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Revision of the *Natada fusca* complex and description of six new Neotropical species (Lepidoptera: Limacodidae)

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Abstract: Six new species in the genus *Natada*, which have been hidden under *Natada fusca* Druce, are described and defined primarily by genitalia. New species include *N. burnsi*, *N. truncata*, *N. singulara*, *N. chaconi*, *N. covelli*, and *N. confusa*. Five of eight species in the *Natada fusca* complex, which also includes *N. fuscodivisa* Dognin, occur in Costa Rica. Distribution of the complex ranges from Mexico to the upper Amazon Basin and Guianas. Detailed geographic information and multiple genitalic drawings of males of one species, *N. confusa*, are provided to help define and separate species. The lectotype and paralectotype of *N. fusca* are designated.

Key Words: Limacodidae, *Natada fusca* complex, *Natada*, Costa Rica, larval host plants, defoliation.

Natada fusca, a medium sized neotropical limacodid moth, was described by Druce (1887), from a group of specimens from Panamá, including Chiriquí. Other than the original description, the only treatments of *fusca* were brief redescriptions by Dyar (1935) and Forbes (1942). The genitalia have been neither described nor figured in the literature.

When approximately 400 specimens of what were initially thought to be *N. fusca* were sorted in the Instituto Nacional de Biodiversidad (INBio) collection, it was noted that there was variation in wing color. Although the variation was later found to be of no taxonomic use, dissections of Costa Rican and other Latin American specimens revealed that under the name *fusca* was a complex of at least seven species. The *fusca* species complex is distributed from Tamaulipas and San Luis Potosí, Mexico in the north, to the state of Pichincha, Ecuador, on the Pacific slope to the south, through the upper Amazon Basin in Brazil, Perú, and Venezuela, and to French Guiana on the east, primarily in localities below 1200 m. The lectotype of *fusca*, designated here, corresponds to the species with the most specimens in museum collections that we have studied. In Costa Rica the species has a broad distribution and is sympatric with four other species in the complex.

Even though the *fusca* complex is relatively common in collections, its natural history is not well known. However, it is presumed that the larvae are generalists, as are other New World species in the genus that have been reared (Janzen and Hallwachs 2003 and J. F. Corrales, pers. observ.). In Costa Rica, several pest attacks by *Natada fusca* or related species have been brought to our attention in recent years (Table 1).

Every species in Costa Rica can be associated with disturbed or semi-open sites. The border of a primary forest, such as the site where *N. chaconi* was collected in the Braulio Carrillo National Park, may also be considered a disturbed site.

TABLE 1
Reports of attacks on crops in Costa Rica by the larvae of the Natada fusca *complex*

Crop	Plant family	Year	Location	Notes	Source
Hieronyma alchornoides	Euphorbiaceae	1994	Puntarenas: Palmar Norte		L. Quiros
H. alchornoides	Euphorbiaceae	Sept. 1995	Limon: Pococi, Cariari	Defoliation of young leaves in 2 year old plantation	M. Arguedas
Terminalia amazonia	Combretaceae	May 1994	Limon: Pococi, Cariari	Defoliation of young leaves	M. Arguedas
Cedrela tonduzii	Meliaceae	1998	Cartago: Cartago	3 trees during 1 isolated year	M. Arguedas

Males of the six new species described herein can be separated reliably from *N. fusca* only by examination of the genitalia. *N. fuscodivisa* Dognin, the only other species in the group, can be easily separated by wing pattern. Females are known for *fusca*, *fuscodivisa* and three of the new species. To avoid redundancy, the redescription of *N. fusca* below will suffice for the description of the wings and body of adults (except forewing lengths) for all the species except *fuscodivisa* and *chaconi*. Likewise, the description of the larva for *fusca* will serve for the rest of the complex.

In our work on the Costa Rican fauna we have found the largest number and highest proportion of new species in the New World *Natada* complex compared to any other complex. In addition to four new species in the *fusca* complex from Costa Rica presented here, we found an additional five new *Natada* species and two from related genera (Corrales and Epstein 2000).

SPECIMENS STUDIED

Specimens examined in this study are from the following collections: Instituto Nacional de Biodiversidad (INBio); National Museum of Natural History, Smithsonian Institution (USNM); Natural History Museum of Los Angeles County (LACM); The Natural History Museum, London (BMNH); Vitor O. Becker private collection, Brasilia, Brazil (VOB); American Museum of Natural History, New York (AMNH); Zoologische Staatssammlung des Bayerischen Staates, München (ZSBS); Zoologisches Museum der Humboldt Universitaet, Berlin (ZMHB); Florida State Collection of Arthropods, Gainesville, Florida (FSCA). Paratypes or additional voucher material not found in the USNM and INBio collections will be deposited at each institution following the completion of the limacodid guide book. INBio bar codes indicated under "Material Examined" are for data base purposes only and do not indicate the collection of deposition. The bar codes on actual specimens have the prefix INBIOCRI. For brevity, we report the bar codes on specimens herein as CB: ####, eliminating zeros that preceed the other numbers in the ten digit code (e.g., INBIOCRI0078654321 = CB: 78654321). Voucher specimens reared by Janzen, Hallwachs and others for the Área de Conservación Guanacaste (ACG) Caterpillars of Santa Rosa National Park project are indicated by ##-SRNP-#### (Janzen and Hallwachs 2003). More detailed specimen data, including capture dates and collectors, were not included for *N. fusca* because of space constraints. This information can be obtained from the inventory data base maintained by INBio and the authors. Geographic

coordinates (Lambert system) are indicated by LN or LS numbers with the specimen label data.

Natada fusca complex

Diagnosis: Adults separated from similar Central American species of *Natada* with two forewing bands that reach subapex of the costa (e.g., *N. daona*, *N. subpectinata*) by the absence of white scale patches on front coxae and scapes of antennae. Presence of bipectinate antennae to apex on male separates it from *subpectinata*. Larvae broad dorsoventrally; cannot be distinguished from a number of other New World species.

Adult: Ground color of body and wings yellowish brown to dark gray. Forewing pattern typical of genus *Natada* with two cream colored lines; line from tornus to apex is straight or slightly curved; second line from median of anal margin to costal margin near apex forms a triangle between the first line and anal margin at base. Forewing R_3 and R_4 stalked near connection of R_2 and R_5. No dark spots are present in discal cell. Antennae bipectinate to apex in males and filiform in females. Proboscis absent in both sexes.

Male genitalia: Uncus simple, without a spine or downcurved apex. Gnathos not extending as far to posterior as apex of uncus; distal arms fused and angled obliquely downward with apical region at least lightly upcurved below. Aedeagus with "hammerhead" base, with dorsal and ventral arms roughly equal in length, followed by distal arm obliquely angled or curved somewhat dorsad. Form of apex of aedeagus is species specific, with spines or processes in most specimens observable by brushing off scales. Transtilla without lobes or processes. Juxta with two membranous lobes. Valva simple, broad, and bluntly pointed or truncate at apex; usually without processes, except for a setose lobe at base of dorsum or near apex above.

Female genitalia: Antrum ranges from narrow to broad with different degrees of sclerotization. Area between ostium bursae and papillae anales (= posterior lobe) varies in complexity from flat and sclerotized to deeply sculpted with different shaped ridges. All known females have a narrow horizontal signum across the width of corpus bursae (= crescent type signum of Holloway, 1986), and common in New World species of *Natada* (Corrales and Epstein 2000). Weakly developed lateral lobes present on outer surface of 8th segment, near anterior apophyses.

Larva: Late instars broad dorsoventrally (round in cross section), with small, equal sized dorsal and subdorsal scoli. Green, with spines sunken and directed towards ventrum at rest.

Natada fusca (Druce, 1887)
(Figs. 1, 2, 3, 23, 28, 29)

Trabala fusca Druce, 1887:207. Lectotype ♂, Panama: Bugaba 800-1500? ft (Champion) (BMNH), designated here. Specimen examined.

Paralectotype ♂, Panamá: Chiriquí, 742, *Trabala fusca* Druce (Original stüche), Coll. Staundinger, det. Martin Hering (ZMNU), designated here. Specimen examined.

Diagnosis: Only species in the complex with a keel shaped gnathos. Aedeagus with toothed apical plate most similar to *burnsi*, although plate not as elongate relative to medial portion of aedeagus to anterior. Shape of valva most rectangular of species in complex.

Adult male: (Fig. 28). Forewing length: 12.6-17.0 mm (lectotype 15.7 mm). Typical of *fusca* complex (see description above). Ground color of wings and body dark yellowish brown. Forewings with two cream lines; one that extends from tornus to apex, other from anal margin of median area to apex forming a triangle or trapezoid, typical of *Natada*. Region inside of trapezoid often grades from dark gray to dark brown medially.

Adult female: (Fig. 29). Forewing length: 17.0-20.0 mm. Similar to male in pattern and coloration, except medial vein of posterior discal cell often highlighted with light scales.

Male genitalia: (Figs. 1, 2, 3). Uncus simple, somewhat flattened. Gnathos shorter than

uncus, sinuate below, keel shaped and laterally compressed. Valva rectangular with truncate apex, sacculus and costal margins more sclerotized than in middle; round setose lobe at dorsal base. Juxta with two spinulate lobes weakly formed. Aedeagus with base projecting above and below, medial arm curved upwards and longer than apical plate; pedunculate apical plate convex above, with 15-40 teeth on right border.

