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NEW NORTH AMERICAN BEES OF THE GENUS DUFOUREA

(Apoidea—Halictidae)

PART III

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Four new species and two new subspecies of the genus *Dufourea* have come to light since parts I and II of the series under the above title were written. Addition of these plus the recognition of *D. spilura* (Ckll.) as a valid species raise the total number of recognized species of American *Dufourea* to sixty-one. It is probable that several more will be found within the next few years. This is especially likely in the Sierra Nevada and Coast Range mountains of California where large areas have been inadequately collected for bees from March to May.

Unless otherwise stated, holotypes and allotypes of the new bees herein described will be deposited at the California Academy of Sciences in San Francisco. Paratypes will be distributed to the following collections besides the author's: United States National Museum; University of California Citrus Experiment Station, Riverside, California; American Museum of Natural History, New York. When available, additional paratypes will be sent to other collections upon request.

Dufourea subdavidsoni n. sp.

Male.—Length about 9 mm., length of anterior wing 5 mm.; pubescence mostly white to pale testaceous but with hair on scape and the longer hairs on vertex and mesonotum mostly black; integument dark, with distinct bluish metallic reflections to entire body except legs, antennae, abdominal sternum, and apical borders of abdominal tergites. *Head*: Face length over breadth, five over six; eyes nearly parallel, the distance between them at antennal insertion nearly one-fourth greater than eye length; face viewed from in front with distance behind posterior ocellus at least twice as great as ocellar diameter; area between posterior ocellus and nearest point of eye shallowly concave; distance from antennal socket to clypeus about equal to socket diameter; clypeus nearly concealed by reclining whitish pubescence which is mostly longer than antennal scape; upper margin of clypeus and lower parietal region with similarly long but more erect black hair; punctures of frons and vertex coarse and dense, mostly separated by less than one-half a puncture diameter; antennae black to dark brown; scape flattened, about twice as broad as long, bearing long grey and a few long blackish hairs; flagellum as long as hind tibia and metatarsus together, the segments without long hairs and very slightly expanded subapically, fourth flagellar segment with basal two-thirds of upper side smooth; first flagellar segment two-thirds, second three-fourths and third quite

as broad as long; maxilla with stipes about as long as eye; galea beyond palpus about twice as long as broad and sharply pointed; maxillary palpus about half as long as stipes, first segment twice as long as broad, twice as long as second which is subequal to each of remaining segments; labial palpus three-fourths as long as maxillary, first segment three times as long as broad, twice as long as each of remaining, second segment as broad as first, twice as broad as succeeding segments; glossa shorter than labial palpus; mandible only slightly dilated along outer margin, about one-fourth as wide as distance from its apex to eye, its outer basal two-thirds bearing a dense tuft of yellowish hairs as long as the eye. *Thorax*: Mesoscutum, mesoscutellum coarsely, moderately closely punctured, the punctures on the average somewhat less than one puncture width apart except for central area of mesoscutum, the interpunctural areas polished; mesoscutum with short, sparse, whitish hair and long, sparse black hair which is about as long as antennal scape; hypopleural area of mesopleuron with about ten widely scattered punctures; wings definitely yellow-tinged, the first transverse cubital vein offset from the first recurrent by about half its own length; hind wing with seven hamuli; legs very slender, without swollen segments; hind leg with femur three times, tibia four times and metatarsus five times as long as their respective breadths; second and third hind tarsal segments slightly longer than broad and somewhat produced dorso-apically; ventral margin of hind tibia with dense fringe of whitish hairs ranging from about half as long to quite as long as tibia; outer face of metatarsus with scattered, very long hairs; hind tibial spurs long and slender, the inner one four-fifths as long as metatarsus and margined with close-set, needle-like teeth. *Propodeum*: Enclosure coarsely, evenly carinate, with about 12 carinae on either side of mid-line. *Abdomen*: Dorsal portions of tergites with punctures mostly slightly over one puncture width apart and entirely covered with whitish pubescence nearly concealing integument when viewed from in front; posterior tergite borders testaceous, with indistinct hair bands; sternites with distinct apical hair bands in addition to short, erect white hair on remainder of first four; posterolateral hooklets of fourth and fifth sternites represented by a minute swelling and a pit respectively; fourth and fifth sternites each with a discreet area of hair medially on a broadly rounded production of the apical margin which is otherwise broadly emarginate; sixth with a median depressed area bounded laterally by strong carinae and terminated apically by a transverse ridge which is almost at the gently emarginate apex of the segment; posterior arms of seventh broadly rounded apically, somewhat longer than their basal, ventral flaps, and each tipped with a hair tuft as long as the arm; posterior projection of eighth about two and one-half times as long as its basal breadth which is about three times as great as its apical breadth.

