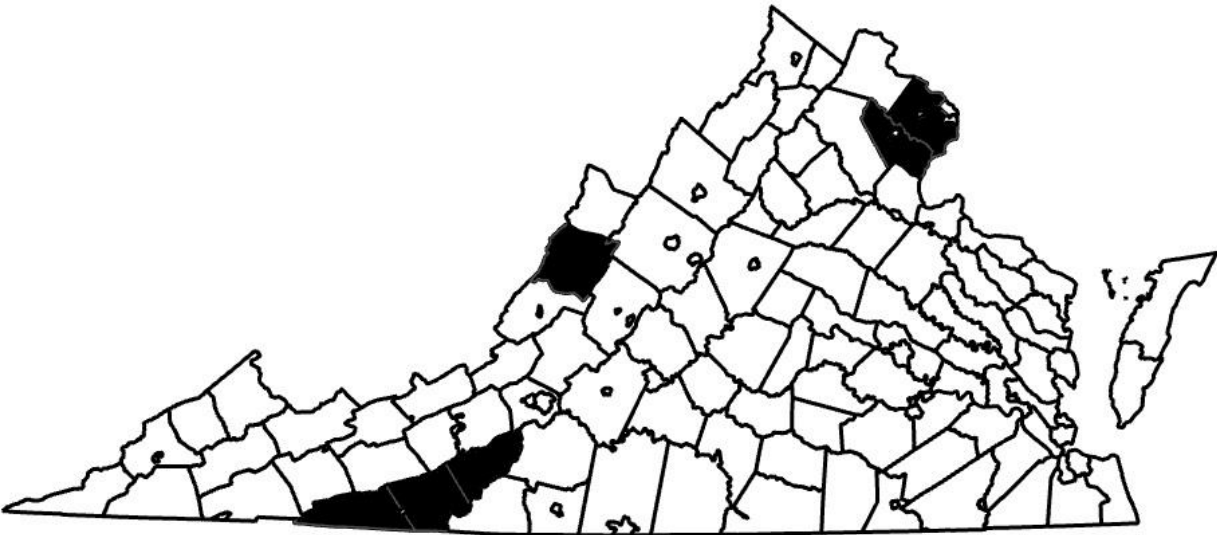


Figure 12. Virginia distribution of *Papaipema lysimachiae* Bird based on specimen collections.

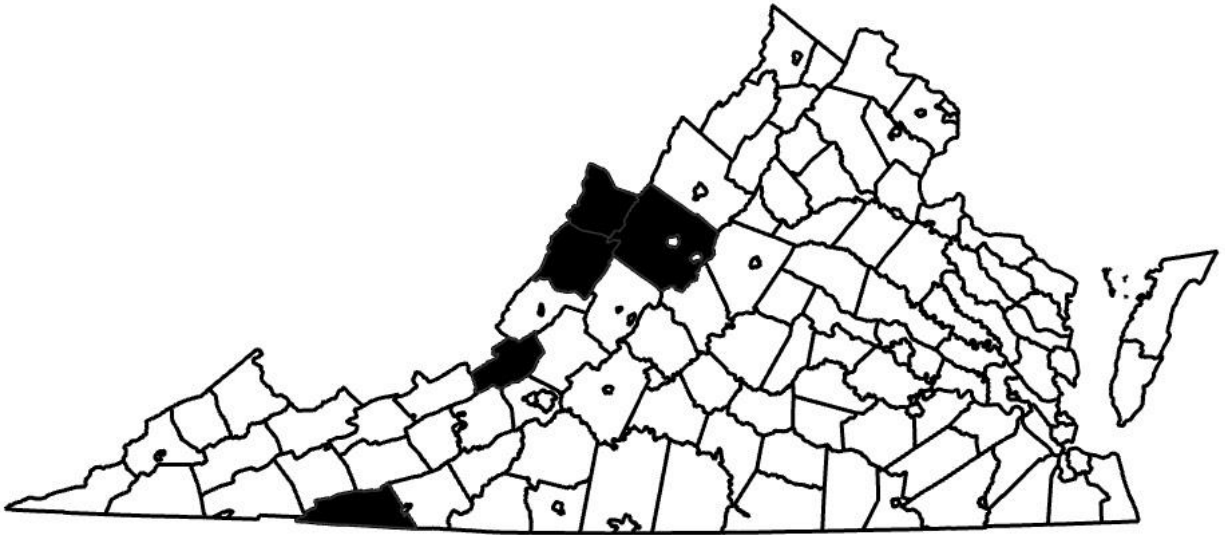


Figure 13. Virginia distribution of *Papaipema pterisii* Bird based on specimen collections.

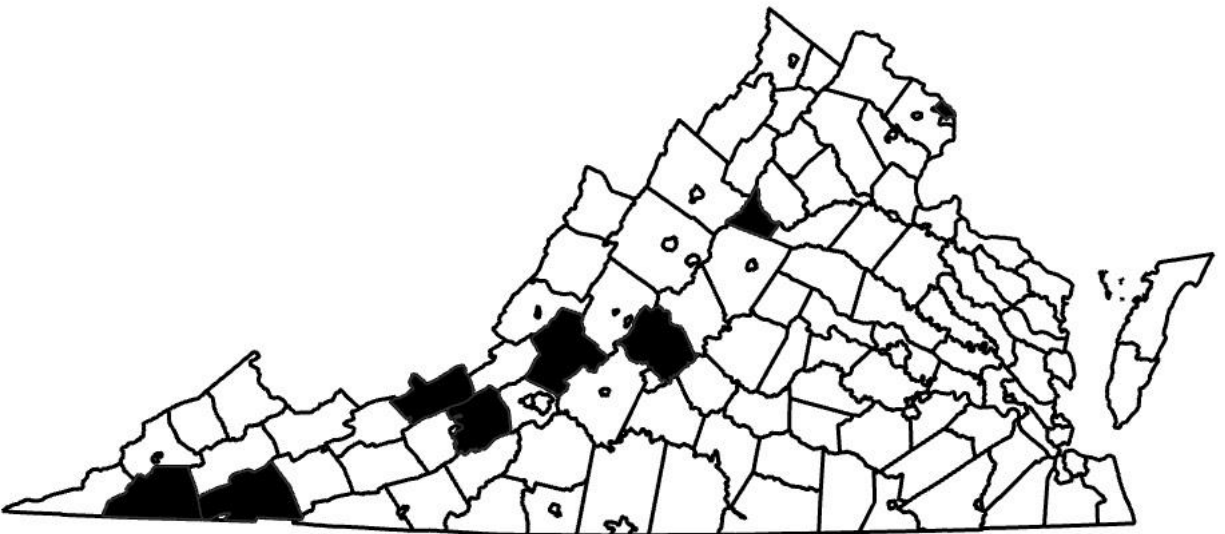


Figure 14. Virginia distribution of *Papaipema polymniae* Bird based on specimen collections.

VDCR-DNH records: Amherst Co., Blue Ridge Parkway, James River Visitor Center, 26 September 1994, S.M. Roble (1). Botetourt Co., 1.6 km NE jct. Co. Rt. 695 and US Rt. 220, 12 September 2001, A.C. Chazal (1); same but 10 October 2001, S.M. Roble (4). Montgomery Co., Slaughterpen Hollow near Den Creek, 4 October 2000, J.C. Ludwig, P.A. Clarke (6); same but 24 September 2020, S.M. Roble (1). Scott Co., Jefferson National Forest, Devils Hens Nest, 29 September 2021, S.M. Roble (1). Washington Co., Clinch Mountain Wildlife Management Area, Tumbling Creek, 20 September 2011, S.M. Roble (2).