Female genitalia: (Fig. 23). Antrum broad and deep, equal in width to 8th segment. Inner, dorsal surface of antrum covered with sensory hairs in two vertical patches joined in middle, ventral side much smoother and translucent. Posterior lobe with two horizontal ridges, one near antrum and other to posterior slightly produced on each side below lateroventral margins of papillae anales; each ridge is covered with sensory hairs.

Hostplants: *Guarea excelsa* (Meliaceae), *Hymenaea courbaril* (Fabaceae)(89-SRNP-794), *Inga vera* (Fabaceae)(96-SRNP-8427), *Andira inermis* (Fabaceae)(96-SRNP-9477), *Spondias mombin* (Anacardiaceae), *Hieronyma alchornoides* (Euphorbiaceae), *Manilkara chicle* (Sapotaceae)(96-SRNP-7703).

Remarks: The altitudinal range of *fusca* is from sea level to 1300 m, with collections in all the months of the year. *N. fusca* is the most abundant species in collections. In Costa Rica it is found throughout the Atlantic and Pacific slopes, in both the dry and rain forests. The geographic distribution is sympatric with all other species in the *fusca* complex found in Costa Rica.

From the original description there are three syntypes. The male lectotype, here designated, and one male paralectotype are deposited in the BMNH. The other male paralectotype is in ZMNU. The specimen illustrated in Druce (1887) is possibly the lectotype because it looks like a male in good condition; other specimens that he mentions are a female, also collected by Champion, and one specimen in the Staudinger collection that was ruined.

N. fusca was placed in Lasiocampidae by Druce (1887), who was doubtful of its assignment to *Trabala* Walker. *Perola salta* Druce was synonymized with *fusca* by Dyar (1935). Although we have not examined the type of *salta*, it is likely to match *fusca* rather than other members of the *fusca* group. This is because the type locality of *salta* is Bonda, in northeastern Colombia, which most closely matches the distribution of *fusca*.

Distribution: *N. fusca* is known from throughout Costa Rica, western and northern Colombia, the state of Guarico in Venezuela, and in northern Ecuador. It is probable that this species occurs in southern Nicaragua because it occurs in similar habitats in Northern Costa Rica.

Material Examined: (548 specimens, 527♂, 21 ♀)

Costa Rica: Área de Conservación Guanacaste (reared vouchers, see Janzen and Hallwachs, 2001): 1♀, Alacrán (96-SRNP-7703); 2♀, Bosque San Emilio (89-SRNP-728b, 89-SRNP-816); 1♂, 1♀ Cafetal (89-SRNP-794, 89-SRNP-795); 1♀, Quebrada Puercos (99-SRNP-10551); 2♂, 1♀, Río Cuajiniquil (94-SRNP-5813, 94-SRNP-5888, 96-SRNP-8427); 1♀, Vado Quebrada Aserradero (99-SRNP-10797), 1♀, Vado Río Esteron (96-SRNP-9477); 1♂, 1♀, Turrialba; 5♂, 1♀, Est. Maritza, 13 km SO Volcán Orosí (LN 316900-373000); 5♂, Cerro de Oro; 2♂, Est. Bijagual; 2♂, Bribrí; 4♂, Barra Honda; 2♂, Est. Agujas; 2♂, Fila Esquinas; 2♂, Fca. Cafrosa; 1♂, Los Almendros; 1♂, Barra Honda; 1♂, Tierras Morenas; 1♂, El Amo; 1♂, Hitoy Cerere; 1♂ Punta Camíbar; 1♂, Cuatro Esquinas; 1♂, La Estrella (CB: 1924871); 1♂, Río Bonito (CB: 1938750); 1, Carmona (CB: 1119123); 1♂, Dos de Tilarán; 1♂, Cabo Blanco (CB: 1652218); 9♂, Río Sardinas; 5♂, Río Esquinas; 5♂, Cedrales de La Rita; 124♂, Parque Nacional Corcovado, Est. Sirena; 12♂, 2♀, P. N. Santa Rosa, A. C. Guanacaste, 300 m (LN 313000 - 359800); 17♂, 1♀, P. N. Manuel Antonio, Quepos; 74♂, 1♀, Queb. Bonita; 12♂, 1♀, Cerro Tortuguero; 8♂, 1♀, Casa Oeste, Cerro el Hacha, 12 km SE La Cruz, 300 m; 5♂, Cerro Cocorí; 10♂, 1♀, Amubri (CB: 1845270);

17♂, 1♀, Las Pailas; 32♂, Rancho Quemado; 68♂, Bosque Esquinas; Panamá: 25♂, 2♀, Isla Barro Colorado (USNM), (AMNH); 2♂, Río Trinidad (USNM); 1♂, Bejuco (CB: 2607496) (USNM); 1♂, Cabina (CB: 2607499) (USNM); 1♂, Cerro Campana (CB: 2607498) (FSCA); 8♂, La Chorrera (USNM); 2♂, Chiriqui (USNM); 2♂, Pipeline Rd, Río Frijoles (USNM); Colombia: 3♂, Colombia [only data on specimens](USNM); 1♂, Río Magdalena (ZSBS); 1♂, Medellin, La Estrella (ZSBS); 6♂, 1♀, Bajo Calima (USNM); 2♂, Iscuande, Nariño (USNM); 1♂, Guapi, Cauca (USNM); 3♂, Pance, Valle Colombia (USNM); Venezuela: 2♂, El Pao; 1♂, Venezuela (USNM); 11♂, Merida, 600 m (USNM); 1♂, Sierra Perija, Guasare (USNM); 2♂, Maracay (USMN); 7♂, Guárico, Calabozo (USNM); 1♂, 1♀, Zulia, 35 km W Carrascuero (FSCA); Ecuador: 5♂, Esmeraldas, San Mateo (ZSBS).

Natada fuscodivisa Dognin, 1910
(Figs. 4, 5, 6, 24, 30, 31)

Natada fuscodivisa Dognin, 1910:41. Holotype ♂: Saint-Laurent du Maroni, Guyane Français. Collection Le Moult (Collection Dognin). USNM type no 29787. Specimen examined.

Diagnosis: Smallest species in *fusca* complex and only species with FW veins highlighted by cream scales on R and M veins of discal cell and branches beyond until reaching medial line or beyond, and on $A_1 + A_2$. Spiny apical plate distinguished from *burnsi* and *fusca* in being u-shaped. Valvae of male distinguished by dorsal lobe near apex and setal tuft on ventrum. Corpus bursae of female relatively elongate with signum located much closer to proximal end than in other species. Antrum and anterior apophyses weakly developed compared to *fusca*.

Adult male: (Fig. 30). Forewing length: 12.0-13.2 mm (holotype 12.0 mm). Triangulate FW band divided into two longitudinal areas by faint light band, with strip along basal inner margin of triangle gray and strip along inside of postmedial margin dark brown. FW discal cell and anal veins highlighted by cream scales, dividing the wing base into three regions.

Adult female: (Fig. 31). Forewing length: 17.0 mm. Similar to males, except no faint light band dividing FW triangle longitudinally.

Male genitalia: (Figs. 4, 5, 6). Aedeagus with elongate dorsal hump at base, longer than ventral arm; distal arm short; apical plate forms oval ring perpendicular to distal arm with spines on right side continuing along the u-shaped apex. Gnathos with distal portion cylindrical and apex rounded. Valva with flap on dorsum near apex, equally sclerotized as margin, and with pointed apex; tuft of setae on ventral margin midway between base and apex.

Female genitalia: (Fig. 24). Antrum narrow and membranous. Lobe ventral and medial to antrum, and surrounding ostium bursae, covered with sensory hairs. Corpus bursae large, roughly equal in length to ductus bursae; transverse signum on anterior end of corpus bursae, near ductus bursae. Anterior apophyses weakly developed.

Remarks: This is the first report of females of this species in the literature and the first report of the species beyond the Guianas. The contrasting FW veins sometimes occur on the M vein of the discal cell and $A_1 + A_2$ in other species in the complex, especially on the females.

The ventral lobe in the female genitalia may be homologous to the posterior lobe, which forms the dorsal wall of the antrum in *fusca*.

Distribution: *N. fuscodivisa* is known from Ecuador, Peru, the upper Amazon of Brazil, southern Venezuela and the Guianas.

Material examined: (17 specimens, 15♂, 2♀).

