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Notes on Some *Polistes* in the American Museum of Natural History, with De- scriptions of New North American Subspecies (Hymenoptera, Vespidae)

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The present paper is presented at this time in order that certain names which I have distributed to various collections may be validated and to present a few comments on the systematics and distribution of some North American *Polistes*.

I wish to express my deep indebtedness to Dr. Mont A. Cazier for making available to me most of the material recorded below. Thanks are due also Dr. Paul D. Hurd, Jr., of the University of California at Berkeley and Dr. George D. Butler, Jr., of the University of Arizona at Tucson for lending me material from their respective collections. Thanks are extended also to Mr. John J. duBois of Turlock, California, for the gift of certain very interesting specimens.

GROUP OF *Polistes gallicus* (LINNÉ)

Bequaert (1918, 1937) has characterized this group as follows: "Prepectal suture and median mesepisternal groove both present; the median mesepisternal groove sometimes incomplete or weakly developed."

Such tropical species as *Polistes major* Beauvois, *P. thoracicus* Fox, *P. testaceicolor* Bequaert, and *P. ruficornis* de Saussure belong to this group. Of these, only the first named occurs in the United States.

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Polistes major major Beauvois

Polistes major BEAUVOIS, 1818, Insectes recueillies en Afrique et en Amérique, p. 206. BEQUAERT, 1936, Ent. News, vol. 47, pp. 10, 11; 1937, Arch. Inst. Biol. Veget., vol. 3, p. 174; 1940, Jour. New York Ent. Soc., vol. 48, p. 15.

This widely distributed species occurs in the southwestern United States, Mexico, Guatemala, Honduras, Nicaragua, Cuba, Isle of Pines, Santo Domingo (type locality), Tortuga Island, Navassa Island, the Bahamas, and Puerto Rico.

SPECIMENS EXAMINED: *United States*: Arizona: Nogales, August 17, 1940 (J. J. duBois; collection Snelling), three females. *Mexico*: Sonora: Bakachaka, Rio Mayo, July 6, 1935 (collection Snelling), three females; Sonora, no further data (C. Lumholtz), one female. Tamaulipas: Eleven miles north of Victoria, May 22, 1952 (M. Cazier, W. Gertsch, R. Schrammel), one female; 9 miles south of Victoria, May 18, 1952 (M. Cazier, W. Gertsch, R. Schrammel), one female. Jalisco: Guadalajara, July–August, 1903 (collection W. Towers), one female. Morelos: Guautla, July–August, 1903 (collection W. Towers), one female. Sinaloa: Ten miles south of Guasave, 100 feet, April 30, 1949 (G. M. Bradt), two females; Mazatlan, no further data except the numeral "2," one female. Oaxaca: Oaxaca, 5000 feet, July 17, 1937 (collection Snelling), one female. *Cuba*: Havana: Havana, December 22, 1951 (A. D. Cerice; collection Snelling), four females.

Except for the cases noted above, all this material is from the collections of the American Museum of Natural History.

Polistes major bakeri Bequaert

Polistes major var. *bakeri* BEQUAERT, 1940, Jour. New York Ent. Soc., vol. 48, p. 15.

Among the material submitted by Dr. Cazier, I have determined the following as *P. major bakeri*. Most of these agree in all the important characters of this form as given by Bequaert in the original description.

SPECIMENS EXAMINED: *United States*: Texas: Basin, Big Bend National Park, Brewster County, 3000–4000 feet, September 27, 1950 (W. Gertsch, M. Cazier), 13 females. *Mexico*: Chihuahua: 27 miles west of Chihuahua, August 15, 1950 (R. F. Smith), one female; Santa Barbara, 6200 feet, April 22, 1947 (G. M. Bradt), one female; same locality and collector, May 11, 1947, one female; 19 miles south of Parrita, August 13, 1950 (R. F. Smith), one female.

During my studies of *Polistes*, I have been able to study material of all the described forms of *Polistes major*, except the subspecies *bonaccansis* Bequaert (1937). This subspecies is placed in the key on the basis of the description.