Other Virginia records: Giles (ELQ) and Greene (ELQ) counties.

Virginia flight dates: 12 September–10 October.

Host plants: *Smallanthus uvedalia* (L.) Mackenzie ex Small (yellow-flowered leafcup).

Comments: The type locality (Rosslyn, Virginia) is now a heavily urbanized area across the Potomac River from the District of Columbia.

2491/9470 *Papaipema araliae* Bird & Jones

Fig. 15; **NEW STATE RECORD**

Literature records: Accomack Co., Chincoteague Island (Jones, 1928–1939 [unpublished ms]; specimen in ELQ collection); District of Columbia vicinity (Forbes, 1954).

VDCR-DNH records: Accomack Co., Wallops Island, 6 September 1994, C. S. Hobson, D. J. Stevenson (1).

Other Virginia records: Lancaster Co., Kilmarnock, 14 September 2012, P. Dennehy (P. Dennehy collection, 1 [BG]). City of Suffolk, Great Dismal Swamp National Wildlife Refuge, Williamson Ditch, 16 September 2000, E.L. Quinter (2; also larval collections on other dates); same but West Ditch, A.E. McBride (ex larvae collected 12 June 2018, CSU [1]; AEM collection). York Co., Tabb, June 1985, larval damage observed (no voucher specimens; D. F. Schweitzer, pers. comm.).

Virginia flight dates: 6–16 September.

Host plants: *Aralia spinosa* L. (devil’s walking-stick) (Bird & Jones, 1921).

Comments: Jones (1928–1939) remarked that this species was locally abundant on Chincoteague Island.

2492/9471 *Papaipema arctivorens* Hampson

Fig. 16

Literature records: Virginia (Covell, 1984), Fairfax Co. (Steury et al., 2007).

VDCR-DNH records: 33 specimens collected at more than 20 sites in the following 14 counties – Augusta, Craig, Fairfax, Fauquier, Floyd, Giles, Halifax, Highland, Lee, Montgomery, Nottoway, Prince William, Pulaski, and Scott.

Other Virginia records: Arlington (Franclemont, CUIC), Bath (CMNH), Floyd (S. Felker collection), Loudoun (VT; R. Lyon collection), Montgomery (NMNH), Pulaski (S. Garriock collection), and Washington (ELQ; J. Hyatt collection) counties.

Photo records: Carroll (B. Perkins), Highland (J. Bulluck), Lee (BM), Rockingham (BM/iNat), and Tazewell (BM) counties.

Virginia flight dates: 22 July–9 October.

Host plants: *Cirsium* (thistle), *Arctium minus* Bernh. (common burdock), etc.

Comments: This species is widely distributed in Virginia. Forbes (1954) recorded it from Plummers Island, Maryland, in the Potomac River near the District of Columbia.

2493/9484 *Papaipema rutila* (Guenée)

Fig. 17

Literature records: Fairfax Co. (Steury et al., 2007); Hanover Co. (Ludwig, 2009); Virginia (Schweitzer et al., 2011).

VDCR-DNH records: 43 specimens collected in the following 14 counties – Augusta, Dickenson, Fairfax, Floyd, Halifax, Hanover, Highland, Lee, Montgomery, Nottoway, Pulaski, Russell, Scott, and Wise counties.

Other Virginia records: Prince William (ELQ) and Pulaski (S. Garriock collection) counties.

Virginia flight dates: 28 August-5 October.

Host plants: *Podophyllum peltatum* L. (mayapple).

2494/9485 *Papaipema baptisiae* (Bird)

Fig. 18

Literature records: Accomack Co. (Jones, 1928-1939 [unpublished ms]; specimen in ELQ collection); Hanover Co. (Ludwig, 2009).

VDCR-DNH records: 50 specimens collected at more than 35 sites in the following 21 counties and one city – Accomack, Alleghany, Bath, Bedford, Botetourt, Brunswick, Charlotte, Dinwiddie, Fairfax, Fauquier, Floyd, Grayson, Halifax, Hanover, Isle of Wight, Lee, Madison, Montgomery, Nottoway, Prince William, and Pulaski counties, and Chesapeake City.

Other Virginia records: Albemarle (VT), Augusta (ELQ), Bedford (VT), Fairfax (NMNH), Floyd (S. Felker collection; YPM), Franklin (ELQ), Loudoun (R. Lyon collection, B. Grooms collection; VT), Montgomery (VT), Rockingham (ELQ), and Washington (J. Hyatt collection) counties and Norfolk City (VT).

Photo records: Augusta (BG), Carroll (B. Perkins), Fairfax (BG/iNat), Loudoun (iNat), Prince William (iNat), Rockingham (BG), and Tazewell (BM) counties and Radford City (BG).

Virginia flight dates: 1 August-10 October.

Host plants: *Apocynum* (dogbane), *Baptisia* (wild indigo).

Comments: This is one of the most common and widespread species of *Papaipema* in Virginia.

2496/9465 *Papaipema duovata* (Bird)Fig. 19; **NEW STATE RECORD**

Literature records: Accomack Co., Chincoteague Island (Jones, 1928-1939 [unpublished ms]; specimen in ELQ collection).

VDCR-DNH records: Accomack Co., Wallops Island, 12 October 1995, C.S. Hobson (6); Chincoteague National Wildlife Refuge, Assateague Island, 13 October 1998, A.C. Chazal (6); Mutton Hunk Fen Natural Area Preserve, 22 October 2003, A.C. Chazal, C.S. Hobson (9). Northampton Co., Kiptopeke State Park, 22-23 October 2024, E.C. Orcutt (2), same but Magothy Bay Natural Area Preserve, 22 October 2024 (4), same but Edward S. Brinkley Nature Preserve, 23 October 2024 (5). Northumberland Co., Hughlett Point Natural Area Preserve, 17 October 2013, A.C. Chazal, L.G. Kling (3).

Photo records: Mathews Co. (BG).

Virginia flight dates: 12 October-7 November.

Host plants: *Solidago sempervirens* L. (seaside goldenrod).

Comments: Jones (1928-1939) noted that he reared larvae of *P. duovata* collected in 1928 on Chincoteague Island, apparently the first Virginia record.

2497/9466 *Papaipema cataphracta* (Grote)

Fig. 20

Literature records: Accomack Co., Chincoteague Island (Jones, 1928-1939 [unpublished ms]); Fairfax Co. (Steury et al., 2007); Hanover Co. (Ludwig, 2009).

VDCR-DNH records: 47 specimens collected at more than 30 sites in the following 17 counties and one city – Amherst, Augusta, Bath, Dickenson, Fairfax, Grayson, Hanover, Highland (larva collected in *Arctium minus*, reared), Montgomery, Northampton, Prince William, Scott, Smyth, Stafford, Sussex, Washington (larva collected in *Arctium minus*, reared), and Wise counties and Suffolk City.

Other Virginia records: Greene (ELQ), Loudoun (ELQ), Lunenburg (Franclemont, CUIC), New Kent (CMNH), Rockingham (K. Richers collection), and Washington (J. Hyatt collection) counties
Photo records: Albemarle (iNat), Augusta (BG), Carroll (B. Perkins), Gloucester (T. Kain), Goochland (BM), Powhatan (iNat), Rockingham (iNat, BM), and Tazewell (BM) counties and Radford City (BG).