Ecuador: Napo Province: 1♂, Misahualli Jungle Hotel on Napo River, 1200 ft, 7-19 Sep 1997, Ron Leuschner (USNM); 2♂, Junction

Río Napo and Misahualli, 366m, 6-18 Sep 1998, 1.034 S, 77.664 W, Ron Leuschner (USNM); Peru: Loreta Province: 1♂, Río Amazonas, 200 m, Explorer's Inn, 26 mi E Iquitos, 9-12 and 17-21 Sep 1990, Ron Leuschner (LACM); 1♂, Cuzco, Pilcopata, 600 m, 8-10 Dec 1979, premontane moist forest, J. B. Heppner (USNM)(Figs. 4-6); 1♂, 1♀, Pakitza, Manu, 11E56'S, 71E18'W, 17-21 Sep 1989, D. Adamski and M. Epstein (USNM); 1♂, Tingo Maria, at light, 7 Feb 1950, H.A.Allard (USNM); Brazil: 1♂, 1♀ Fonte Boa, Upper Amazon, May 1906, S.M. Klages (BMNH); 1♂, Rondonia, Porto Velho, 180 m, 24 Apr 1989, V.O. Becker (USNM); 1♂, Porto Velho, Coll. of Brooklyn Museum (USNM); 1♂, Amazonas, Manaus, Reserva Ducke, uv light, AM-010, km 26, 2E55'S, 59E59'W, 14 Dec 1993, R.W. Hutchings & J. B. Sullivan (USNM);1♂, Amazones, P. Nac. Do Jau, rio Carabinani, 2E01'S, 61E32'W, 1-2 Aug 1995, R.W. Hutchings (USNM); Guyana: 1♂, Kartabo Bartica District, 18 Jul 1922 (AMNH) (CB: 2249401); Venezuela: 1♂, T.P. Amaz. Cerro de la Neblina Basecamp, 66N 9'44"W, 140 m 1-10 Mar 1984 D. Davis & T. McCabe (USNM).

Natada burnsi sp. n.
(Figs. 7, 8, 9, 32)

Diagnosis: Only species in complex with an aedeagus having a spiny apical plate more than half as long as distal arm and a valva with a deeply emarginated apex.

Adult male: (Fig. 32). Forewing length: 16.5 mm (holotype and paratype). External features same as *fusca* (see description above).

Adult female: Unknown.

Male genitalia: (Figs. 7, 8, 9). Aedeagus with large apical plate longer than distal arm. Plate dorsally striated with up to 72 small teeth along right margin. Apex of valva emarginate. Base of gnathos short.

Remarks: The aedeagus suggests a close relationship with *fusca*. The species is named in honor of Dr. John M. Burns, for a life dedicated to the understanding and meticulous explanation of the taxonomy of Hesperiidae, and for poetically giving this information to the scientific community.

Distribution: *N. burnsi* is only known to occur in southwestern Colombia.

Material Examined: (3♂ specimens)

Holotype ♂. Colombia: Cauca, Popayan, Finca Manzana, 2 200 m, 9 Jan 1959, J. F. G. Clarke (USNM)(CB: 1147430).

Paratype. Colombia: 1♂, Cauca, Popayan, Finca Manzana, 2 200 m, 9 Jan 1959, J. F. G. Clarke (USNM)(CB: 1121355)(Figs. 7-9); 1♂, Pance, Valle Colombia, 4 000 ft, 20 Jan 1986, J. Bolling Sullivan (USNM)(CB: 1121358).

Natada truncata sp. n.
(Figs. 10, 11, 25, 33, 34)

Diagnosis: Truncated tips of two processes at apex of aedeagus separates this from other species in complex. Valva nearly as wide at apex as base, intermediate between *fusca* and *burnsii* and other species in complex.

Adult male: (Fig. 33). Forewing Length: 15.8-18.0 mm (holotype 17.0 mm). External features same as *fusca* (see description above).

Adult female: (Fig. 34). Forewing length: 21.0 mm. Similar to male in pattern and color.

Male genitalia: (Figs. 10, 11). Apex of aedeagus with two dorsally angled processes, truncated at apex. Dorsal hump at base of aedeagus short and wide, angled toward posterior. Gnathos thin dorsoventrally in distal half and of even width. Valva trapezoidal, with bump near apex below.

Female genitalia: (Fig. 25). Ostium bursae round with irregular margin and forms a shallow bowl with short antrum. Posterior lobes with short sensory hairs. A short, sclerotized ridge between posterior margin of ostium bursae and posterior lobe. Cleft between two horizontal rows well sclerotized and extending to lateral part of 8th segment. Dorsum of 8th segment convex.

Remarks: The altitudinal limit of *truncata* is from sea level to 1340 m. Specimens have

been collected every month of the year, except September and December. The species is named for the truncate processes near the apex of the aedeagus.

Distribution: *Natada truncata* is only known from Costa Rica in the humid Pacific slope, with its northern limits at Estación Quebrada Bonita in the Carara Biological Reserve to Estación Sirena in Corcovado National Park, Osa Peninsula, in the south.

Material Examined: (79 specimens, 78♂, 1♀)

Holotype. ♂. Costa Rica: PUNTARENAS: Zona Protectora Las Tablas, 1380 m, 25 Aug B 25 Sep 1995, M. Segura (LS 319300 B 594700) (CB: 2344631).

Paratypes. Costa Rica: PUNTARENAS: Bosque Esquinas, Península de Osa, 200 m, (LS 302400 - 545250), 1♂, J. F. Quesada, Jun 1994 (CB: 2003519), 4♂, M. Segura, Apr 1994 (CB: 1773548, 1773555, 1773557, 1773566), 8♂, May 1994 (CB: 1999922, 1999924, 1999925, 1999926, 1999928, 1999932, 1999933, 1999935); 1.8 mi W. Rincon, Osa Penin, 19 Feb 1971, 1♂, J.P. Donahue & C.L. Hogue (LACM)(CB: 1147435); Fca Cafrosa, Est. Las Mellizas, P. N. La Amistad, 1300 m, (LS 316100 - 596100), 3♂, M. Ramirez, Apr 1991 (CB: 1112276, 1112278, 1112281), 1♂, Mar 1991 (CB: 679510), 7♂, G. Mora, May 1991 (CB: 510483, 510575, 510629, 510664, 532549, 532770, 665217), 2♂, Mar 1991, 1♂, Apr 1991, 1♂, M. Ramirez & G. Mora, Jun 1990, 3♂, Oct 1989, 1♂, Mar 1990, 2♂, 20 Aug - 4 Sep 1989, 2♂, R. Delgado, 19-26 Jun 1990 (CB: 234770, 246728); Finca Cafrosa, 1.5 km NE. de la escuela El Progreso, 1240 m, (LS358100 - 595500), 1♂, M. Chichilla, 8-11 Apr 1996 (CB: 2368591); Est. Sirena, P. N. Corcovado, 0-100 m, (LS270500 - 508300), 2♂, G. Fonseca, 27 Aug - 4 Sep 1989 (CB: 19620, 28744), 1♂, Nov 1989 (CB: 113437), 2♂, Jan 1990, 1♂ (CB: 185139, 185144), Oct 1989 (CB: 617280), 1♂, DH Janzen & W Hallwachs, 5-11 Jan 1981 (CB: 1119136), 1♂, 10-19 Aug 1980 (CB: 1119099); Rancho Quemado, Pen. de Osa, 200 m, (LS 292500 - 511000), 3♂, Francisco Quesada, 1 Feb-2 Mar 1991 (CB: 217425, 217697, 217933) , 1♂, Mar 1991 (CB: 275941), 2♂, Apr 1991 (CB: 439889, 444906), 1♂, Oct 1990 (CB:1374283), 1♂, A. L. Marín, Jul 1992 (CB: 692402), 1♂, 6-12 Feb 1994 (CB: 1913325); Est. Quebrada Bonita, Res. Biol. Carara, 50 m, (LN 194500 - 469850), 2♂, J. C. Saborío, May 1992 (CB: 804780, 808236), 1♂, Jan 1994 (CB: 1842502), 1♂, Dec 1994, 1♂, E. Bello & E. Rojas, Jul 1990 (CB: 241587), 1♂, R. Zuñiga, Aug 1989 (CB: 16807), 1♀, Jun 1991 (CB: 590569); Albergue Cerro de Oro, 150 m, (LS 279650 - 518450), 3♂, J. F. Corrales, 29 May 1995 (CB: 2212658, 2212659, 2212661), 2♂, L. Angulo, 30 Aug 1995 (CB: 2404535, 2404537), 1♂, 16-20 May 1996 (CB: 2454390); Zona Protectora Las Tablas, 1 380 m, (LS 319300 - 594700), 1♂, M. Segura, 25 Aug-25 Sep 1995 [same locality and date as holotype](CB: 2344632); Punta Camibar, 0 m, (LS 298550 - 528350), 1♂, J. F. Quesada, Jun 1994 (CB:2350393); Est. Santa Elena, Las Nubes, 1210 m, (LS 371750 - 507800), 1♂, E. Alfaro, 14 Dec 1996 (CB:2540325); Sector Altamira, Buenos Aires, P. I. L. A, 1 400 m, (LS 332700 - 572400), 1♂, R. Delgado, Aug 1994 (CB: 2026957); Fila Guerra, 100 m, (LS 300350 - 506100), 1♂, J. Quesada, Mar 1991, (CB: 1689894); La Escuadra, P. N. La Amistad, 1 340 m, (LS 326700 - 591200), 1♂, M. Ramirez & G. Mora, 14 Apr 1989 (CB: 2942); Las Cruces, Biol. Sta, San Vito, 1 200 m, (LS 304500 - 577500), 1♂, I. Chacón, 16-20 Nov 1987 (CB: 1119156), 1♂, 26-27 Jun 1972, C.L. Hogue & J. Dockweiler (LACM)(CB: 1147434); Fila Esquinas, 35 km S. Palmar Norte, 150 m, (LS 301800 - 531000), 2♂, D. H. Janzen & W. Hallwachs, 7-8 Jan 1983 (CB: 1119145 [Figs. 10, 11], 1120951); Est. Agujas, Río Agujas, 300 m, (LS 276750 - 526550), A. Azofeifa, 1♂, 13-18 Sep 1996 (CB: 2457968), 1♂, 9-28 Mar 1996 (CB: 2372973); Las Alturas Field Station, 35 km NE of San Vito: Cal Snyder & Andrei Sourakov, 3♂, 26 Jun 1992 (AMNH)(CB: 222688, 2607578, 2226885), 1♂, 27 Jun 1992 (AMNH)(CB:

2226880), 1♂, Cal Snyder, 23 May 1992 (AMNH)(CB: 2226886), 2♂, A. Sourakov, 3 Aug 1992 (AMNH)(CB: 2226888), 16 Jul 1992 (AMNH)(CB: 2226887); Villa Neilly, 800 m, 2♂, 26 Nov 1973, V. O. Becker col., N° 31351, (LS 2895000 - 579500) (USNM)(VOB) (CB: 1121214, 1147436).