Female.—Length about 8.5 mm., length of anterior wing 5 mm.; slender in form with pubescence rather long, mostly yellowish white to testaceous but with numerous long sooty to blackish hairs on clypeus, scape, vertex, mesoscutum and posterior margins of apical tergites; integument with distinct bluish tinge on head and thorax but essentially black on clypeus and abdomen. *Head*: Face five-sixths as long as broad; inner eye margins parallel; eye length slightly over three-

fourths interocular width at antennal insertion; distance from antennal socket to clypeus about three-fourths socket diameter; distance from posterior ocellus to vertex about equal to ocellar diameter; hair on clypeus, lower portion of frons as long as apical fringe hairs of clypeus; clypeus with at least 50 punctures; punctures of frons mostly much closer than one puncture width apart except near ocelli; mouthparts (except mandibles) similar to those of holotype. *Thorax*: Mesoscutum with punctures of central half a little finer than those of frons and mostly separated by more than one puncture width; mesoscutellar punctures about one puncture width apart; hypopimeron with lower half bare, upper half densely, coarsely punctured; dorsal vestiture testaceous and short except for numerous long, sooty hairs; hind wing with eight hamuli; posterior tibia over four times, posterior metatarsus over five times as long as their respective breadths; mid tibial spur uniformly testaceous; tibial scopa sparse, whitish ventrally, sooty dorsally. *Abdomen*: First tergite as long as broad and rather uniformly covered with fine punctures which are mostly several puncture widths apart; tergites with subapical hair fringes testaceous to sooty, sparse except on tergites five and six; anal fimbria reddish testaceous.

Holotype male, *allotype* female, 8 male and 3 female paratypes: Giant Forest, Tulare Co., Calif., July 16-26, 1923 (C. L. Fox). One male paratype, Tallac, Lake Tahoe, Calif., July 17, (1925?), (E. P. Van Duzee). I also have a female specimen from Gold Lake, Sierra Co., Calif., July 26, 1921 (C. L. Fox) which appears to be this rather than *D. scabricornis* n. sp.

One male specimen from Giant Forest has the first three antennal segments of about the same proportions as the other species of this group. Several of the males also have more black hair on the scape than has the holotype.

This species is very close to *D. davidsoni* (Ckll.), *D. spilura* (Ckll.), and *D. scabricornis* n. sp. The male may be distinguished readily from any of these by the gently emarginate apex of the sixth abdominal sternite. The female has sparser mesoscutal punctures than *D. davidsoni* or *D. spilura* and appears to have finer ones than *D. scabricornis* n. sp. It is probable, however, that some female specimens will prove to be indistinguishable.

Dufourea scabricornis n. sp.

Male.—Very close to holotype of *D. subdavidsoni* n. sp. but differing as follows. *Antennae*: Scape with black hairs more numerous and conspicuous than pale ones; upper side of fourth flagellar segment over one-half and eleventh about one-third roughened; first flagellar segment half, second two-thirds, and third five-sixths as broad as their respective lengths. *Mesoscutum*: punctures rather sparse and irregularly placed, often separated by two or more puncture widths peripherally as well as centrally. *Abdominal sternites*: fourth and fifth with apical hair fringes continuous but reduced sublaterally; sixth with median depressed area produced apically into a pair of projections separated by a V-shaped notch and with the subapical transverse ridge bounded laterally by a pair of bosses.

Female.—Very close to allotype of *D. subdavidsoni* but with punctures of mesoscutum considerably coarser than those of mesoscutellum.