Virginia flight dates: 26 August-6 November.

Host plants: widely polyphagous; *Verbesina alternifolia* (L.) Britton ex Kearney (wingstem), *Arctium minus* Bernh. (common burdock), aster, etc.

Comments: Jones (1928-1939) reared larvae of this species from Chincoteague Island on *Eupatorium serotinum* Michx. (late thoroughwort), apparently the first Virginia record (YPM specimen eclosed 14 October 1928).

2500/9473 *Papaipema impecuniosa* (Grote)

Fig. 21; **NEW STATE RECORD**

Literature records: none.

VDCR-DNH records: Augusta Co., Cowbane Prairie Natural Area Preserve, 21 October 2020, S.M. Roble (3); George Washington National Forest, Augusta Springs Wetlands, 25 October 2022, E.C. Orcutt (2); George Washington National Forest, Mad Lick area, 19 July 2023, C.S. Hobson (1). Carroll Co., Blue Ridge Parkway, Milepost 209, 8 October 1993, C.S. Hobson (1). Fairfax Co., Wakefield Park, 23 October 2024, A.J. Rapp (1). Grayson Co., Grayson Highlands State Park, 12 October 2010 (1) and 15 October 2020 (1), both S.M. Roble; Jefferson National Forest, Whitetop Mountain, 5 October 2011, S.M. Roble (1); Jefferson National Forest, Elk Garden trailhead, 15 September 2014, S.M. Roble (1). Nelson Co., George Washington National Forest, Crabtree Meadow, 10 August 2023, E.C. Orcutt (1). Scott Co., Jefferson National Forest, Staunton Creek, 4 October 2023, E.C. Orcutt, S.M. Roble (1). Wise Co., Jefferson National Forest, High Knob Recreation Area, 4 October 2023, E.C. Orcutt, S.M. Roble (1).

Other Virginia records: Arlington Co. (Franclemont, CUIC; larvae reared on *Doellingeria umbellata* emerged 21-29 October). Washington Co., Mendota Trail, Wolf Run Gorge, 5 October 2023 (1) and 13 October 2023 (3), both J. Hyatt collection.

Photo records: Madison (iNat), Montgomery (BG), Nelson (iNat), Powhatan (iNat), and Tazewell (BM) counties and Radford City (BG).

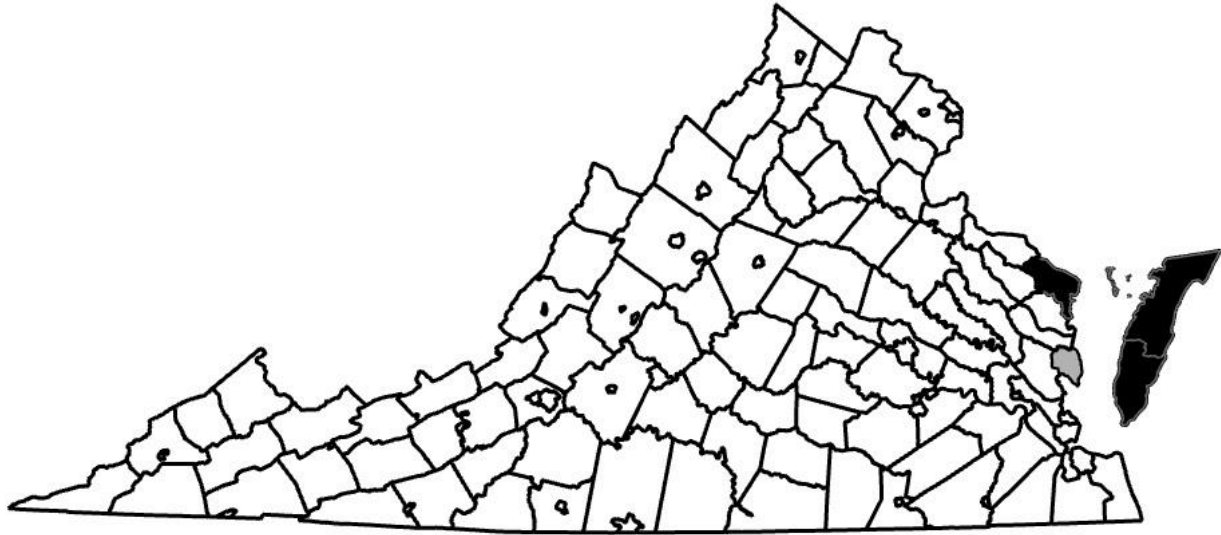


Figure 19. Virginia distribution of *Papaipema duovata* (Bird) based on specimens (dark shading) and photographs (light shading).

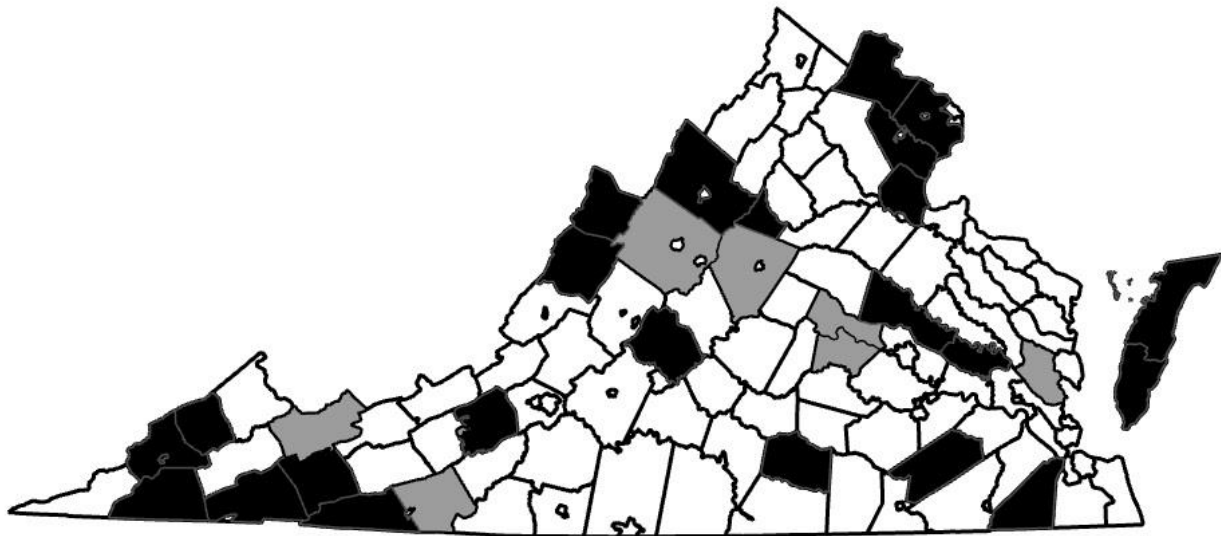


Figure 20. Virginia distribution of *Papaipema cataphracta* (Grote) based on specimens (dark shading) and photographs (light shading).

Virginia flight dates: 9 August-30 October.

Host plants: *Doellingeria umbellata* (P. Mill) Nees (= *Aster umbellatus*) (tall flat-topped white aster); *Aster puniceus* L. (purplestem aster).