Natada singularara sp. n.
(Figs. 12, 13, 26, 35, 36)

Diagnosis: Aedeagus very elongated, with a single downcurved spine at apex, unique in *fusca* complex.

Adult male: (Fig. 35). Forewing length: 14.0-17.2 mm (holotype 16.0 mm). External features same as *fusca* (see description above).

Adult female: (Fig. 36). Forewing length: 17.5-21.5 mm. Similar to the male in pattern and color.

Male genitalia: (Figs. 12, 13). Apex of aedeagus with single downcurved spine. Distal part of aedeagus more elongate than in other species in complex, only slightly curved, with base and dorsal hump small in relation to it. Gnathos with basal part wide and angled downward; distal part narrows immediately beyond base. Valva triangulate with bump on ventral margin midway between apex and horizontal base. Membranous juxta lobes located lateral to aedeagus.

Female genitalia: (Fig. 26). Ostium bursae narrow and not broadly connected with bulbous sclerotized antrum below. Posterior lobe with two horizontal ridges similar to *fusca*, though more shallow in between. Dorsum of 8th segment wrinkled and convex beyond posterior margin.

Remarks: The altitudinal limit is from sea level to 1200 m. Specimens have been collected almost all year round, except for December. *N. singularara* has been only collected in the Costa Rican Caribbean zone associated with the rain forest. The species is named for the single spine at the apex of the aedeagus.

Distribution: *N. singularara* is only known on the Caribbean slope of Costa Rica.

Material Examined: (75 specimens, 71♂, 4♀)

Holotype. ♂. Costa Rica: GUANACASTE: P. N. Guanacaste, Estacion Pitilla, 9 km Sur de Santa Cecilia, 700 m, (LN330200 - 380200), 22 Sep-14 Oct 1992, Calixto Moraga (CB:837554).

Paratypes. Costa Rica: Costa Rica [only data on specimen], 1♂, Nevermann, 30. Nov 1935 (ZSBS)(CB:2226884); CARTAGO: Turrialba, 600 m, V.O. Becker, 7♂, 3 Dec 1972, 5 Mar 1973, 8 Apr 1973,10 May 1973, 20 May 1972, 10 Jul 1973, 10 Jan 1973, 25 Oct 1972, Jul 1981 (USNM)(CB: 1121210, 1121209, 1121212, 1121208, 1121205, 1121206, 1121213, 1121211, 2226878); Turrialba, 2 080 ft, Scullen & Bolinger, 1♀, 22 Jul 1963, (USNM)(CB: 1147463); GUANACASTE: 4 km E. Casetilla, Rincón Nat. Pk., 750 m, 1♂, D. H. Janzen & W. Hallwachs, 11 Apr 1983(USNM) (CB:1120952); Estación Pitilla, 9 km Sur de Santa Cecilia, 700 m, (LN 330200 - 380200), C. Moraga, 3♂, Aug 1991 (CB: 493481, 493497, 493498), 1♂, 1♀, Mar 1993 (CB:1203091, 1203092), 1♂, Jun 1991 (CB: 616847), 2♂, Oct 1992 (CB: 837460, 837461), 2♂, Oct 1993 (CB: 1641811, 1641813), 2♂, Mar 1994 (CB: 1763663,1763664), 1♂, 6-17 Sep 1993 (CB: 1614496), 1♂, 21-29 Nov 1992 (CB: 820507), Biodiversity Survey, 4♂, Jul 1988 (CB: 27736, 45814, 105489, 124467), 1♂, Oct 1988 (CB: 1055850), 2♂, May 1989 (CB: 1055852, 1055942), 1♂, 27 Jan-4 Feb 1989 (CB: 45814), 1♀, May 1988 (CB: 105489), 1♀, Aug 1988 (CB: 124467), P. Rios, 1♂, May 1991 (CB: 541429), 1♂, Aug 1991, 2♂, 18-23 Jul 1993, 1♂, 19-23 Jun 1993, 1♂, Oct 1994, 1♂, Apr 1990 (CB: 615425), P. Rios, C. Moraga & R. Blanco, 1♂, Mar 1990 (CB: 206034), C. Moraga & P. Rios, 3♂, Nov 1989, 8♂, Sep 1989 (CB: 54660, 54662, 54663, 54664, 54665, 54747, 104344, 104449), A. Chacón & M. Espinoza, 2♂, Jan 1988 (CB: 1119149, 1119152), M. Espinoza, 5♂, Jun 1988 (CB: 1119155, 1119299, 1119315, 1119325, 1119330), Espinoza & Chaves, 4♂,

Jul 1988 (CB: 1119154, 1119157, 1119158, 1119316), 2♂, Aug 1988, Janzen & Hallwachs, 1♂, 18 May 1988, Taller de Microlepidoptera, 1♂, 23-26 Jun 1993, C. Moraga (CB: 54747), 1♂, 4-24 Apr 1995 (CB: 2141241); LIMON: Reventazon, 25 m, 1♂, Ferd. Nevermann, 15 Apr 1923 (ZSBS)(CB: 2226883), Hac. La Suerte/Tapezco, 29 air km W Tortuguero, 10.49 degrees N, 83.78 degrees W, 13-31 Aug 1979, 3♂, J. & K. Donahue, C. Hair, N. Moore, M. Hopkins (LACM) (CB: 1147427, 1147432, 1147433); SAN JOSE: Carrillo, 1♂, 15 Jun 1900 (ZSBS)(CB: 2226879).

Natada confusa sp. n.
(Figs. 18, 19, 20, 21, 22, 27, 37, 38)

Diagnosis: Aedeagus elongate with two distal processes variable in length, shape, and direction.

Adult male: (Fig. 37). Forewing length: 14.3-16.9 mm (holotype 16.0 mm). External features same as *fusca* (see description above).

Adult female: (Fig. 38). Forewing length: 18.0-20.0 mm. Similar to the male in patterns and color.

Male genitalia: (Figs. 18, 19, 20, 21, 22). Apex of the aedeagus with two processes of variable length and direction (Figs. 19-22) (see "Remarks" below). Dorsal hump nearly equal to basal arm or longer. Distal arm with shallow u-shaped curve. Gnathos with pointed upcurved apex. Valva with ventral concavity between apex and horizontal base.

Female genitalia: (Fig. 27). Antrum and ostium bursae broadly connected, similar to *fusca*. Major difference is dorsal side of antrum extends to posterior lobe, dividing anterior ridge in two parts, and sensory hairs less pronounced. Dorsum of 8th segment convex, similar *singulara*.

Host plant: *Swietenia macrophylla* (Meliaceae)(90-SRNP-1300), *Spondias mombin* (Anacardiaceae)(89-SRNP-843).

Remarks: The anterior process of the aedeagus of *confusa* tends to be directed toward the dorsum in specimens at the limits of the range in northern Mexico and along the Pacific Coast in Guatemala, El Salvador, and northern Costa Rica (Fig. 19) (note: the anterior process is often hooked laterad and left at the apex). Specimens from Nicaragua and Honduras have sharp narrow processes forming a wide V (Fig. 20) (note: the anterior process is directed laterally to the left, so it appears foreshortened). Specimens from Tikal, Guatemala are similar to those from Nicauragua and Honduras, but possess a rounded, upcurved posterior process (Fig. 22). The most distinctive geographic form of *confusa* occurs in the state of Veracruz, Mexico (Fig. 21). It has the broadest aedeagus, with distal arm thick, anterior process on the left side, is strong, curved, and directed toward the apex, and the posterior process is long, sharp, and well sclerotized.

The name *confusa* refers to the confusion surrounding the limits of this species due to the variation discussed above. The altitudinal range of this species is from sea level to 700 m. The specimens were collected from April through June and October. In Costa Rica, *N. confusa* has been collected only in the dry forests.

Distribution: *N. confusa* is known from the Mexican gulf coast to northern Pacific slope of Costa Rica.