KEY TO THE COLOR FORMS OF *Polistes major*

1. Thorax more or less extensively marked with yellow; abdomen with broad apical fasciae on all tergites 2
Thorax without, or with much reduced, yellow maculi 5
2. Ground color reddish; wings russet-fuscous or reddish brown 3
Ground color cinnamon to blackish brown; wings dark cinnamon-brown, russet tinged 4
3. Dark areas of body light ferruginous brown; no black markings along pleural sutures, towards leg bases, middle of propodeum, and on bases of terga 1 and 2; wings russet-fuscous, reflecting purplish (Riverside County, California) *palmarum* Bequaert
Dark areas of body dark reddish; black markings present along pleural sutures, towards leg bases, middle of propodeum, and on bases of terga 1 and 2; wings reddish brown, veins brown (Baja California, Mexico) *sleveni* Bohart
4. Thorax extensively marked with yellow, the propodeum almost entirely of that color (southern Arizona, Mexico, Central America) . . . *major* Beauvois
Thorax with reduced yellow markings, propodeum entirely black (Texas and Chihuahua) *bakeri* Bequaert
5. Body almost uniformly dark chestnut-brown; only tarsi and blotches on head (rarely on thorax) yellowish; abdomen without yellow fasciae (Arizona and Sonora) *castaneicolor* Bequaert
Dark areas of body dark chestnut-brown; the abdominal terga mostly with broad apical orange-yellow or yellow fasciae *bonaccensis* Bequaert

GROUP OF *Polistes canadensis* (LINNÉ)

The group characters as defined by Bequaert (1937) are: prepectal suture absent; median mesepisternal groove distinct and complete.

This is the largest group of American *Polistes* and contains a large number of species and subspecies.

Polistes carnifex carnifex (Fabricius)

Vespa carnifex FABRICIUS, 1775, Systema entomologiae, p. 365.

Polistes carnifex FABRICIUS, 1804, Systema piezatorum, p. 272. DE SAUSSURE, 1853-1855, Étude sur la famille des vespides, vol. 2, p. 90, pl. 10, fig. 5; 1857, Ann. Ent. Soc. France, ser. 5, vol. 5, p. 314. FOX, 1893, Proc. California Acad. Sci., ser. 2, vol. 4, p. 14; 1894, *ibid.*, ser. 2, vol. 4, p. 112 (in part). DUCKE, 1904, Bol. Mus. Goeldi, Para, vol. 4, p. 368; 1905, *ibid.*, vol. 4, p. 691; 1907, *ibid.*, vol. 5, pp. 191, 195. BEQUAERT, 1928, Bull. Brooklyn Ent. Soc., vol. 23, p. 58; 1936, Rev. de Ent., vol. 6, pp. 378-391.

Polistes oerata LEPELETIER, 1836, Histoire naturelle des insectes, hyménoptères, suites à Buffon, Paris, vol. 1, p. 524.

Polistes valida SAY, 1837, Boston Jour. Nat. Hist., vol. 1, pt. 4, p. 389; in Lecote, Writings of Thomas Say, 1859, vol. 2, p. 769.

Polistes transverso-strigata SPINOLA, 1851, Mem. Acad. Sci. Torino, ser. 2, vol. 13, p. 78.

For a more complete reference list, the reader is referred to Bequaert (1936).

Bequaert has provided a key to the known color forms in his paper of 1936.

SPECIMENS EXAMINED: *United States:* Arizona: Nogales, August 17, 1940 (J. J. duBois; collection Snelling), two females. *Mexico:* Baja California: La Paz, July 7, 1953 (R. R. Snelling), one female. Sonora: Sonora (C. Lumholtz), no further data, seven females. Sinaloa: Mazatlan, no further data except the numeral "42," one female. Nayarit: Twenty-five miles northwest of Tepic, October 8, 1950 (R. F. Smith), three females. Veracruz: Finca el Mirador, Huatusco, August 28, 1947 (H. M. Wegener), two females, one male. Jalisco: Guadalajara, September, 1903 (collection Snelling), one female. Morelos: Cuautla, July-August, 1903 (collection Snelling), one female.

This species is here recorded for the first time from the United States.

