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## *Andrena nahua*, a new bee species from central Mexico (Hymenoptera: Andrenidae: Andreninae)

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**Abstract.** *Andrena nahua* Neff, new species, is described from three males from central Mexico. It can be distinguished from other Mexican *Andrena* species by the combination of head significantly broader than long and broader than the mesosoma, broad gena, absence of facial maculation, 1<sup>st</sup> recurrent vein nearly interstitial with 2<sup>nd</sup> transverse cubital vein, black color and weak tergal fascia. As its placement in recent *Andrena* phylogenies indicate it does not fit in any extent *Andrena* subgenus, *Labergeia* new subgenus, is also proposed.

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### INTRODUCTION

With more than 1600 described species (Ascher & Pickering, 2020), *Andrena* Fabricius is one of the world's most species rich bee genera. More than 500 species of *Andrena* have been reported from North America with at least 100 species known from Mexico (Ascher & Pickering, 2020). The alpha taxonomy of the genus in North America has a strong foundation thanks to the decades long work of Wallace LaBerge and his collaborators but the higher relationships within *Andrena* remain incompletely resolved as recent molecular studies indicate as many as a third of the currently recognized subgenera are paraphyletic (Pisanty *et al.*, 2022, Bossert *et al.*, 2022). I here describe a new species from central Mexico to make the name available for a species included in the molecular phylogenetic study of the genus by Pisanty *et al.* (2022).

### MATERIALS AND METHODS

Terminology and measurements used largely follow LaBerge (1967) with some exceptions and additions. The facial quadrangle is calculated as in LaBerge (1964) but

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when discussed separately, facial length is measured as the distance from the vertex to the apex of the clypeus while facial width is the maximal width of the face in frontal view. Mesosomal width is the maximal distance between the outer margins of the tegulae, while the inter-tegular span is the ITS of Cane (1987), the minimal distance between the inner margins of the tegulae. Metasomal width is the maximal width of tergum 2. Measurements are given as the mean plus the range. Measurements were made with an ocular micrometer with a maximum magnification of 50x on a Wild M5 dissecting microscope. All measurements are reported as mm. The photographs of the of the holotype were taken with a Canon EOS7D camera with a MP-E 65mm1-5x macro lens using three Neewer® brand off-camera strobes shot through two sheets of Roscolux® tough white diffusion. The camera is mounted on a motorized z-stepper rail, the Cognisys StackShot®. The stacked image is processed in Zerene Stacker® and the final images were cropped and given minor levels adjustments in Adobe Photoshop.

## SYSTEMATICS

Genus *Andrena* Fabricius

*Labergeia* Neff, new subgenus

ZooBank: urn:lsid:zoobank.org:act:ED044F43-BA97-4D80-ACC5-0812D48CD0E4

TYPE SPECIES: *Andrena nahua* Neff

DIAGNOSIS: *Labergeia* can be distinguished from other *Andrena* subgenera by the combination of head significantly broader than long and broader than the mesosoma and gena significantly broader than the eye; integument entirely black, without facial maculation; 1<sup>st</sup> recurrent vein nearly interstitial with 2<sup>nd</sup> transverse cubital vein; pilosity sparse; tergal fascia weak; humeral angle strong but dorsoventral ridge weakly defined; and metapostnotum weakly delimited, surface irregularly roughened anteriorly and dulled by tessellation posteriorly.

Other than its very broad head and gena combined with its somewhat unusual wing venation, there seem to be few morphological justifications for erecting a new subgenus for this small black bee, known only from three males. However, it does not fit easily into any extant subgenus of *Andrena* and molecular analyses (Pisanty *et al.*, 2022; Bossert pers. comm.) give a firm justification for erecting a new subgenus.

ETYMOLOGY: The name is in honor of Wallace LaBerge who did so much to further our knowledge of North American *Andrena*, and who brought attention to the specimens that led to the description of this subgenus. The gender of the name is feminine.

*Andrena (Labergeia) nahua* Neff, new species

urn:lsid:zoobank.org:act:373B3C37-288A-4DEE-84A8-26B9EECBD156

(Figs. 1–6)

DIAGNOSIS: The male of *Andrena nahua* can be distinguished from other Mexican *Andrena* by the combination of its head being much broader than long and broader than the mesosoma, gena much broader than eye, absence of facial maculation, 1<sup>st</sup> recurrent vein nearly interstitial with 2<sup>nd</sup> transverse cubital vein, black color and weak tergal fascia.