Material Examined: (106 specimens, 100♂, 6♀)

Holotype. ♂. Honduras: San Pedro Sula, 700 m, Robert D. Lehman, 15 Jul 1979 (USNM)(CB: 1147143)

Paratypes. México: CHIAPAS: Santa Anita, 1♂, C. C. Hoffmann, 14 Jul 1930 (AMNH)(CB:1150036); La Granja, 1♂, C. C. Hoffmann, 28 Jul 1930, No. 2030, "*Natada salta* Drc." (AMNH)(CB: 1150037); TAMAULIPAS.:Rancho del Cielo, 6 km NNW Gomez Farias, 3500 ft, 1♂, M. A. Solis, July1982 (USNM)(CB: 1147431); El Ensino, 250 m, 4-13 Aug 1988, 2♂, V. O. Becker (VOB# 68922)(VOB), 1♂, (USNM) (CB: 1121364); Gómez Farias, 1200 m, 2♂, 26 May 1997, V. O. Becker Col, (VOB# 109184)

(VOB); SAN LUIS POTOSI: Rancho Quemado, Rt 85, km 353, 4-6 Aug 1966, 1♀, O.S. Flint (USNM)(CB: 1121361); Xilitla, Vencidor Station, 3750 ft, 1♂, W. H. Howe, 12 June 1974 (AMNH)(CB: 1150040); San Luis Potosi, Tamazunchele, 300 ft, 1♂, W. H. Howe, 24 Apr 1977 (AMNH)(CB: 1150040); VERACRUZ: Cordova, 2♂, Wm Schaus, May [19]06 (USNM)(CB: 2607577, 2249405), 1♂, Apr 1906 (USNM)(CB: 1146206), 1♂, Wm Schaus, "v" [May?](USNM)(CB: 2607597), 1♂, Fredk Knab, 28 Apr 1908 (USNM)(CB: 1146209)(Fig. 21); Jalapa, 1♂, Wm Schaus (USNM)(CB: 1147141); Misantla, 1♂, Apr 1909 (ZSBS)(CB: 2249397), 1♀, Sep 29 (ZSBS)(CB:3030197); Orizaba, 1♂, May 1908 (USNM)(CB: 1146208), 1♂, C. C. Hoffmann, May 1909 (AMNH)(CB: 1150038), 1♂, Jul [19?] 10, 1♀, May [19?]11 (ZSBS) (CB: 3030196), 1♀, no date (ZSBS)(CB: 2249404); CAMPECHE, Escarcega, 85 m, 2♂, V. O. Becker, 17-21 May 1981 (Col. Becker 42916)(USNM)(CB: 1121360)(VOB)(Col. Becker 42917); Belize: Augustine, Mt. Pine Ridge, 500 m, 24-25 Sep 1973, V.O. Becker, 2♂, (VOB)(VOB# 31408), (USNM) (CB: 1147142); Guatemala: 1♂, "Guatemala", [Lg. Brodinas?] (ZSBS) (2249402); 1♂, Dept. Retalhuleu Pte. El Nino, Flint & Ortiz, 16 Jun 1966 (USMN)(CB: 1121365);1♂ Quirigua, Dec, Schaus & Barnes Coll (USNM) (CB:1147145); Tikal, 200 m, 2♂, S. Steinhauser, 10 May 1969 (USNM) (CB: 1121363 [Fig. 22], 2607596); Tikal, Petén, Guatemala, 19-22 Sep 1973, V.O. Becker, 1♂ (VOB # 31400)(CB: 3030198); El Salvador: San Salvador, Amérique centrale, 1♂, Dognin Collection (USNM)(CB: 1147177); San Salvador, 600 m, 2♂, 29 May 1960, 12 Jun 1960, leg. Bechyné (ZSBS)(CB: 2249403, 2607583); Santa Tecla, 900 m, 1♂, S.R. & L. M. Steinhauser, 19 May 1968 (USNM)(CB: 2607581), 5♂, L. Steinhauser, 18-31 May 1968 (USNM)(CB: 2607579, 2607582, 2607585, 2607584, 1147144); Nicaragua: Esteli, 2♂, V. O. Becker, 3 Sep 1973 (VOB)(USNM)(CB: 1146212)(Fig. 20); Costa Rica: GUANACASTE: P. N. Santa Rosa, A. C. Guanacaste, 300 m, (LN 313000 - 359800), D. H. Janzen, 1♂, 13-15 Jul 1979 (USNM) (CB: 1120955), 2♂, 18-20 May 1979 (CB: 1119113, 1119126), 2♂, 29-31 May 1979, 3♂, 23 May 1978 (CB: 1119104, 1119106, 1119131), 4♂, 5 June 1978 (CB: 1119089, 1119101, 1119116, 1119120), 4♂, 15-17 May 1979, D. H. Janzen & W. Hallwachs (CB: 1119090, 1119091, 1119103, 1119107), 4♂, May 1985 (CB: 1119313, 1119321, 1119328, 1120061), 5♂, May 1983 (CB: 1119802, 1119806, 1120046, 1120047, 1120056), 2♂, Jun 1994 (CB: 1987553, 1987555), 1♂, 2-4 May 1980, 1♂, Apr 1983 (CB: 1119318)(Fig. 19), 1♂, 17-19 May 1980 (CB: 1119105); Area Administrativa, 280 m, 1♂, 5 Jul 1982, D.H. Janzen (82-SRNP-450); Bosque San Emilio, 300 m, "gusaneros", 1♀, 5 Aug 1989, (89-SRNP-843), 1♂, 5 Aug 1989 (90-SRNP-1300); Est. Murciélago, 8 km SW Cuajiniquil, 100 m, (LN 320300-347200), F. A. Quesada, 9♂, 3-19 Sep 1994 (CB: 2033930, 2033931, 2033932, 2033933, 2033934, 2033935, 2033936, 2033937, 2033938), 2♂, 18 May - 5 Jun 1995 (CB: 1182202, 1182292), 1♂, 7-25 Mar 1994 (CB: 1758880), C. Cano, 2♂, 4-18 Sep 1994 (CB: 2022336, 2022340), 2♂, 10-28 Sep 1993 (CB: 1955976, 1955978), 1♂, 11-29 Aug 1993 (CB: 1945883); Casa Oeste, Cerro el Hacha, 12 km SE La Cruz, 300 m, 5♂, A. Chacón, Oct 1987 (CB: 1119114, 1119124, 1119128, 1119295, 1119298); Est. Maritsa, Hda. Orosí, 550 m, W. Hallwachs & D. H. Janzen, 1♂, 2-5 Jun 1986 (CB: 1119148); Bahía Santa Elena, P. N. Guanacaste, A. C. Guanacaste, 100 m, (LN 321800 - 339100), F. A. Quesada, 2♂, 11 Jun 1994 (CB: 1966400); Finca Jenny, 30 km N. Liberia, 240 m, (LN 317150- 363700), 1♂, E. Araya, 6 Nov -5 Dec 1994 (CB: 2193747); Agua Buena, 220 m, (LN 334800-364100), 1♂, III Curso de Parataxónomos, Jun 1992 (CB: 858460); Est. los Almendros, P. N. G. 300 m, (LN 334800-369800), 1♂, E. Lopez, 18-26 May 1993 (CB: 1750692).

Natada chaconi sp. n.
(Figs. 14, 15, 39)

Diagnosis: Male forewing longest in *fusca* complex and with a unique dark reddish ground color. Gnathos distal arm is most horizontal relative to uncus of any species in complex. Aedeagus apex with a dorsal process on each side rather than one anterior and one posterior as in *confusa* and *covelli*.

Adult male: (Fig. 39). Forewing length: 19.3 mm. External features same as *fusca* except for dark reddish ground color of forewing (see description above).

Adult female: Unknown.

Male genitalia: (Fig. 14, 15). Aedeagus apex with a small, rounded process on each side of dorsum, giving apex a truncated appearance. Membranous juxta lobes located ventral to aedeagus. Gnathos with distal arm angled parallel with uncus and extending nearly as far to posterior. Valva triangulate with bump on ventral margin near apex and concave from bump to horizontal base.

Remarks: The species is only known from the type specimen, which was collected in February in the Costa Rican Caribbean slope rain forest. *N. chaconi* is named in honor of Isidro and Abelardo Chacón Gamboa, for their important contribution to the study of Lepidoptera in Costa Rica.

Distribution: *N. chaconi* is only known from old Braulio Carrillo station near Río Sucio, Costa Rica.

Material Examined: (1♂ specimen)

Holotype ♂. Costa Rica: Estacion Carrillo, Pk. Nac. Braulio Carrillo. Prov. San Jose, 700 m Feb 1985 Coll. I. & A. Chacón (LN 238500 B 541200)(CB: 1119317).

Natada covelli sp. n.
(Figs. 16, 17, 40)

Diagnosis: Only species in *fusca* complex with valva having both narrow apex and convex ventral margin.

Adult male: (Fig. 40). Forewing length: 15.0-16.0 mm (holotype male 15.0 mm). External features same as *fusca* (see description above).

Adult female: Unknown.

Male genitalia: (Figs. 16, 17). Apex of aedeagus with two small dorsal processes, one to anterior on left side more developed and other to posterior arises on right side. Distal arm of aedeagus bent in middle. Gnathos distal arm sinuate above and below. Valva with ventral margin convex to base after indentation near apex.