Polistes exclamans Viereck

Polistes exclamans Viereck belongs to a small complex of tropical wasps recognizable by their small size, slender build, barely bulging second sternum, elongate first tergum, weakly developed propodeal striae, and lack of a mediobasal tubercle on the seventh male sternum. In addition to *exclamans* this complex includes such species as *P. instabilis* de Saussure, *P. cubensis* Lepeletier, and *P. versicolor* (Olivier). The females of this complex are often quite difficult to separate satisfactorily, and the best characters are to be found in the males, as is usually the case in many of the complexes in this genus. In the following key to the color forms of *P. exclamans*, I include the nominotypical form of *P. instabilis*, which is particularly like the female of *exclamans* in structure.

KEY TO COLOR FORMS OF *Polistes exclamans*¹

1. Pale markings much reduced; whitish maculi as follows: narrow margin of pronotum, tegulae mostly, anterior angles of the scutellum, anterior margin of postscutellum narrowly, elongate spot on mesopleura below tegulae, two narrow fasciae on first three terga, and legs partly; ground color of head, thorax, and abdomen reddish mahogany brown (New Orleans, Louisiana) *e. exclamans* Viereck, var.
 Pale markings, if reduced, yellow; ground color of head, thorax, and abdomen often largely blackish 2
2. Mesonotum with longitudinal yellow stripes 3
 Mesonotum without longitudinal yellow stripes 5
3. Mesonotum and propodeum with four yellow stripes; ground color of head, thorax, and abdomen reddish (Baja California, Mexico)
 *e. lineonotus* Bohart

¹ Because of the difficulties involved in separating the males of the various subspecies, I have omitted them from the key. They must be arbitrarily matched to the females from the same or near-by areas.

- Mesonotum with two or four yellow stripes; ground color of head and thorax mostly black (Bahama Islands group) 4
4. Yellow markings of moderate extent; mesonotum and propodeum each with two narrow, short lines; face partly reddish brown; apical fasciae of abdominal segments narrow (New Providence Island, Eleuthera, Bahamas, Bimini Island) *e. bilineolatus* Bequaert and Salt
- Yellow markings very extensive; mesonotum with four wide longitudinal stripes; propodeum extensively yellow; face mostly yellow; apical fasciae of abdominal segments broad (Acklin Island, Mariguana, Rum Cay, etc.) *e. picturatus* Bequaert and Salt
5. Under side of thorax reddish, hardly if at all suffused with blackish . . . 6
- Under side of thorax black, or very strongly suffused with that color; abdomen frequently black beneath 7
6. Yellow markings of body extensive; mesopleura and propodeum largely of that color; abdomen with broad apical fasciae on all terga and sterna; wings smoky, slightly purplish (eastern and southern United States) *e. exclamans* Viereck
- Yellow somewhat more reduced; first three terga and second sternum only with narrow apical fasciae; ground color of abdomen varying from brown to brownish black (Arizona, California, and Sonora) . *e. arizonensis* Snelling
7. Head and thorax black and ferruginous, abdomen ferruginous red with black base; usually only first tergum with broad apical yellow fascia, rarely second also with narrow fascia (Andros Island, Florida) *e. bahamensis* Bequaert and Salt
- Head reddish, under side of thorax and sometimes abdomen black; at least first three terga with apical fasciae 8
8. Ground color very dark ferruginous; sometimes with dull yellow apical fasciae on first four terga (Florida) *e. bahamensis* Bequaert and Salt, var. At least first three terga with broad apical yellow fasciae, the yellow sometimes approaching sulphur color; ground color light ferruginous (Mexico) 9
9. All terga with broad apical fasciae, under side of abdomen mostly yellow with black basal marks on second and third sterna; mesopleura with two yellow spots (Durango and Chihuahua) *e. durangoensis*, new subspecies
- First three, rarely first four, terga with narrow apical fasciae; under side of abdomen largely black, second sternum rarely with a narrow apical fascia, more often with two widely separated apico-lateral spots; mesopleura with a single yellow spot; widely distributed *i. instabilis* de Saussure

Polistes exclamans exclamans Viereck

Polistes exclamans VIERECK, 1906, Trans. Amer. Ent. Soc., vol. 32, p. 201.
 BEQUAERT, 1940, Jour. New York Ent. Soc., vol. 48, p. 13.