2501/9496 *Papaipema nebris* (Guenée)

Fig. 22

Literature records: Virginia (Decker, 1931); Accomack Co., Chincoteague Island (Jones, 1928-1939 [unpublished ms]; YPM specimen); Hanover Co. (Ludwig, 2009); City of Virginia Beach (Bastian, 2011).

VDCR-DNH records: 30 specimens collected at 15 sites in the following eight counties and one city: Grayson, Hanover, Lee, Montgomery, Northampton, Scott, Washington, and Wise counties and Chesapeake City.

Other Virginia records: Albemarle (NMNH), Arlington (NMNH), Essex (NMNH), Fairfax (NMNH), Floyd (YPM), Giles (ELQ), Henry (VT), Montgomery (NMNH, VT), Roanoke (YPM), and Washington (NMNH) counties and the cities of Norfolk (VT) and Suffolk (ELQ).

Photo records: Carroll (B. Perkins) and Nelson (BM) counties and Radford City (BG).

Virginia flight dates: 25 July-20 October.

Host plants: many plants, including corn (*Zea mays* L.), of which it is considered a pest species. (Decker, 1931; Binning & Rice, 2002); the usual host plant is *Ambrosia trifida* L. (giant ragweed).

Comments: This is probably the most widespread member of the genus in Virginia, perhaps first documented in the state in 1899 when Ellison Smyth took a specimen in Montgomery County (NMNH).

2502/9501 *Papaipema eupatorii* (Lyman)

Fig. 23

Literature records: Hanover Co. (Ludwig, 2009).

VDCR-DNH records: Bedford Co., Jefferson National Forest, Thunder Hill, 19 September 1994, S.M. Roble (2), same but 10 October 2001 (2). Hanover Co., 2 km W Vontay, 9 November 1997, 19 and 21 October 1998, 3 October 2001, all J.C. Ludwig (4).

Other Virginia records: Rockingham Co. (ELQ).

Photo records: Albemarle Co. (D. Davis [Facebook post]).

Virginia flight dates: 19 September-9 November.

Host plants: *Eupatorium* (joe-pye-weed).

2503/9499 *Papaipema duplicata* Bird

Fig. 24

Literature records: Virginia (McBride, 2009; Schweitzer et al., 2011).

VDCR-DNH records: More than 200 specimens of this rarely collected species have been taken at five sites in Virginia since 1992: Augusta Co., Jefferson National Forest, off Blue Ridge Parkway near Dripping Rocks, milepost 9, 15 October 1992, S.M. Roble (1). Bath Co., Warm Springs Mountain, 1 September 1999, S.M. Roble (2), same but 9 September 1999 (16) and 20 September 1999 (41); same but 9 September 2023, S.M. Roble, A.E. McBride (VDCR-DNH, 50; AEM, 48).

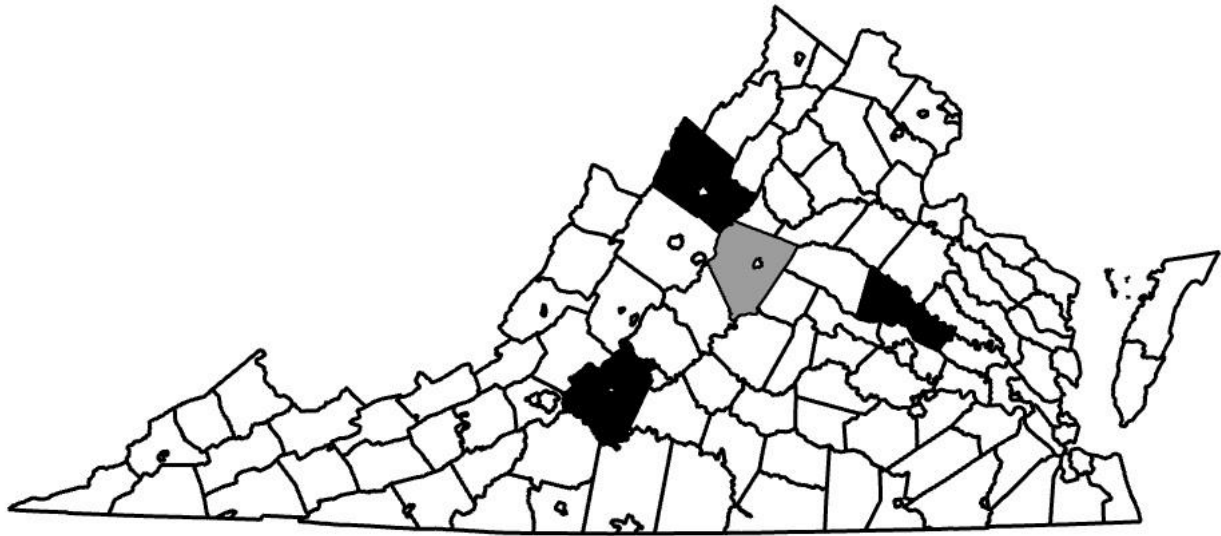


Figure 23. Virginia distribution of *Papaipema eupatorii* (Lyman) based on specimens (dark shading) and photographs (light shading).

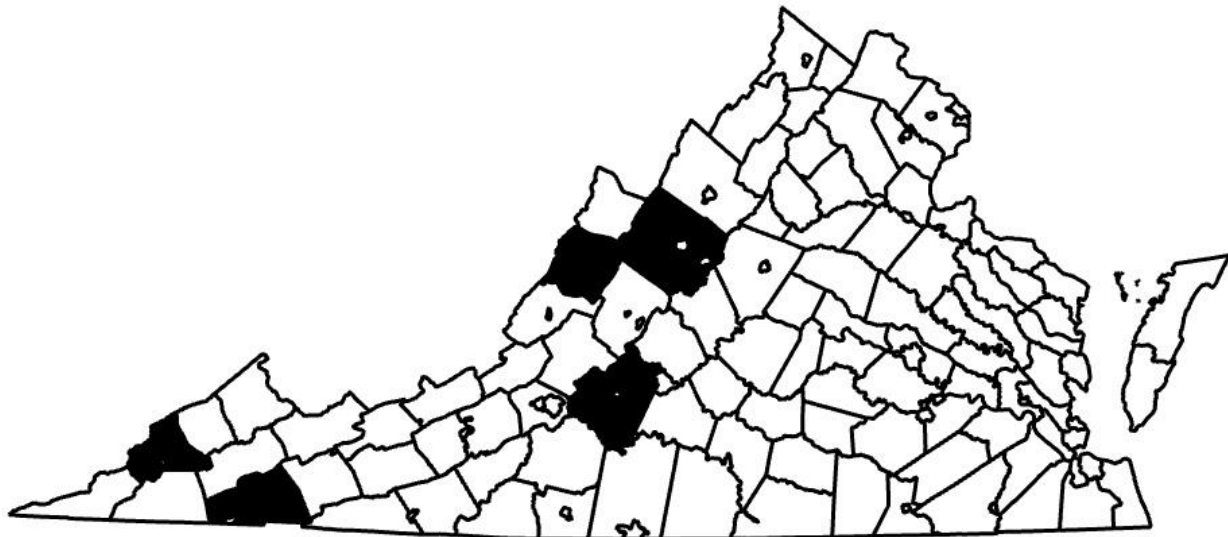


Figure 24. Virginia distribution of *Papaipema duplicata* Bird based on specimen collections.