Remarks: This species is named after Dr. Charles V. Covell, Jr. (University of Louisville), who collected the holotype of this species. Covell's active work in New World moths, especially in the Geometridae, and his field guide to moths, have encouraged a new generation of lepidopterists.

Distribution: This species is found only in the southern part of the Pacific slope in Colombia and in northern Ecuador.

Material Examined: (7♂ specimens)

Holotype ♂. Ecuador: Tinalandia, el 700 m, Pichinchi Prov. 24 Jun 1983, C. V. Covell, Jr. (USNM)(CB: 2607501).

Paratypes. Colombia: 2♂, C. C. Hq., Bajo Calima, 300ft, Valle Colombia, J. Bolling Sullivan 11-12 Jan 1985 (USNM) (CB: 2607502, 2607500); 1♂, Dept. Valle Anchicaya, 600 m, long. 76° 53", lat. 3° 33', 20 - 24 Jan 1992, J. Bolling Sullivan (USNM) (CB: 1146205) (Figs. 16, 17); 1♂, Colombia [only data on specimen] (USNM) (CB: 2607503); Ecuador: 1♂, Tinalandia, el 700 m, Pichinchi Prov., H. V. Weems, Jr, 10 - 17 Jul 1983 (FSCA)(CB: 2226889); 1♂, Pichincha Tinalandia, 16 km E Santo Domingo de los Colorados, 600 m, 5-11 May 1990, R.H. Leuschner (LACM) (CB: 1147429).

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RESUMEN

Se describen seis nuevas especies en el género *Natada*, las cuales habían estado escondidas bajo el nombre *Natada fusca* Druce, que se definen principalmente por los genitales. La nuevas especies incluyen *N. burnsi*, *N. truncata*, *N. singulara*, *N. chaconi*, *N. covelli*, y *N. confusa*. Cinco de ocho especies en el complejo *Natada fusca*, que también incluye a *N. fuscodivisa* Dognin, están presentes en Costa Rica. La distribución del complejo tiene un ámbito desde México hasta el escudo del Amazonas y de las Guayanas. Se proporciona información geográfica detallada y múltiples dibujos de los genitales masculinos de la especie *N. confusa*, para ayudar a separar las especies. Se designaron el lectotipo y el paralectotipo de *N. fusca*.

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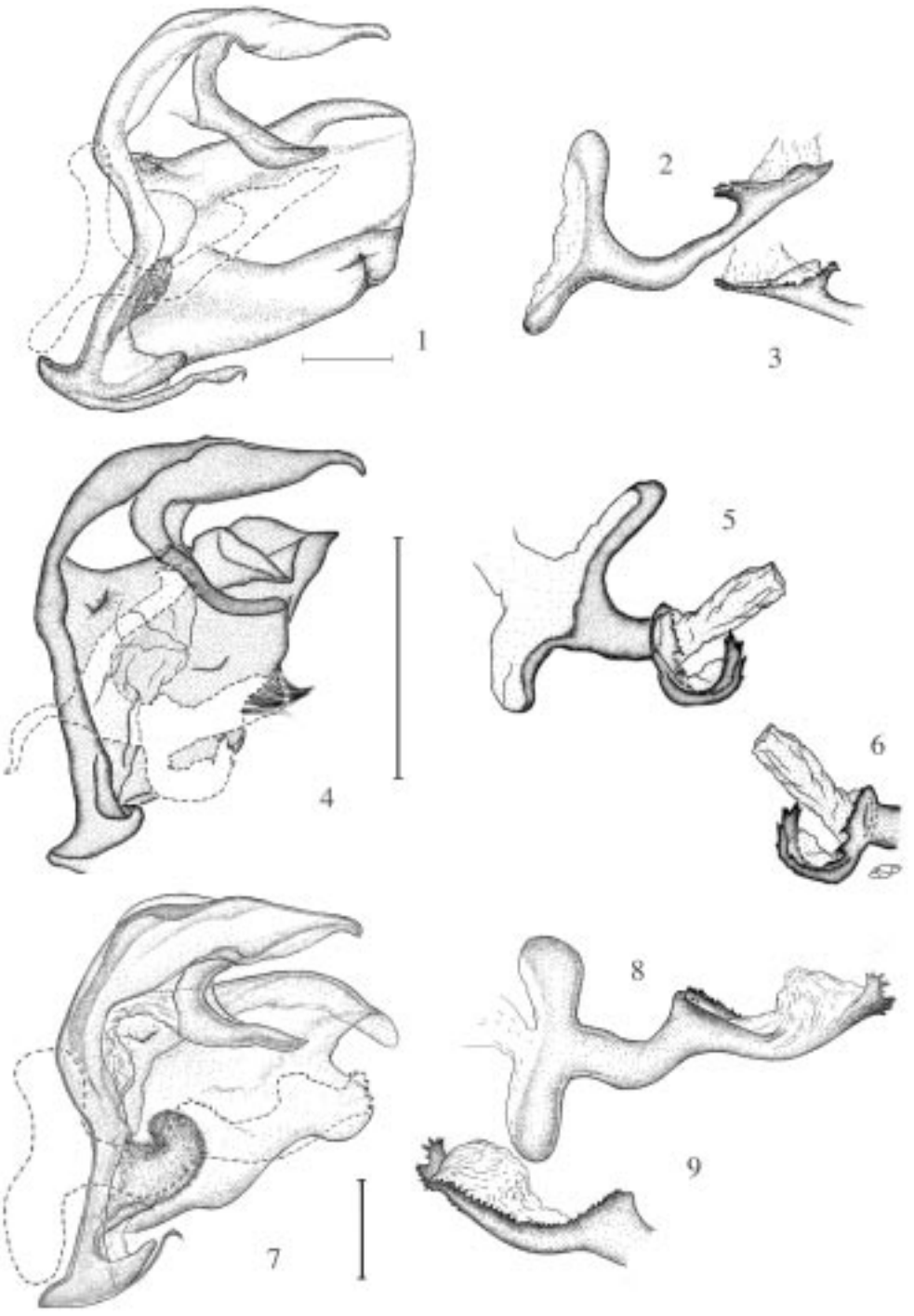
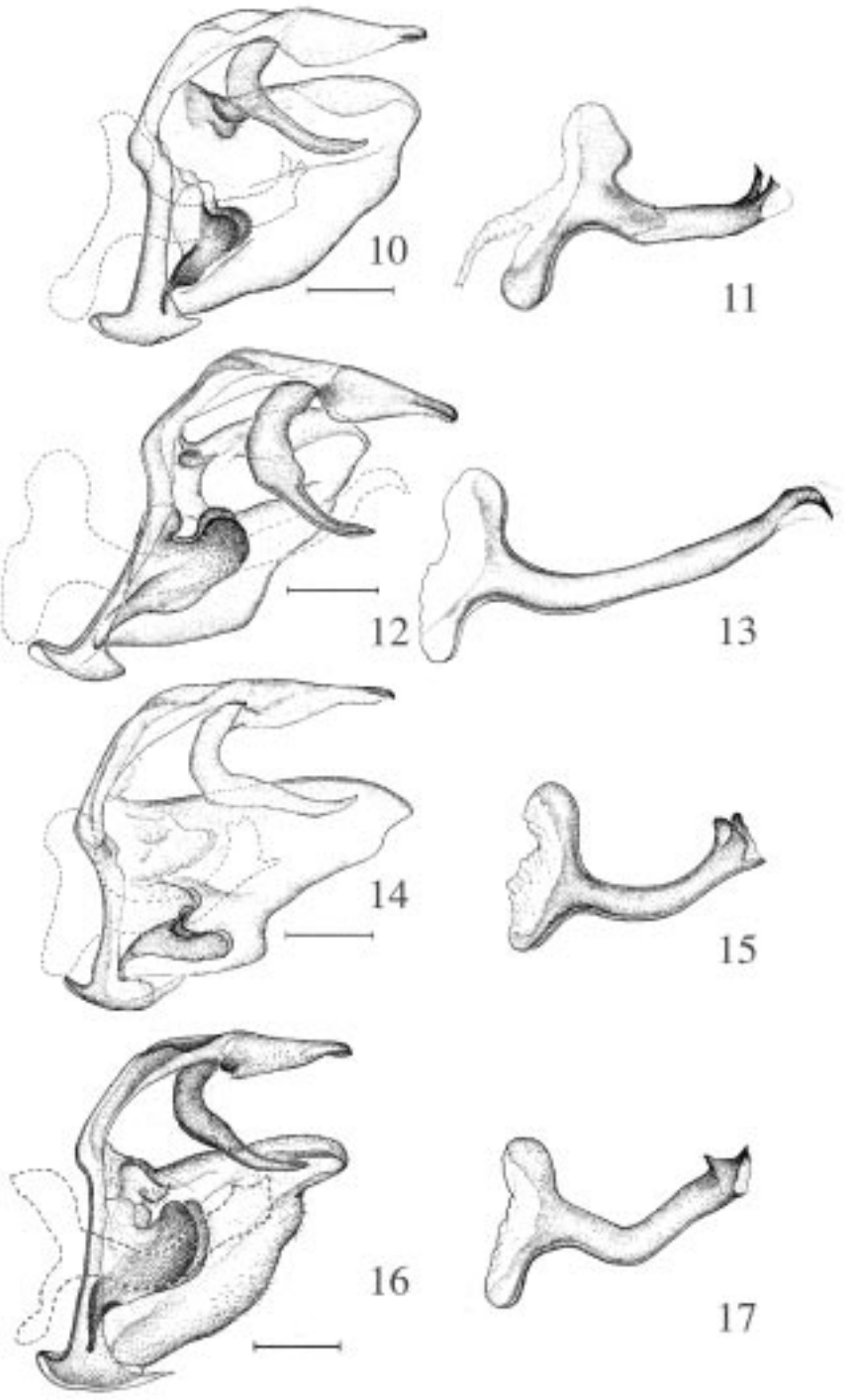
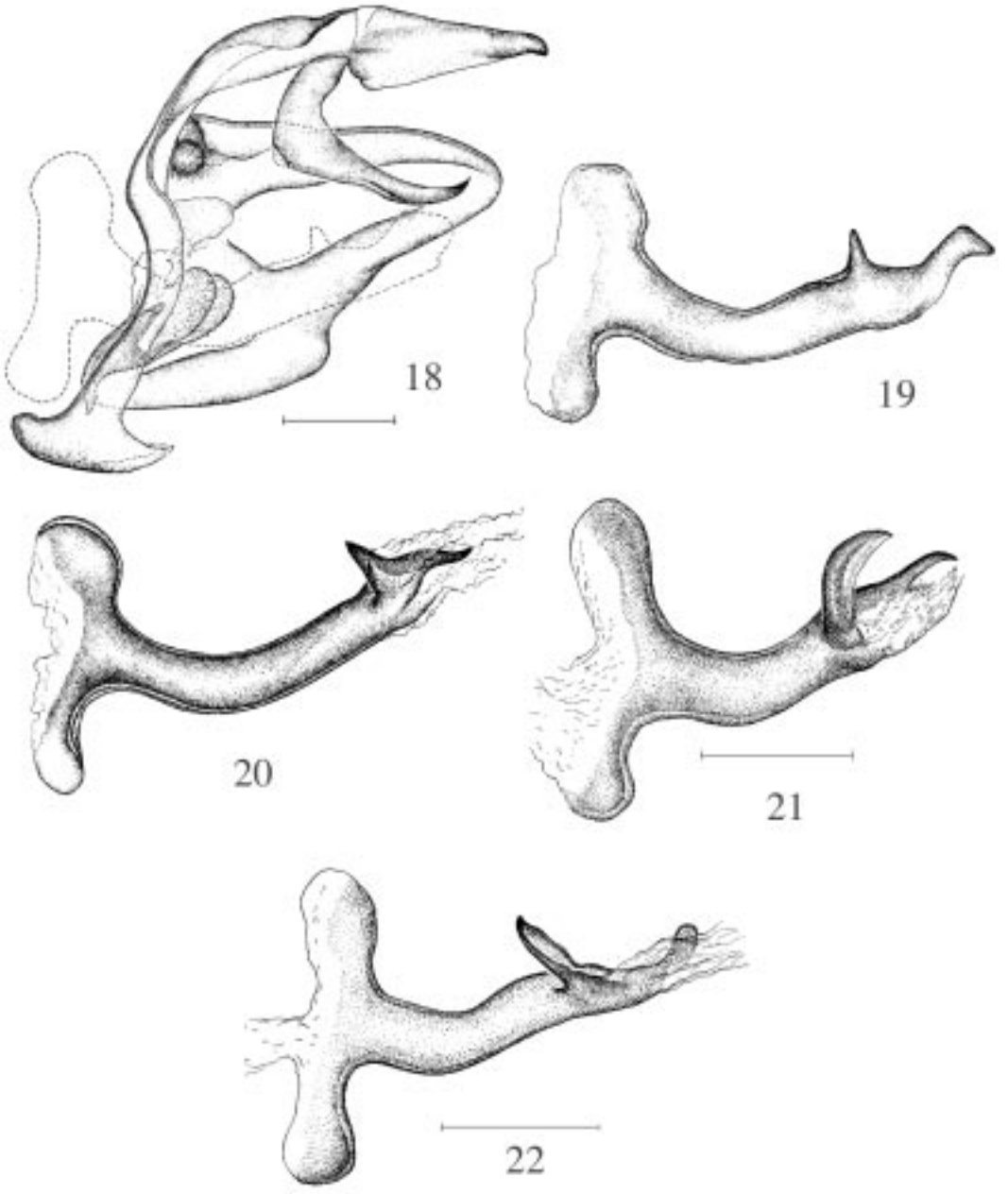