Polistes exclamans var. *louisianus* BEQUAERT, 1940, Jour. New York Ent. Soc., vol. 48, p. 14. New synonymy.

The form that Bequaert described as *louisianus* from New Orleans, Louisiana, I do not regard as worthy of separation from the nomino-typical form. Because a subspecies is marked by an average difference from all other forms of the species, and the vast majority of specimens

that I have seen from New Orleans are to be referred to the typical form, I feel that *louisianus* is merely a population variation brought about from time to time through certain unknown influences. I have examined the populations of two nests of *exclamans* taken in New Orleans, and in both cases almost 95 per cent of the total number of wasps were typical, the remainder being almost equally divided between the intergrades and the *louisianus*-like form. Also, in a nest which I collected in Lawrence, Douglas County, Kansas, of a total of 93 wasps, 92 were *exclamans* and one was *louisianus*. I had never seen this form from Kansas except on that occasion.

SPECIMENS EXAMINED¹: Florida, Georgia, North Carolina, Alabama, Louisiana, Mississippi, Kansas, Oklahoma, and Texas.

Polistes exclamans arizonensis Snelling

Polistes exclamans subsp. *arizonensis* SNELLING, 1954, Jour. Kansas Ent. Soc., vol. 27, p. 152.

This form is apparently peculiar to the Sonoran deserts of the extreme southwest. I have thus far seen it from Arizona (type locality, Baboquivari Mountains), California, and Sonora.

Arizonensis differs from the typical form in the much reduced maculi and the darker, usually violaceous, wings. The dark areas of the body vary from dark ferruginous or cinnamon red to almost black.

Polistes exclamans bahamensis Bequaert and Salt

Polistes bahamensis BEQUAERT AND SALT, 1931, Ann. Amer. Ent. Soc., vol. 24, pp. 793-796.

Polistes exclamans bahamensis, BEQUAERT, 1940, Jour. New York Ent. Soc., vol. 48, p. 14.

Some of the material of *exclamans* submitted to me by Dr. Cazier extends the distribution of this form from Andros Island, Bahamas, to southern Florida. Although there are certain individuals which differ considerably from true *bahamensis*, the intergrades between the two are so numerous that I hardly think it wise to separate the two under different names.

SPECIMENS EXAMINED: Archbold Biological Station, Lake Placid, Florida, February 26, 1943 (M. A. Cazier), 20 females; Royal Palm State Park, Florida, March 25, 1937, one female.

¹ Because of the large number of specimens seen of this form, and in the interest of conserving printing space, I have given only the state distribution of the material I have seen.

Polistes exclamans bilineolatus Bequaert and Salt

Polistes bahamensis var. *bilineolatus* BEQUAERT AND SALT, 1931, Ann. Ent. Soc. Amer., vol. 24, p. 796.

Polistes exclamans var. *bilineolatus*, BEQUAERT, 1940, Jour. New York Ent. Soc., vol. 48, p. 14. KROMBEIN, 1953, Amer. Mus. Novitates, no. 1633, p. 7.

SPECIMEN EXAMINED: New Providence Island, Bahamas, May, 1909, one female.

Polistes exclamans durangoensis, new subspecies

This form differs from typical *exclamans* in the presence of large amounts of black on the thorax, coupled with a largely yellow abdomen. Occasional specimens of *exclamans exclamans* from Kansas and Texas show one or another of these variations, but I have never seen material from these states with both.

HOLOTYPE: Female; San Juan del Rio, Durango, Mexico, August 7, 1951 (P. D. Hurd, Jr.),¹ on flowers of *Baccharis glutinosa*, in the collection of the University of California at Berkeley.