Bedford Co., Jefferson National Forest, Thunder Hill, 19 September 1994, S.M. Roble (22); same but 25 September 1994, S.M. Roble, E.L. Quinter, P.Z. Goldstein (VDCR-DNH, 16; ELQ); same site but 10 October 2001, S.M. Roble (15). Washington Co., Clinch Mountain Wildlife Management Area, 20 September 2011, S.M. Roble (2). Wise Co., Powell Mountain Karst Preserve, 21 October 2009, S.M. Roble, C.S. Hobson (1); Bull Hill Road, 8 October 2024, D.A. Hennen (1).

Other Virginia records: A.E. McBride reared larvae collected at the Bath County site on 11-12 July 2008 and again on 3-4 July 2015 (CSU, 1; AEM collection).

Virginia flight dates: 1 September-21 October.

Host plant: *Collinsonia canadensis* L. (stoneroot, horse balm).

Comments: The report by Schweitzer et al. (2011) of *P. duplicata* in Virginia is based on some of the VDCR-DNH records listed above. Bird (1908a) originally described this species under the name *P. duplicatus*, but in the subsequent issue of the same journal he corrected the spelling to *P. duplicata* to match the gender of the genus name (Bird, 1908b). Lafontaine & Schmidt (2010) chose to recognize the former name because it was the original one and Pohl & Nanz (2023) followed their lead. However, we agree with Quinter (1983) and Quinter & McBride (*in press*) in recognizing the emended name.

2505/9503 *Papaipema rigida* (Grote)

Fig. 25

Literature records: Virginia (Schweitzer et al., 2011).

VDCR-DNH records: Alleghany Co., George Washington National Forest, Forest Road 350, 2 September 2020, S.M. Roble (1). Bath Co., Warm Springs Mountain, 9 September 1999 (8), 20 September 1999 (11), and 2 September 2008 (3), all S.M. Roble; same but 17 August 2023, E.C. Orcutt (1), same but 9 September 2023, S.M. Roble, A.E. McBride (VDCR-DNH, 4; AEM, 2). Bedford Co., Jefferson National Forest, Thunder Hill, 19 September 1994 (5), 25 September 1994 (1; with E.L. Quinter, P.Z. Goldstein), 31 August 1999 (1), 10 October 2001 (4), 1 September 2010 (30), all S.M. Roble; Blue Ridge Parkway, Peaks of Otter Recreation Area, Sharp Top Mountain, 13 September 2001, J. Basinger (1), same but 10 October 2001, S.M. Roble (1). Floyd Co., Buffalo Mountain Natural Area Preserve, 12 September 2001, S.M. Roble (1); nearby private property, 13 September 2007, A.C. Chazal, A.V. Evans (1), Grayson Co., Jefferson National Forest, Elk Garden trailhead, 15 September 2014, S.M. Roble (1). Highland Co., Mustoe, 31 August 2017, S.M. Roble (1). Madison Co., Shenandoah National Park, Big Meadows Nature Trail, 28 September 1995, S.M. Roble (1). Nelson Co., George Washington National Forest, Crabtree Meadow, 10 August 2023, E.C. Orcutt (66), same but 6 August 2024, S.M. Roble (8). Scott Co., Jefferson National Forest, Devils Hens Nest, 26 August 2021, S.M. Roble (1), same but 13-15 September 2021, S.M. Roble, C.S. Hobson (10), same but 28-29 September 2021, S.M. Roble (2). Wise Co., Powell Mountain Karst Preserve, 22 September 2009, C.S. Hobson, S.M. Roble, W. Orndorff (2); Jefferson National Forest, Stone Mountain, High Knob Recreation Area, 4 October 2023, E.C. Orcutt, S.M. Roble (4).

Other Virginia records: None.

Virginia flight dates: 9 August-10 October.

Host plants: *Heliopsis helianthoides* (L.) Sweet (oxeye sunflower), *Helianthus decapetalus* L. (ten-petaled sunflower), *Zizia aurea* (L.) W.D.J. Koch (golden alexander).

Comments: The report by Schweitzer et al. (2011) of *P. rigida* in Virginia is based on some of the VDCR-DNH records listed above. This is a northern species near its southern range limit in Virginia (ranges south to Georgia in the Appalachians).

2506/9502 *Papaipema nelita* (Strecker)

Fig. 26; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Floyd Co., Blue Ridge Parkway, Rakes Millpond, 5 August 1993, S.M. Roble (1). Nelson Co., George Washington National Forest, Crabtree Meadow, 10 August 2023, E.C. Orcutt (3), same but 6 August 2024, S.M. Roble (6); same but Crabtree Creek seepage swamp, 10 August 2023, E.C. Orcutt (3), same but 6 August 2024, S.M. Roble (1). Rockingham Co., George Washington National Forest, Briery Branch Gap, 18 June 2024 (2 larvae collected in *Arctium minus*, reared), S.M. Roble. Scott Co., Jefferson National Forest, Devils Hens Nest, 24–26 August 2021, S.M. Roble (3). Washington Co., Jefferson National Forest, Whitetop Mountain, 16 July 2020 (larva collected in *Arctium minus*, reared), S.M. Roble.

Other Virginia records: Alleghany (ELQ), Floyd (S. Felker collection), and Roanoke (YPM) counties.

Virginia flight dates: 5 August–1 October.

Host plants: *Rudbeckia laciniata* L. (cutleaf coneflower) and *Arctium minus* Bernh. (common burdock).

Comments: This is another northern species near its southern range limit in Virginia (ranges south to Georgia in the Appalachians).

2510/9497 *Papaipema necopina* (Grote)

Fig. 27; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Lee Co., Fletcher Cliff Preserve, 12 September 2001, J. C. Ludwig (1). Scott Co., Jefferson National Forest, Devils Hens Nest, 29 September 2021, S.M. Roble (1).

Photo records: Wildwood Park, Radford City, 18 September 2012 and 26 September 2014, both N. Kent (BG).

Virginia flight dates: 12–29 September.

Host plants: *Helianthus giganteus* L., *H. tuberosus* L., *H. strumosus* L., and *H. divaricatus* L. (sunflowers).

[No numbers] *Papaipema* sp. nov. (cane)

Fig. 28; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Isle of Wight Co., Blackwater Ecological Preserve, 3 October 2002, S.M. Roble (ELQ, 1). Sussex Co., Cherry Orchard Bog Natural Area Preserve, 23 October 2024, S.M. Roble, S.O. Lockett (1). City of Suffolk, South Quay Sandhills Natural Area Preserve, 23 October 2002, S.M. Roble (ELQ, 1); same but 4 November 2003, S.M. Roble (1). City of Virginia Beach, North Landing River Natural Area Preserve, 12 October 2001, C.S. Hobson (7); same but 28 September 2022, E.C. Orcutt, S.M. Roble, (2); Oceana Naval Air Station, 19 October 2001, K.L.