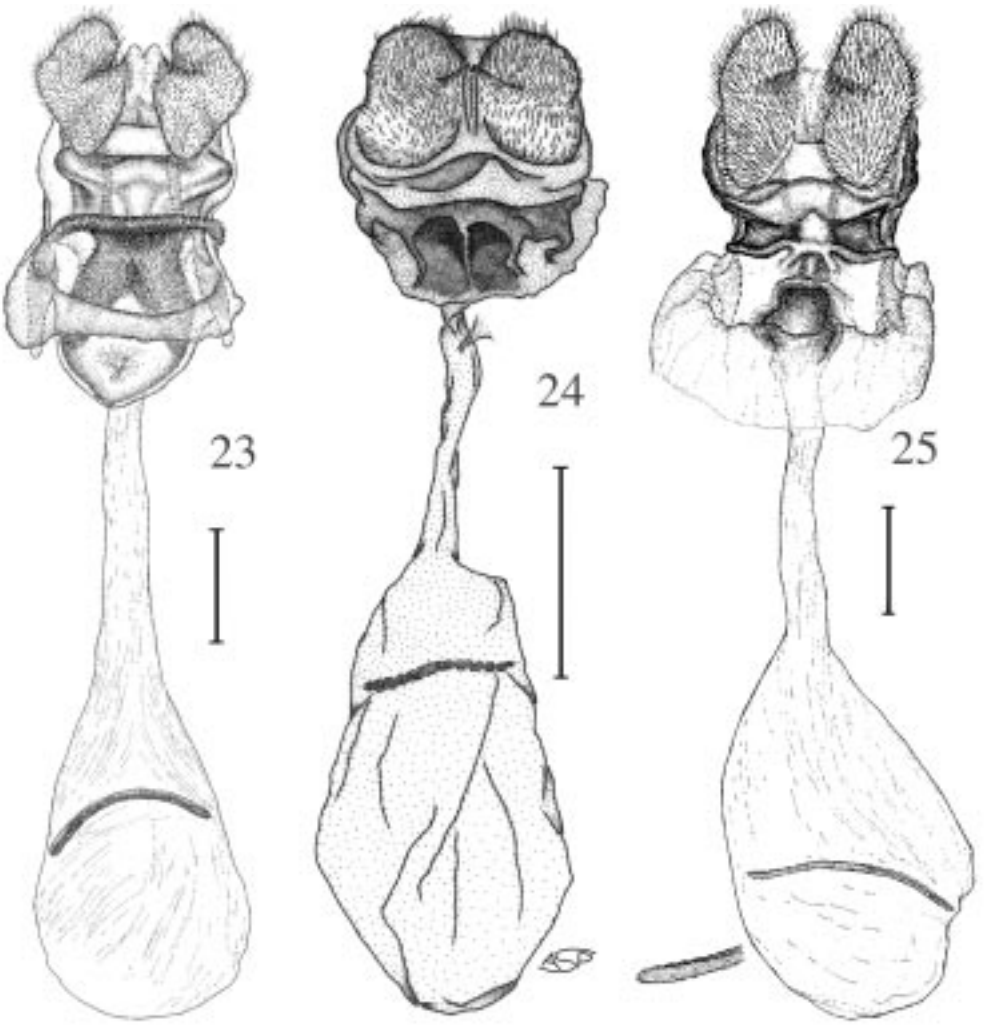
Figs. 1-9. Male genitalia (lateral view with left valva removed). 1-3, *Natada fusca* (lectotype, Panama): 1, lateral view of genitalia; 2, aedeagus; 3, right lateral view of aedeagus apex; 4-6, *N. fuscodivisa* (Cuzco, Peru): 4, lateral view of genitalia; 5, aedeagus; 6, right lateral view of aedeagus apex; 7-9, *N. burnsi*, new species (CB: 1121355): 7, lateral view of genitalia; 8, aedeagus; 9, right lateral view of aedeagus apex. (scale = 1mm).