**Figures 1–2.** *Andrena nahua*, new species. 1. Lateral view, holotype, scale bar = 1.0 mm. 2. Facial frontal view, holotype, scale bar = 0.5 mm.

**DESCRIPTION:** Male, body length = 7.9 (7.5–8.3) mm, head width = 2.5 mm (2.4–2.6), head length = 1.8 mm (1.6–1.9), inter-tegular span = 1.4 mm (1.2–1.5), mesosomal width = 1.8 mm, metasomal width = 1.8 mm, forewing length = 6.6 mm (Fig. 1).

**Color:** Black except as follows: mandibles with apices dark brown, tegulae dark brown, wings slightly infuscated with veins brown, legs dark brown, becoming slightly lighter distally, spurs dark brown, claws translucent yellow with apical half more reddish, terga 2–5 with depressed apical third translucent brown.

**Structure:** Head much broader than long (Fig. 2), head width 1.41 x head length, facial quadrangle = 1.22 (1.19–1.26), eye length = 0.66 x head length (0.63–0.69), clypeal length = 0.36 x head length, eyes slightly diverging above, maximal separation just below apex so apical portion weakly convergent. Clypeus rounded medially and slightly projecting, apical margin strongly depressed, depressed area broadest above lateral margins of labrum. Clypeus weakly shiny, surface partially dulled by fine tessellation; punctures moderate and shallow, 1.5–2 puncture widths apart, slightly denser laterally, depressed apical margin shiny and nearly impunctate. Clypeus slightly raised medially, disc smooth, shiny with strong punctures 1–3 puncture widths apart, lateral portions dulled with weak shagreening with punctation denser, lower clypeal margin slightly protuberant medially beyond lower eye margin. Parocular area with sculpture similar to disc of clypeus. Supraclypeal area slightly raised, weakly shagreened with sparse punctures, with narrow, raised median carina extending from midpoint of antennal insertion to 1/3 distance to middle ocellus, frons dulled by fine striation over sparsely punctate ground, vertex sparsely punctate and dulled by fine shagreening. Diameter median ocellus = 0.18 mm, lateral ocellar diameter = 0.14 mm. Ocello-occipital distance slightly longer than lateral ocellar diameter, ocello-ocular distance = 4 x lateral ocellar diameter. Gena very broad medially (maximal width = 1.88 x lateral eye width), produced to rounded posterior margin, narrowing above and below; surface dulled and sparsely punctate except narrow, smooth, shiny impunctate band extending along eye. Antennae long (length = 1.35 mm), reaching posterior margin of scutellum in repose; scape length (0.60 mm) less than combined length of flagellar segments 1–3 (0.70 mm). Malar space linear. Mandibles slender and elongate, length = 1.3 mm, with subapical tooth, mandibular length 0.67 x inter-mandibular span. Antennae long (1.35 mm), reaching posterior margin of scutellum in repose, scape length (0.6 mm) less than combined length flagellar segments 1–3 (0.7 mm), first flagellar segment nearly twice length of second, third flagellar segment slightly longer than second. Labral process broad and short, strongly emarginate medially, surface smooth and shiny, apical margin approximately half width of basal width, length