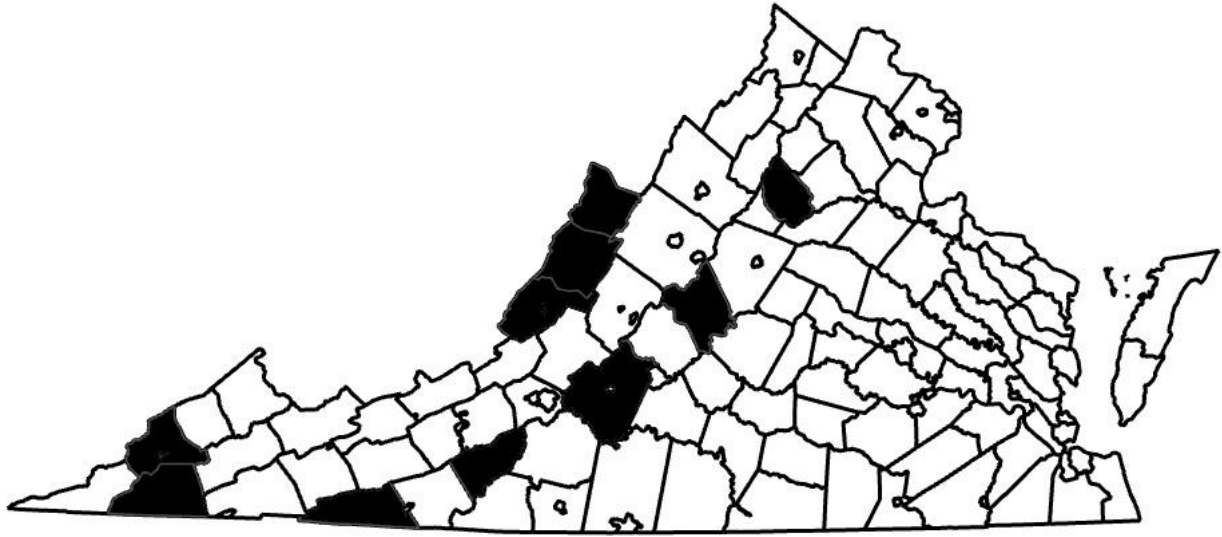


Figure 25. Virginia distribution of *Papaipema rigida* (Grote) based on specimen collections.

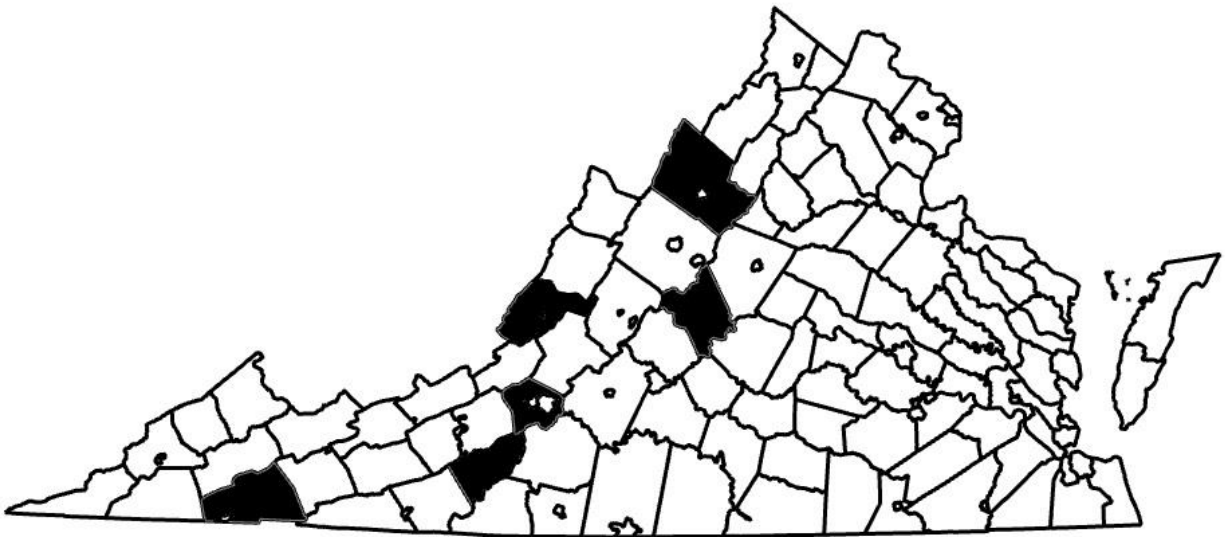


Figure 26. Virginia distribution of *Papaipema nelita* (Strecker) based on specimen collections.

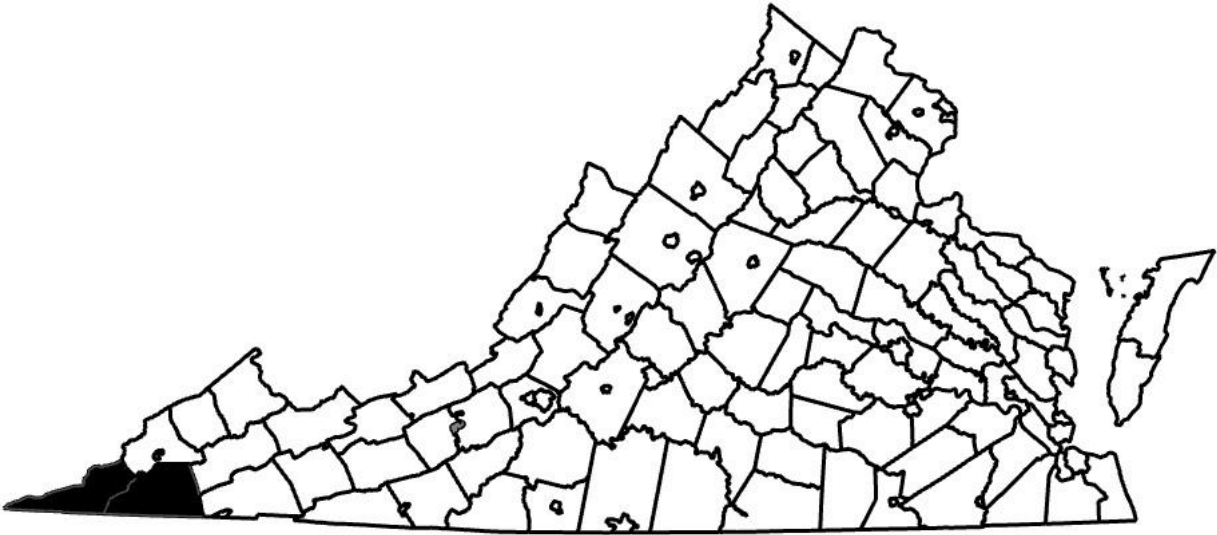


Figure 27. Virginia distribution of *Papaipema necopina* (Grote) based on specimens (dark shading) and photographs (light shading).