FEMALE: Structurally identical to nominotypical and other forms. Bright sulphur-yellow as follows: mandibles except apices, clypeus except median stripe of variable width, broad inner orbits to and including lower half of ocular sinuses, broad outer orbits, spots on frons above interantennal tubercle, transverse stripe on vertex behind posterior ocelli, pronotal margins, tegulae, spot on upper and lower corners of mesopleura, scutellum mostly, postscutellum, four broad stripes on propodeum, lateral and apical margins of all abdominal segments except the first sternum and seventh tergum and sternum. Mesopleura and metapleura, propodeum, basal marks on first three terga, second and third sterna, and legs partly, black. Remainder light reddish brown. Spot at apex of scape and median segments of flagellum above, blackish; remainder of antennae orange-yellow below, brownish above. Wings brownish, stigma russet, veins blackish. Length, to apex of second tergum, 12.5–13.5 mm.; forewing, 13.0–14.5 mm.

PARATYPES: *Mexico*: Durango: three females, same data as type; two females, Nombre de Dios, August 1, 1951 (P. D. Hurd, Jr.). Chihuahua: One female, 18 miles west of Jimenez, August 10, 1951 (P. D. Hurd, Jr.), on flowers of *Baccharis*; two females, Ojo Laguna, June 30, 1947 (David Rockefeller expedition; Spieth), on flowers of *Prosopis*; one female, Kilometer 36, Santa Barbara-Ojito, 6900 feet, August 17, 1947 (G. M. Bradt).

¹ All material taken in Mexico by Hurd was collected under the sponsorship of the Associates in Tropical Biogeography of the University of California.

Paratypes have been placed in the collections of the American Museum of Natural History, the University of California at Berkeley, and the author.

Polistes exclamans lineonotus Bohart

Polistes exclamans subsp. *lineonotus* BOHART, 1949, Pan-Pacific Ent., vol. 24, p. 98.

This form is apparently confined to the peninsula of Baja California.

SPECIMENS EXAMINED: *Mexico*: Baja California: Between San Jose del Cabo and Triunfo, Albatross expedition of 1911, four females, one male; La Paz, July 7, 1953 (R. R. Snelling), one female; Buena Vista, La Rivera, May 16, 1947, one female.

Polistes exclamans picturatus Bequaert and Salt

Polistes bahamensis var. *picturatus* BEQUAERT AND SALT, 1931, Ann. Ent. Soc. Amer., vol. 24, p. 797.

Polistes exclamans picturatus, BEQUAERT, 1940, Jour. New York Ent. Soc., vol. 48, p. 14.

This form, which I have not seen, is known from Acklin Island, Mari-guana, Rum Cay, Crooked Island, Long Island, Watlings Island, and Cat Island, Bahamas.

Polistes instabilis pseudoculatus, new subspecies

Among the material presented to me by Mr. duBois are two specimens which seem to be structurally identical with *Polistes instabilis* de Saussure. The male is particularly like that of *instabilis* in the characters of the clypeus, eyes, and genitalia. The female has the pronotal collar somewhat sharper and the propodeal striae more developed than in that species, however, and so it may prove that this represents a valid species. However, before *pseudoculatus* can be raised to specific level, more material must be studied in this interesting complex of species.

HOLOTYPE: Female; Sima Camillas, Rio Mayo, Chihuahua, Mexico, October 3, 1935, in the collection of the author.

FEMALE: Structurally similar to that sex of *instabilis*, except as noted above. Body entirely light ferruginous, except for blackish infuscations as follows: ocellar region, median stripe of mesonotum, pleural and sutural infuscations, median groove of propodeum, basal blotches on all terga, basal blotch on second sternum, and stripe on posterior surface of hind femora. Wings darkly violaceous, stigma and veins blackish. Length, to apex of second tergum, 16.5 mm.; forewing, 20.7 mm.

ALLOTYPE: Male; same data as holotype, in the collection of the author.

MALE: Structurally inseparable from that of *instabilis*, in color very similar to female *pseudocolatus*. Black and ferruginous as in female. Yellow as follows: mandibles, clypeus, malar area, broad inner orbits to lower third of ocular sinuses, lower half of face, outer orbits on lower third, and anterior surfaces of fore and mid coxae. Wings brownish, reflecting violaceous, stigma and veins brownish. Length, to apex of second tergum, 12.5 mm.; forewing, 19.0 mm.

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