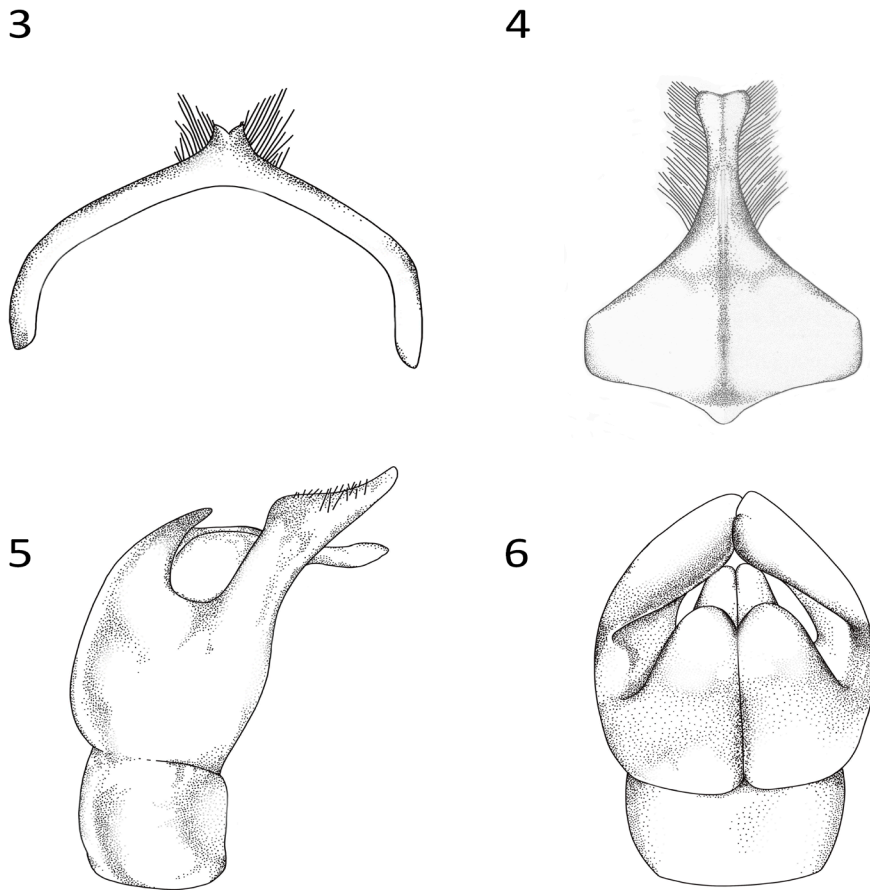
one fourth basal width. Galea short, length = 0.21 x head length, abruptly narrowed apically, surface smooth and shiny. Glossa short, 0.22 x head length. Length stipes 0.53 x head length, surface smooth and shiny, antero-dorsal margin with strong carina, lower margin straight. Surface of prementum smooth, length = 0.63 x head length. Maxillary palps 1.43 x as long as galea, ratio of segment lengths 8:7:5:5:3:5, segment 1 stout and cylindrical, segments 2-5 narrower but expanded apically, segment 6 narrow and linear. Labial palps short, half as long as galea, ratio of segment lengths 6:4:3:3, basal segment strongly arched.

Mesosoma: Pronotum with strong humeral angle, dorsoventral ridge weakly defined, interrupted medially by weak transverse depression, surface dulled by fine shagreening. Scutum slightly dulled by weak shagreening, surface with very small punctures, 2-4 puncture widths apart, scutellum with surface smooth, shiny, with few small widely separated punctures, metanotum very narrow, dull and impunctate; metapostnotum weakly delimited, surface irregularly roughened anteriorly and dulled by tessellation posteriorly, dorsal and posterior faces weakly distinguished. Mesepisterna slightly dulled by fine shagreening, appearing impunctate. Legs with surfaces smooth and shiny, without obvious modifications, basitibial plates small, shiny, impunctate, reniform, with raised margins; tibial spurs normal; claws all with long inner teeth. Tegulae unmodified, surface smooth and shiny. Wings with stigma large, three submarginal cells, first longer than third and much longer than second, ratio cell lengths on posterior margin 40:11:35; 1<sup>st</sup> recurrent vein nearly interstitial with 2<sup>nd</sup> transverse cubital vein, 2<sup>nd</sup> recurrent meeting posterior margin of third submarginal nearly at end of third submarginal. Metasoma: Surface of tergum 1 shiny with fine, very sparse punctures; discs of terga 2-6 with fine punctures 1-3 puncture widths apart, slightly dulled by fine tessellation, apical areas not depressed; pygidial plate absent. Sterna with surfaces shiny but weakly shagreened, with sparse, shallow punctures 2-4 puncture widths apart; sternum 6 with broad, shallow, apical, median emargination, lateral apices slightly reflexed; sternum 7 with distal medial process reduced to short, emarginate process with lateral fringes of short setae (Fig. 3); sternum 8 with distal process narrow, expanded apically with rounded apex, sides with rows of simple setae (Fig. 4). Gonocoxites with broad, elongate, apically rounded dorsal processes, distal processes of gonocoxites triangular in lateral view and flattened and expanded above (Fig. 5), penis valves narrowly rounded at tips, expanded basally (Fig. 6).