Holotype male: Brockway, Lake Tahoe, Calif., elev. 6400 ft., July 10, 1941 (G. E. Bohart). *Allotype*: Jenny Lake, Grand Teton National Park, Wyo., July, 1937 (J. W. MacSwain). *Paratypes*: 1 male, Coffee Creek, Trinity Co., Calif., elev. 5500 ft., June 22, 1934 (T. H. Aitken); 1 male, Carrville, Trinity Co., Calif., elev., 2500 ft., June 15, 1934 (G. E. Bohart); 3 males (2 damaged) same as for allotype; 1 male, Timpanogos Mtn. near Provo, Utah, June 25, 1925 (A. L. Melander).

The specimen from Utah is slightly smaller than the others but otherwise the type series is very uniform.

This species is in a closely knit group with *D. davidsoni* (Ckll.), *D. spilura* (Ckll.) and *D. subdavidsoni* n. sp. The male can be distinguished from *D. spilura* by the absence of long hairs on the flagellum, from *D. davidsoni* by the smaller antennae, the greater extent of roughness on the fourth and last flagellar segments, and from *D. subdavidsoni* by the deeply V-shaped notch at the apical margin of the sixth abdominal sternite. It also differs from *D. spilura* and *D. davidsoni* in having relatively unexpanded mandibles, in which regard it resembles *D. subdavidsoni*. The female, represented by one specimen in poor condition, apparently has a more sparsely and coarsely punctured mesoscutum than the related species. There may be justification for considering the four species of this group as subspecies inasmuch as they are practically indistinguishable in the female sex and have fewer distinguishing characteristics in the male than is usual with *Dufourea*. However, no intergradation of essential characters has been found and the territories of at least three of them overlap. To my knowledge, two or more of these species have not been collected together.

Dufourea impunctata n. sp.

Male.—Length about 8 mm., length of anterior wing 4.5 mm.; pubescence wholly pale, mostly white; integument shining jet black, with no trace of bluish or greenish reflections. *Head*: Face length over breadth 5 over 5.5; eyes nearly parallel, very slightly convergent below, the distance between them at antennal sockets slightly greater than eye length; face, when viewed from front, with distance behind posterior ocellus nearly twice ocellar diameter; area laterad to posterior ocellus flattened; distance from antennal socket to clypeus slightly greater than socket diameter; clypeus, supraclypeal area largely concealed by dense, white pubescence, long and suberect on the former, prostrate on the latter except laterally; punctures of frons coarse, mostly separated by about one puncture width except for nearly impunctate areas surrounding ocelli; pubescence of frons, cheeks long, sparse, entirely pale; antennae black basally, dark brown above on last ten segments, about one-half as long as anterior wing, the flagellar segments not at all swollen medially, slightly broader than long except for last two which are longer than broad; underside of flagellum distinctly flattened, with several rows of pale hairs bent at their middles to right angles and about half as long as flagellar width; scape nearly as broad as long, covered with long white hair; maxillary stipes three-fourths as long as hind tibia; the galea beyond palpus about one-third as long as prepupal portion and less than three times as long as broad; maxillary palpus five-sixths as long as stipes, the second segment about three times as

long as broad and one-third longer than any of others which are subequal; labial palpus about three-fourths as long as maxillary, the first segment equal to next two combined. *Thorax*: Mesoscutum polished, nearly impunctate except for fine scattered punctures anterior and lateral to parapsidal furrows; mesoscutellum more densely punctured but with punctures rather fine and mostly two or more puncture widths apart; mesoscutal and scutellar hair long, white, sparse, not at all concealing integument from any view; wings clear, without yellow or grey tinge, the veins pale testaceous; first recurrent vein offset from first transverse cubital by nearly its own length; hind wing with seven hamuli; legs somewhat swollen but without striking modifications; femora about half as broad as long, the first two broadest subbasally; hind tibia about two and three-fourths times as long as broad; hind metatarsus parallel-sided, about three and one-half times as long as broad; next three segments about as broad as long, slightly produced posteriorly; hind tibial spurs not over half as long as metatarsus, their margins with numerous, fine, close-set teeth. *Propodeum*: Enclosure strongly, evenly carinate throughout, with about 18 distinct carinae on either side of mid line; vertical posterior portion of enclosure smooth, without transverse carinae even at summit. *Abdomen*: Tergites with very sparse, setigerous punctures, the central two-thirds of the first almost impunctate; posterior tergite borders transparent, appearing black when closely applied to succeeding segments, and not preceded by distinct hair bands except for sparse ones on fifth and sixth tergites; sternites polished, with indistinct, fine pubescence except for that of apical borders where it forms a band of erect to recurved hairs on third and fourth segments; fourth also with a pair of strongly recurved hooklets posterolaterally; fifth evenly emarginate; sixth medially depressed, with a flat, subtriangular, apically truncate projection, about as broad as long, a little longer than antennal scape, and entirely covered with a long, dense tuft of yellowish hair; posterior arms of seventh with long hair tufts and about half as broad as their lengths beyond the basal flaps which have inner, apical, pointed extensions; apical projection of eighth with proximal half triangular, distal half nearly parallel-sided, less than one-fourth as broad as base.