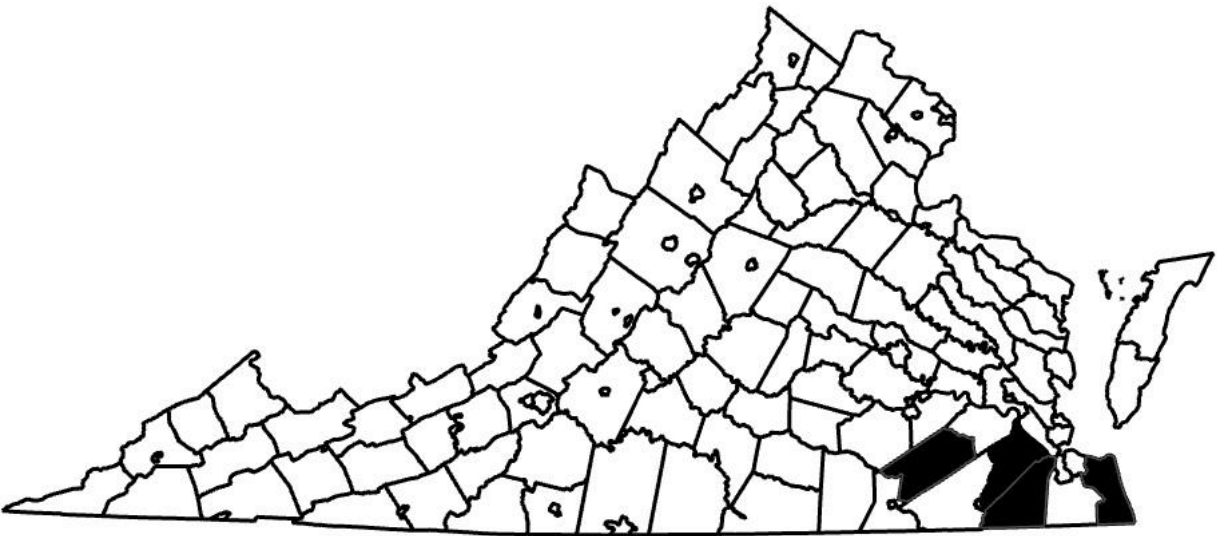


Figure 28. Virginia distribution of *Papaipema* sp. nov. (cane) based on specimen collections.

Derge, A.C. Chazal (10); Landstowne powerline, 6 October 2010, A.C. Chazal, S. Kupiec (2), same but 7 October 2010, A.C. Chazal, M. Pennington (1), same but 13-14 October 2010, A.C. Chazal (2).

Other Virginia records: City of Suffolk, Great Dismal Swamp National Wildlife Refuge (Quinter; many larvae and reared adults, ELQ).

Virginia flight dates: 3 October-4 November.

Host plants: *Arundinaria tecta* (Walter) Muhl. (switch cane).

Comments: The formal description of this and the following species will appear in a forthcoming fascicle in the *Moths of North America* (MONA) series (Quinter & McBride, *in press*).

[No numbers] *Papaipema* sp. nov. (fly-poison)

Fig. 29; **NEW STATE RECORD**

Literature records: None.

VDCR-DNH records: Montgomery Co., Slaughterpen Hollow near Den Creek, 31 August 2000, J.C. Ludwig (1).

Other Virginia records: Bath Co., Warm Springs Mountain, A.E. McBride, S.M. Roble, 9 September 2023 (5 adults [VDCR-DNH, 2; AEM, 3]; also 2 pupal shells found in host plant burrows; AEM).

Virginia flight dates: 31 August-9 September.

Host plants: *Amianthium muscitoxicum* (Walt.) Gray (fly-poison).

Comments: This undescribed species, first discovered in 1971, was long thought to be endemic to Pennsylvania, particularly the Pocono Mountains region in the east-central part of that state (Schweitzer et al., 2011; Quinter & McBride, *in press*), but there is one recent record from North Carolina (NC Biodiversity Project website) in addition to the Virginia records reported here. The host plant is a forb that is not consumed by White-tailed Deer (*Odocoileus virginianus*). Fly-poison is common in mountainous areas of western Virginia, but our past surveys in Shenandoah National Park (several sites), George Washington National Forest (Bother Knob, Rockingham Co.) and near Mountain Lake (Giles Co.), all areas with abundant populations of this plant, were negative.

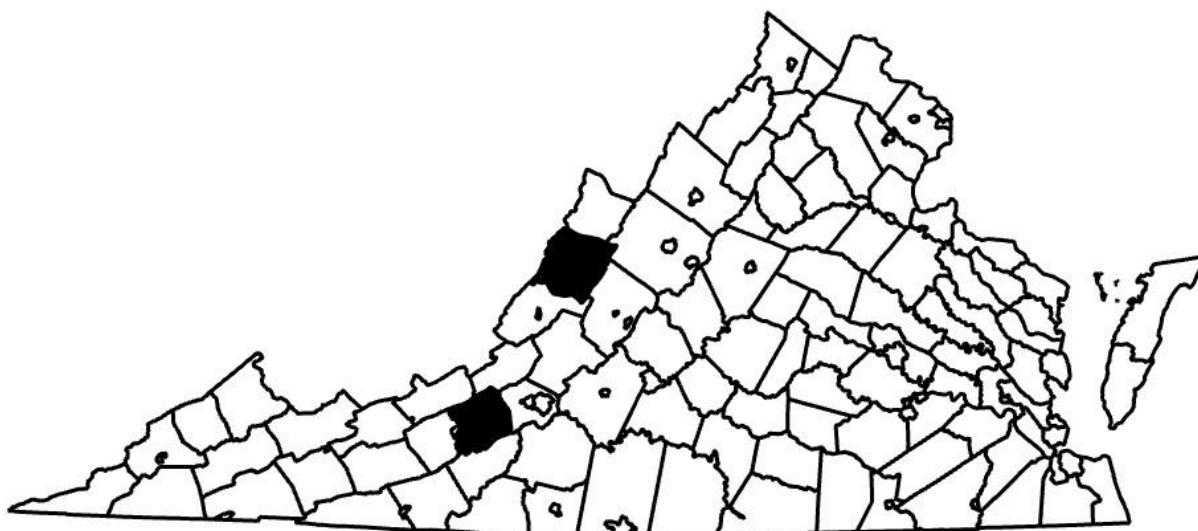


Figure 29. Virginia distribution of *Papaipema* sp. nov. (fly-poison) based on specimen collections.

Six additional species of *Papaipema* potentially occur in Virginia as discussed below.

2466/9464 *Papaipema cerina* (Grote)

Long known only from the Great Lakes region and the Northeast, there are recent records from western North Carolina (three counties; NC Biodiversity Project website) and eastern Tennessee (two counties, L. Durden and J. Hyatt, unpub. data; BG). These new records suggest the possibility that *P. cerina* occurs in the higher mountains of southwestern Virginia. Young larvae feed on bottlebrush grass (*Elymus hystrix* L.) and other stout forest grasses before switching in later instars to lilies, mayapple, or starry campion (Schweitzer et al., 2011).

2467/9493 *Papaipema appassionata* (Harvey)

This species ranges from eastern Canada to Florida and is known from both Maryland and North Carolina, but it has not been documented in Virginia. Larval host plants are pitcher plants (*Sarracenia* spp.) that grow in bogs. Two species of *Sarracenia* (*S. flava* L. and *S. purpurea* L.) occur in Virginia, but both are very rare and restricted to the Coastal Plain (Porter, 1991; Digital Atlas of the Virginia Flora) where they are now typically confined to boggy utility rights of way. The Peabody Museum of Natural History at Yale University contains two specimens of *P. appassionata* with labels stating “Virginia: Bedford County, Route 460, 8 km E of Bedford, 29 September 1981, W.J. Garnett.” However, we conclude the label data are erroneous because there are no native populations of *Sarracenia* in the Virginia mountains nor anywhere else near Bedford County (Digital Atlas of the Virginia Flora).

2469/9494 *Papaipema eryngii* Bird

This rare, primarily Midwestern species, is known from North Carolina and Kentucky. Its primary host plant is *Eryngium yuccifolium* Michx. (rattlesnake master), which is a very rare plant in Virginia (Digital Atlas of the Virginia Flora). Our surveys of several of the few known populations of this plant in the state have been negative to date. It seems unlikely that the moth occurs in Virginia.