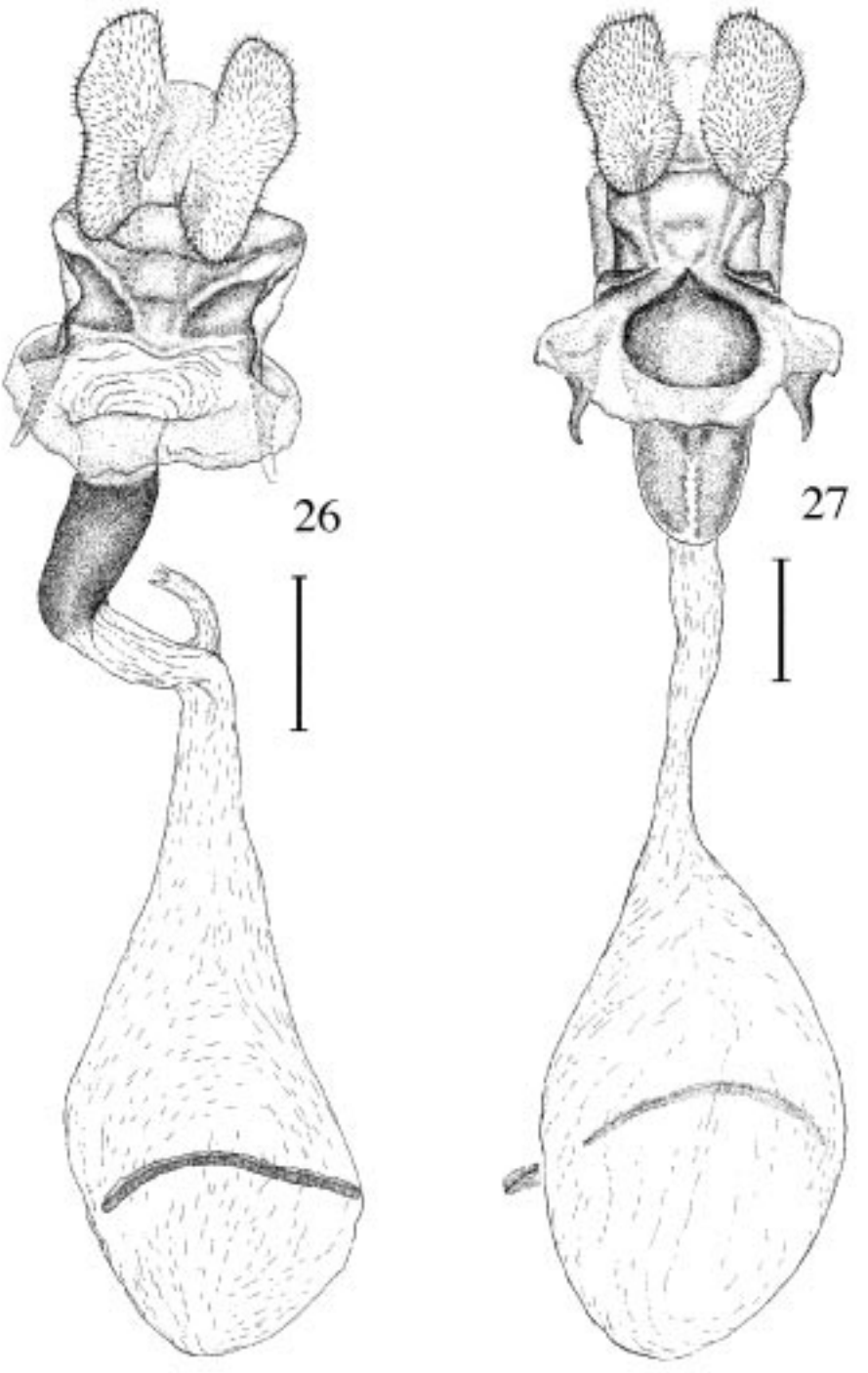
Figs. 10-17. Male genitalia (lateral view with left valva removed). 10-11, *Natada truncata*, new species (CB: 1119145): 10, lateral view of genitalia; 11, aedeagus; *N. singulara* (CB: 541429): 12, lateral view of genitalia; 13, aedeagus; 14-15, *N. chaconi*, new species (holotype, CB: 1119317): 14, lateral view of genitalia; 15, aedeagus; 16-17, *N. covelli*, new species (CB: 1146205): 16, lateral view of genitalia; 17, aedeagus. (scale = 1mm).



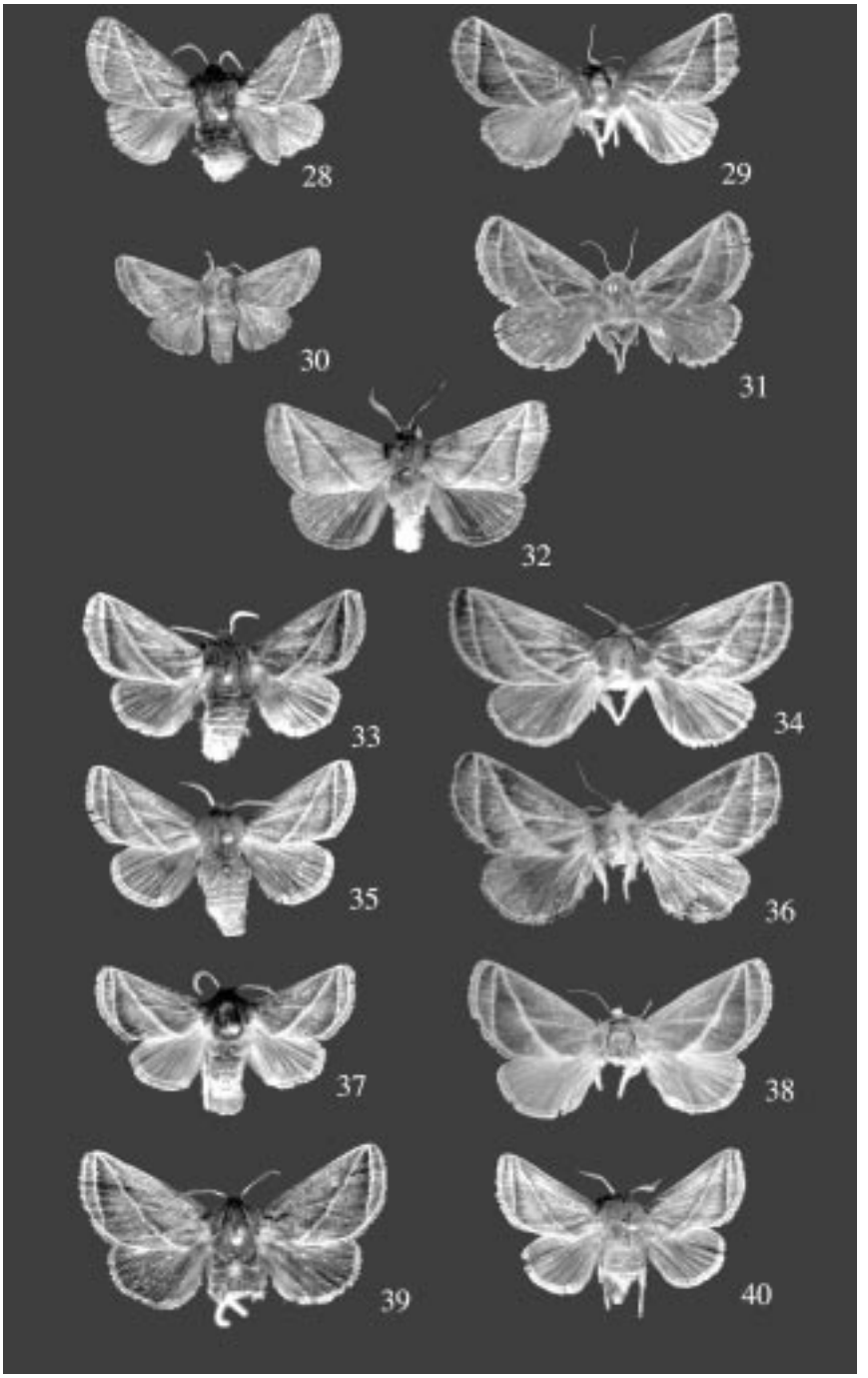
Figs. 18-22. *Natada confusa*, new species, male genitalia (lateral view with left valva removed) and distribution. 18-19, (Guanacaste, Costa Rica, CB: 1119318): 18, lateral view of genitalia; 19, aedeagus; 20, aedeagus (Esteli, Nicaragua, CB: 1146212); 21, aedeagus (Tikal, Guatemala, CB: 1121363); 22, aedeagus (Veracruz, México, CB: 1146209). (scale = 1mm).



Figs. 23-25. Female genitalia (ventral view). 23, *Natada fusca* (CB: 1119329); 24, *N. fuscodivisa* (Fonte Boa, Brazil); 25, *N. truncata*, new species (CB: 590569). (scale = 1mm).



Figs. 26-27. Female genitalia (ventral view). 26, *Natada singulara*, new species (CB: 641212); 27, *N. confusa*, new species (CB: 1119806). (scale = 1mm).



Figs. 28-40. Species in the *Natada fusca* complex. 28-29, *N. fusca*: 28, male (CB: 1328653); 29, female (CB: 119329); 30-31, *N. fuscodivisa*: 30, male (holotype); 31, female; 32, *N. burnsi*, new species, male (holotype, CB: 2009806); 33-34, *N. truncata* new species: 33, male (holotype, CB: 2344631); 34, female (CB: 590569); 35-36, *N. singulara*, new species: 35, male (CB: 1120040); 36, female (CB: 1118507); 37-38, *N. confusa*, new species: 37, male (CB: 2033936); 38, female (CB: 1119802); 39, *N. chaconi*, new species, male (holotype, CB: 1119317); 40, *N. covelli*, new species, male (holotype, CB: 2607501).