Holotype male, 1 male *paratype*, "So. Cal." from the collection of the Philadelphia Academy of Sciences where the holotype will be deposited.

This is a very distinct species, probably related to *D. nudicornis* Timb. but easily separated by its non-crenulate antennal flagellum which bears bent hairs ventrally. Its non-metallic integument and sparse punctation distinguish it from species having similar antennae.

***Dufourea convergens* n. sp.**

Male.—Length about 6 mm.; length of anterior wing 4.5 mm.; hair wholly pale, mostly white, rather long, not dense; integument dark greenish blue; body rather robust. *Head*: Face length over breadth 6 over 7.5; eyes distinctly convergent below, the distance between them at their lower margin three-fifths that at their extreme summits; eye length slightly less than distance between them at antennal insertions; clypeus over twice as broad as long, densely punctured, covered with

long, dense, reclining, white hair; supraclypeal area similarly punctured and haired; distance from antennal socket to clypeus about equal to socket diameter; hair of cheeks, frons, vertex white, long, quite sparse; frons, vertex moderately finely, closely punctured, the punctures mostly less than one puncture width apart, but somewhat sparser near ocelli; area between lateral ocellus and compound eye well rounded; face, viewed directly from in front, with distance behind lateral ocellus less than half ocellar diameter; antenna short, black to dark brown, flagellar segments, except first, as broad as or broader than long, the apical seven each slightly crenulate on outer side; scape rather flat, over twice as long as broad; flagellum bare except for usual minute general pubescence; maxilla with stipes about four-fifths as long as hind tibia; galea about one-third as long as stipes, narrowly rounded apically; maxillary palpus about two-thirds as long as stipes, first segment about three times as long as broad, a little longer than second, twice as long as any of remaining segments; labial palpus about half as long as stipes, first segment as long as next two combined. *Thorax*: Mesoscutum finely, rather densely punctured, the punctures somewhat less than one puncture width apart anteriorly and laterally, slightly more centrally, posteriorly; mesoscutum with short, white pubescence in addition to longer, sparser white hair (rather matted with moisture in available specimen); area above mesonotal spiracle bare ventrally, with about 15 fine punctures dorsally; thorax remarkably broad and deep for the genus; wings slightly brownish, the first transverse cubital vein offset from first recurrent by two-thirds its own length; legs of moderate girth and not conspicuously modified; fore and mid femora over twice as long, hind femur thrice as long as broad; hind tibia four times as long as broad, nearly as broad apically as subapically, covered with white hair which is much shorter than tibial width; hind metatarsus five times as long as broad, the succeeding two segments each nearly twice as long as broad. *Propodeum*: Enclosure five times as broad as long, the median half with fine, irregular carinae, the lateral portions with rather widely spaced, regular carinae. *Abdomen*: First tergite highly polished, with rather numerous but very fine and widely separated punctures; succeeding tergites with subapical hair bands weakly developed, those of fourth and fifth scarcely distinct from general pubescence; apical tergite with a distinct narrow, bare pygidial area; sternites nearly bare, without sublateral hooklets or callosities; fourth and fifth sternites simply transverse on apical margins; sixth unmodified except for a very small, pointed but flat apical projection; apical lobes of seventh broadly rounded distally, the portions projecting beyond their basal, ventral flaps about as broad as long; apical projection of eighth slender nearly to extreme base, with the distal swelling, viewed from the side, shaped like a short foot with a well-developed instep; penis valves, viewed from the side, with free portions leaf-like, each about two-thirds as broad as long, highly arched dorsally, and extending for one-third its length beyond the gonostyli.

Holotype male (unique): San Diego, California (collector and date of collection unknown); from California Academy of Sciences collection.