Vestiture: Head with long, sparse, erect, white hair on gena and hypostomal area with face appearing bare, scape with sparse long erect brown hair and vertex with short, erect black hair. Hair of mesosoma mainly sparse, pale and erect except mix of sparse pale and dark hair on scutum and scutellum and mainly short erect dark hair on upper anterior surface of mesepisternum; legs with sparse, erect pale hair except that of fore-tibia and -femur appearing darker. Hair of metasomal terga and sterna with complete but very weak, pale apical fascia, discs of terga 2-5 with short, erect dark hair.

♀: Unknown

HOLOTYPE: ♂, MEXICO: Mexico City; 16 mi. S., 8550 ft, August 28, 1963, Scullen & Bollinger coll., with additional labels: INHS Insect Collection #78879, *Andrena* (*Celetandrena*) *vinnula* LaBerge and Hurd, det W. E. LaBerge 2003, a small handwritten label with the number 30, and a larger UCE yellow label. The terminalia were pulled and mounted on paper attached to the pin. This is the specimen used for DNA extraction by Pisanty and colleagues and is the only specimen with its mouthparts



**Figures 3–6.** *Andrena nahua*, new species, male terminalia. 3. Sternum 7. 4. Sternum 8. 5. Genital capsule, lateral view. 6. Genital capsule, dorsal view.

extended. The locality label does not say Mexico but this is reasonably inferred.

**PARATYPES:** 1♂, Mexico: Puebla: 8 mi. W. Huachinango, 6540', 21 Aug 1962, Univ. Kans. Mex. Exped., additional label INHS Insect Collection # 78878, deposited Illinois Natural History Survey Insect Collection.; 1♂, MEXICO: Mexico: 22 mi. N. of Atacomulco, 8100', 18 Aug 1954, C. D. Michener and party; additional label INHS Insect Collection # 78877, deposited United States National Museum. Both specimens labeled "*Andrena* (*Celetandrena*) *vinnula* LaBerge and Hurd" det W. E. LaBerge 2003 and with their terminalia dissected and mounted on paper cards attached to their pins.

The specimens are in relatively poor condition, the wings (particularly the left wings) being badly wrinkled and hair and body surfaces partially obscured by matting, perhaps a byproduct of the relaxing technique used when the genitalia were removed. One paratype (IN78878) has its left hind tarsus missing and the right side of the scutum of the holotype is split open, perhaps due to damage when it was pinned, and the tip of its right mandible is broken.

**DEPOSITION:** The holotype and paratype 78878 will be deposited at the Illinois Natural History Survey, Champaign-Urbana, Illinois while paratype 78877 will be



deposited at the United States National Museum, Washington, D. C.

ETYMOLOGY: The name *nahua* is proposed as a noun in apposition and honors the Nahua, the largest modern indigenous group of Mexico, speakers of Nahautl, and the ancient inhabitants of the region of central Mexico where this bee occurs.

## DISCUSSION

The specimens on which *Andrena nahua* is based were originally identified as *A. vinnula* by LaBerge, one of the original describers of that species (LaBerge & Hurd, 1965). The males of both *A. nahua* and *A. vinnula* are superficially similar, both being small, large-headed, black bees from central Mexico, but they differ in many details. *Andrena nahua* is smaller (length 7.5–8.3 mm), has a weakly protuberant clypeus, and lacks both the extensive dark hair and facial maculation of *A. vinnula* which is larger (length 8–10 mm) and has a flat clypeus. In addition, all three male *A. nahua* had their genitalia dissected and mounted. These, while showing some broad similarities to those of *A. vinnula*, obviously differ from that species. The misidentifications may have been related to health problems that arose late in Dr. LaBerge's life.