2488/9478 *Papaipema leucostigma* (Harris)

This species is known from three counties in Kentucky (Jefferson, Meade, and Menifee; Covell, 1999) and also at least one site in West Virginia (MPG). The larval host plant, *Aquilegia canadensis* L. (wild columbine), is rather common and widespread in Virginia (Digital Atlas of the Virginia Flora), so surveys in areas where it occurs may eventually document the moth.

2509/9500 *Papaipema maritima* Bird

This species has both inland (primarily Great Lakes region) and Atlantic coastal populations. It is known from one county each in Kentucky (McCracken) and far western North Carolina (Macon) and has also been reported from New York City (Bird, 1909) and New Jersey (McBride, 2009). Its southern range limit along the Atlantic Coast is Bombay Hook, Delaware (Quinter, unpub. data). Host plants include several species of *Helianthus*, especially *H. giganteus*

L. (tall or giant sunflower). This moth should be sought near the edges of coastal salt marshes as well as in the mountains of western Virginia in areas where *Helianthus* is common.

2504/9507 *Papaipema limpida* (Guenée)

The larval host plant is *Vernonia gigantea* (Walt.) Trel. Ex Brann. & Cov. (giant ironweed), which is most common in the mountains of far southwestern Virginia (Digital Atlas of the Virginia Flora). The moth has been documented from several counties each in Kentucky (Gallatin, Jefferson, and Oldham; Covell, 1999) and West Virginia (Marshall, Monongalia, Ohio, and Wetzel; Butler & Strazanac, 2014), but none of these areas is near the Virginia border.

DISCUSSION

Twenty-nine species of *Papaipema* have been documented for Virginia, 14 of which are newly recorded from the state in this paper. This total compares favorably to other eastern states (Table 1). Four of the 29 species are limited to the Coastal Plain (*P. araliae*, *P. duovata*, *P. stenocelis*, and *P. sp. nov.* [cane]), whereas eight species occur only in the mountains (*P. astuta*, *P. beeriana*, *P. duplicata*, *P. necopina*, *P. nelita*, *P. pterisii*, *P. rigida*, and *P. sp. nov.* [fly-poison]). Two other species (*P. polymniae* and *P. unimoda*) are primarily known from mountainous counties, but both were collected historically in Arlington County (across the Potomac River from the District of Columbia).

Table 1. Known diversity of *Papaipema* species in various U.S. states as compared to the Virginia fauna. The number of species shared with Virginia is provided parenthetically.

State	Number of <i>Papaipema</i> species	Source
Florida	7 (5)	Heppner (2003)
Iowa	28 (20)	Peterson et al. (1990); Schmitt & Larsen (2021); Insects of Iowa website
Kentucky	31 (24)	Covell (1999); Gibson & Covell (2006); Covell & Gibson (2008); Covell et al. (2009); Gibson et al. (2021)
Maryland	26 (24)	Glaser et al. (unpublished ms); MD Biodiversity Project website
Massachusetts	27 (20)	MassMoths website
Michigan	34 (23)	Moore (1955); Nielsen (1995); MPG website
New Jersey	32 (24)	McBride (2009); Schweitzer et al. (2014)
North Carolina	32 (27)	NC Biodiversity Project website
Ohio	28 (22)	Rings et al. (1992)
Pennsylvania	29 (23)	Tietz (1936); PNHP website
Vermont	18 (15)	Grehan et al. (1995)
Virginia	29	This paper
West Virginia	24 (21)	Albu & Metzler (2004); Butler & Strazanac (2014)
Wisconsin	29 (20)	Ferge & Balogh (2000); Ferge et al. (2018)

Nearly a century ago, Bird (1934) initiated discussion concerning the conservation of *Papaipema* populations, focusing on habitat destruction and the adverse effects of fires on the overwintering egg stage. Schweitzer et al. (2011, 2014) elaborated more on the conservation status and threats to various species, emphasizing the negative impacts of excessive browsing by abundant populations of White-tailed Deer on forest forbs that serve as larval host plants for various *Papaipema* species.

VDCR-DNH staff (Roble, 2024) have identified nine species of *Papaipema* in the state that are believed to warrant conservation concern and have assigned NatureServe conservation ranks to each (Table 2). Currently, the long-term viability of the highly disjunct population of *P. beeriana* in Bath County is of the greatest concern. The remnant wet prairie that it inhabits is privately owned and unprotected. Future sampling for the undescribed fly-poison borer may reveal that it is more widespread in the Virginia mountains and of less urgent conservation concern than its current state rank (S1) suggests. To date, VDCR-DNH staff have documented six sites in Virginia for *P. duplicata*, the species with the highest global conservation rank (G1G2). Two of these sites are known to support large populations of the moth, but the others have not been thoroughly evaluated. The two exemplary sites contain abundant populations of the host plant *Collinsonia canadensis* and no evidence of significant browsing by deer. Virginia appears to be a stronghold for *P. duplicata*, a species that has declined severely or been extirpated in several Northeastern states due to habitat loss and fragmentation, invasive species, and overbrowsing of its host plant by White-tailed Deer (McBride, 2009; Schweitzer et al., 2011). Seven additional species are currently on the VDCR-DNH Watchlist (Roble, 2024), which includes species believed to be of less critical conservation concern (Table 3). The ash-feeding *P. furcata* seems most likely to experience population declines, in its case due to widespread mortality of ash trees caused by the exotic emerald ash borer (Wagner, 2007).

Table 2. Species of *Papaipema* currently regarded as state rare by the Virginia Department of Conservation and Recreation, Division of Natural Heritage (Roble, 2024). Conservation ranks are assigned on a 1 to 5 scale, with 1 and 2 being the rarest/most imperiled (typically 1–5 and 6–20 populations, respectively) and 5 is the most common/least concern. Global ranks were assigned by NatureServe and state ranks by VDCR-DNH.

Species	Global conservation rank	State conservation rank
<i>Papaipema araliae</i>	G3G4	S2S3
<i>Papaipema astuta</i>	G3?	S1S3
<i>Papaipema beeriana</i>	G3?	S1
<i>Papaipema duovata</i>	G2G3	S2S3
<i>Papaipema duplicata</i>	G1G2	S2
<i>Papaipema necopina</i>	G4	S1S3
<i>Papaipema stenocelis</i>	G3G4	S1S3
<i>Papaipema</i> sp. (fly-poison)	G2G3	S1
<i>Papaipema</i> sp. (cane)	G4	S2S3

Table 3. Species of *Papaipema* currently regarded as uncommon or potentially rare by the Virginia Department of Conservation and Recreation, Division of Natural Heritage and thus included on the agency’s Animal Watchlist (Roble, 2024).

Species	Global conservation rank	State conservation rank
<i>Papaipema furcata</i>	G4	S3S4
<i>Papaipema impecuniosa</i>	G5	S2S4
<i>Papaipema nepheleptena</i>	G4G5	S2S4
<i>Papaipema polymniae</i>	G4?	S2S4
<i>Papaipema pterisii</i>	G5	S3
<i>Papaipema speciosissima</i>	G3G4	S3
<i>Papaipema unimoda</i>	G5	S2S4

Further sampling of the Virginia *Papaipema* fauna will help to provide a better understanding of the conservation status of the various species, with the status of some downgraded as more populations are discovered and the status of other species potentially upgraded to a more threatened status due to continuing or new threats, such as habitat destruction, fragmentation, and degradation, invasive species impacts, pesticides, parasites, and climate change.

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