This is in a small, compact group including *D. leachi* Timb. and *D. viridis* Timb. The group is easily distinguished in the male sex by

the relatively simple sixth sternite and by the globose genitalia. Females resemble members of the *D. sandhouseae* (Mich.) group quite closely. *D. convergens* may be separated from *D. viridis* by its blue instead of green color and by the foot-like structure at the apex of the eighth sternite. It may be separated from *D. leachi* by the eyes which are more strongly convergent below and by the penis valves which are more highly arched and extend considerably beyond the gonostyli.

***Dufourea australis mexicana* n. subsp.**

Male.—Differs from *D. australis australis* (Mich.) and *D. australis dammersi* Timb. (new combination) in being smaller (body length 6 mm. and anterior wing length 4 mm. as against average measurements of 8 mm. body and 5 mm. wing for the other subspecies), and narrower (distance between tegulae 1 mm. as against an average of nearly 1.5 for the others). It also has a more nearly jet black ground color with the posterior tergite borders showing black instead of brown against the succeeding tergites. The vestiture is very sparse and that of the scape and paraocular areas has many sooty hairs in addition to white ones. Punctuation is moderately sparse and fine, the punctures of mesoscutum and mesoscutellum being mostly separated by two or more puncture widths and those of the first apparent tergite by three or four.

Female.—Differs from the other subspecies in essentially the same characteristics as the male. Its body and wing length compare closely with the male's and its ground color, vestiture length and color, and punctuation likewise differ from the other subspecies. It has closer punctuation than the male, the punctures of the anterior half of the mesoscutum being slightly less than one and of the central portion about one puncture width apart. Punctuation of females of the other subspecies is still closer. An additional difference exhibited by the female is the considerable amount of sooty mesoscutal pubescence.

Holotype male, *allotype* female, 8 paratype females and two paratype males, La Laguna, Sierra Laguna, Lower California, October 14, 1941, from a composite (G. E. Bohart and E. S. Ross).

This may represent a distinct species but its distinguishing characteristics of size, ground color, hair color, and density of punctuation are usually considered of subspecific value. It seems to represent the small, dark, sparsely punctured extreme of a series of subspecies in which the other extreme is the relatively large, yellowish haired, densely punctured *D. australis australis*.

***Dufourea sandhouseae arida* n. subsp.**

Male.—Differs from *D. sandhouseae sandhouseae* (Mich.) in having the hind tibia slightly less than one-third as broad as long (in the latter it is usually one-third or more) and in having a brighter yellow antennal flagellum. Punctures of the central portion of the mesoscutum are quite fine and average at least two puncture widths apart. In most males of *D. sandhouseae* s. str. the thoracic punctures are somewhat closer. The clypeus has a patch of long, erect hairs confined to the central portion whereas in most *D. sandhouseae* s. str. it occupies most of the clypeus.

Female.—Outer side of antennal flagellum reddish testaceous on

apical six segments instead of dark brown to dull yellowish brown as is the case with most *D. sandhouseae* s. str. As in the male, punctuation is slightly finer.

Holotype male, *allotype* female, four male and two female paratypes: Westgard Pass Plateau, Inyo Co., Calif., May 27, 1937, from *Phacelia* (C. D. Michener). Other paratypes: one male, Westgard Pass, Calif., May 19, 1947 (R. M. Bohart); 1 male and females, Mt. Springs Cyn., Argus Mts., Inyo Co., Calif., elev. 5000 ft., May 22, 1937 (N. W. Frazier); 4 males, Palmdale, Los Angeles Co., Calif., April 11, 1936 (G. E., R. M. Bohart); 1 male, Baker, Calif., March 15, 1935; 1 male, Poway, Calif., March 22, 1890 (F. E. Blaisdell).

This subspecies represents an arid type. Intermediate specimens are found in the inner Coast Ranges (Priest Valley, Monterey Co., Calif.) and occasionally in any area largely populated by distinctive members of one or the other subspecies. Antennal flagellar color of the males from Inyo County varies from reddish yellow to a rather pale yellow but does not assume the dull brownish yellow typical of the more coastal form. Females of *D. s. arida* are apt to be confused with females of *D. malacothricis* Timb. in whose territory they are frequently found. The latter differ principally in having very fine and rather sparse mesonotal punctures.