Nothing is known of the biology of *Andrena nahua* other than its summer flight season. In the molecular phylogenetic analysis of *Andrena* by Pisanty *et al.*, (2022) *A. nahua* is sister to *A. (Dactylandrena) caliginosa* Viereck. An unpublished molecular study by Bossert found a similar relationship of *A. nahua* with *A. caliginosa* with the added relationship of *A. nahua* as sister to an undescribed species from southwest Texas and northern Mexico. This latter species is known from both sexes but lacks any of the distinctive characters of *A. nahua* and probably will require yet another new subgenus. *Dactylandrena* is a small group of four species from the western U. S. and Canada (LaBerge, 1986). Males of *Dactylandrena* have a maculate clypeus, a long malar space, elongate galea, and lack tergal apical fascia (LaBerge, 1986), all characters differing from those of *A. nahua*. As a result, *A. nahua* will not run to *Dactylandrena* in any extant key. The genitalia of *A. nahua* do share similarities with those of *Dactylandrena* such as the greatly reduced apical lobes of sternum 7 and the form of the gonocoxites but these are character states found in many other *Andrena* species. In the analysis of Pisanty and colleagues, *A. nahua* plus *A. (Dactylandrena) caliginosa* are nested in a clade of Old World species including *A. (Habromelissa) omogensis* Hirashima and two species of the subgenus *Troandrena*. From the keys in Michener (2007), *A. nahua* does not agree with the diagnoses of those Old World subgenera. As *A. nahua* does not fit easily within any currently recognized subgenus of *Andrena*, nor does it share any distinctive morphological characteristics with any of its closest relatives, placing it in its own subgenus seems appropriate for now.

## ACKNOWLEDGEMENTS

Gideon Pisanty first noted that a specimen labeled as *Andrena vinnula* in a loan from the Illinois Natural History Survey was not *A. vinnula* and sent the specimen to me for examination. Tommy McElrath of the Illinois Natural History Survey arranged the transfer of the loan of that specimen plus the loan of additional material listed in the Survey database likely to include more specimens of *A. nahua*. Comments by Beryl Simpson and an anonymous reviewer improved an earlier version of the manuscript. Victoria Puentes transformed the authors' crude sketches of the terminalia into

something publishable. Alex Wild took the microphotographs and Silas Bossert turned them into a plate.

#### REFERENCES

- Ascher, J. S. & J. Pickering. 2020. Discoverlife bee species guides and world checklist (Hymenoptera: Apoidea: Anthophila). ([http://www.discoverlife.org/mp20q?guide=Apoidea\\_species](http://www.discoverlife.org/mp20q?guide=Apoidea_species); last accessed 10 Nov 2023).
- Bossert, S., T. J. Wood, S. Patiny, D. Michez, E. A. B. Almeida, R. L. Minckley, L. Packer, J. L. Neff, R. S. Copeland, J. Straka, A. Pauly, T. Griswold, S. G. Brady, B. N. Danforth & E. M. Elizabeth. 2022. Phylogeny, biogeography, and diversification of the mining bee Andrenidae. *Systematic Entomology* 47: 283–302.
- Cane, J. H. 1987. Estimation of bee size using intertegular span (Apoidea). *Journal of the Kansas Entomological Society* 60: 145–147.
- Gusenleitner, F. & M. Schwarz. 2002. Weltweite Checkliste der Bienengattung *Andrena* mit Bemerkungen und Ergänzungen zu paläarktischen Arten (Hymenoptera, Apidae, Andreninae, *Andrena*). *Entomofauna* (Suppl. 12): 1–1280.
- LaBerge, W. E. 1964. Prodromus of the American bees of the genus *Andrena* (Hymenoptera, Apoidea). *Bulletin of the University of Nebraska State Museum* 4: 279–316.
- LaBerge, W. E. 1967. A revision of the bees of the genus *Andrena* of the Western Hemisphere. Part 1. *Callandrena* (Hymenoptera: Andrenidae). *Bulletin of the University of Nebraska State Museum* 7: 1–316.
- LaBerge, W. E. 1986. A revision of the bees of the genus *Andrena* of the Western Hemisphere. Part XI. Minor subgenera and subgeneric key. *Transactions of the American Entomological Society* 111: 440–567.
- LaBerge, W. E. & P. D. Hurd. 1965. A new subgenus and species of matinal *Andrena* from the flowers of *Sicyos* (Cucurbitaceae). *Pan-Pacific Entomologist* 41: 186–193.
- Michener, C. D. 2007. *The Bees of the World* [2<sup>nd</sup> Edition]. The Johns Hopkins University Press; Baltimore, MD; xvi +[i]+ 953 pp., + 20 pls.
- Pisanty, G., R. Richter, T. Martin, J. Dettman & S. Cardinal. 2022. Molecular phylogeny, historical biogeography and revised classification of andrenine bees (Hymenoptera: Andrenidae). *Molecular Phylogenetics and Evolution* 170: 107051.

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