

A NEW SPECIES OF *PROGOMPHUS* SELYS, 1854 FROM NORTH AMERICA (ANISOPTERA: GOMPHIDAE)

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Progomphus bellei sp. n. (♂ holotype, ♀ allotype: United States, Florida, Calhoun Co., Juniper Creek at Hwy 20) is described and illustrated. The new species is apparently related to the other North American species of *Progomphus*, especially *P. alachuensis* Byers, 1939.

INTRODUCTION

This species is being named after Dr. Jean Belle, (The Netherlands) in honor of his extensive revision of *Progomphus*. The format and illustrations of this paper will follow that of BELLE, 1973.

PROGOMPHUS BELLEI SPEC. NOV.

Figures 1-8

Material. — United States: Florida, Calhoun Co., Juniper Creek at Hwy 20, 25 May 1976, holotype ♂ and allotype ♀ (mated pair), K.W. Knopf, (Florida State Collection of Arthropods, Gainesville); 29 June 1974, 13 ♂, K.J. Tennessen, 1 ♂, K.W. Knopf; 10 June 1975, 2 ♂, K.J. Tennessen, 2 ♂, K.W. Knopf; 14 June 1975, 5 ♂, 1 ♀, 28 June 1975, 4 ♂, 2 ♀, 25 May 1976, 1 ♂, 1 ♀, 6 August 1977, 1 ♂, K.W. Knopf; 26 July 1975, 3 ♂, K.J. Tennessen, (1 ♂, to the USNM, Washington, D.C.). All of the above listed specimens (exclusive of the holotype and allotype) are paratypes. Additional material examined: Florida, Liberty Co., Bristol, Mystic Lake, 24 May 1957, 2 ♂, M.J. Westfall, Jr., (FSCA); 28 June 1975, 1 ♂, K.W. Knopf; Florida, Leon Co., Lake Bradford, 21 June 1951, 2 ♂, 1 ♀, W.H. Cross, (FSCA); Florida, Santa Rosa Co., Blackwater River State Forest, Third creek west of Riley's Landing, 27 July 1975, 1 ♂, K.J. Tennessen; North Carolina, Bladen Co., White Lake, 28 June 1970, 1 ♂, R.D. Cuyler, (FSCA).

Male (holotype; right superior caudal appendage broken and repaired). — Total length 58 mm; abdomen 43 mm; hind wing 36 mm; costal edge of pterostigma in fore wing 6 mm.

Face pale greenish yellow. Diffuse brown cross stripes on frontoclypeal suture and dorsum of labrum. Labrum dull yellow below. Face with scattered coarse black hairs. Frons from above yellow, with medial dark brown semicircular spot, base of spot confluent with brown of vertex. Width of spot as wide as distance between external edges of lateral ocelli. Vertex with a low, rounded, sinuous ridge in close approximation to the rear of the lateral and medial ocelli. Vertex dark brown with yellow spot posterior to ocellar ridge. Occiput yellow, fringed with fine brown hairs. Rear of head behind eyes black above, pale below.

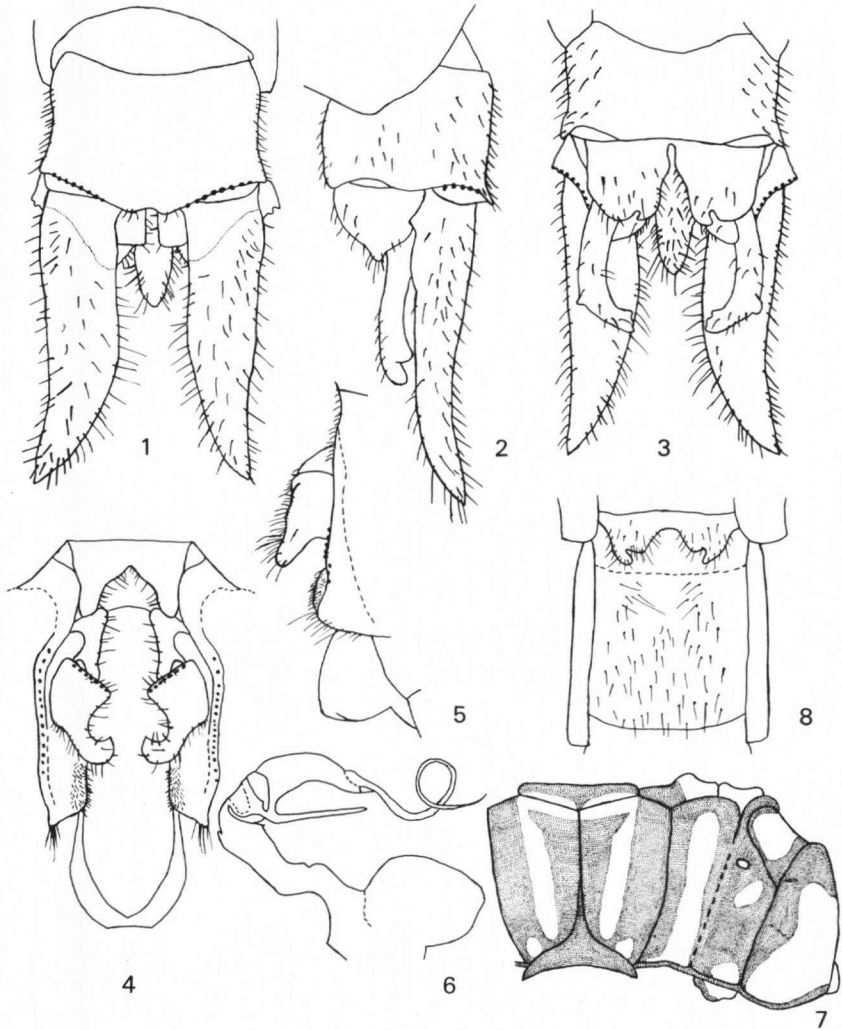
Prothorax brown with a medial and lateral yellow spot.

Pterothorax dark brown with light areas on the dorsum yellow, on the sides greyish white. Pattern as diagrammed in Figure 7.

Femora brown dorsally with white knees. Fore femora with large white spot ventrally, much reduced on middle, and absent on hind femora. Hind tarsi (including claws) $1/5$ shorter than tibia. Lamina tibialis of fore tibia about $1/3$ tibial length.

Wings hyaline, except extreme base brown in antenodal interspace to level of first complete crossvein, and trace of brown spot visible under magnification at nodus and arculus. Venation brown. Leading edge of costa yellow. Pterostigma brown, surmounting 7 or 8 cells. Basal subcostal crossvein present. Antenodal and postnodal crossveins of the first series 16:7, 17:8/13:9, 13:10 in fore and hind wings, respectively. Second primary antenodal crossvein the fifth in all wings. All triangles three-celled except two-celled left hind wing triangle. Subtriangles two-celled in all wings, with one cell much smaller than the other in the hind wings. Trigonal interspace starts with three cells against triangle in fore wings, and four in hind wings; two rows of cells thereafter in all wings. Hind wings with five paranal cells. Anal triangle three-celled.

Abdomen dark brown to black and distinctly patterned as follows. Segments 1-3 with greyish white (same color as sides of pterothorax) lateral and ventral markings. Bright yellow middorsal spots on segments 1-7, not contiguous with lateral and ventral spots on 1-3. Dorsal spots on 3-7 constricted at about $2/5$ of the length of the segment (from anterior) such that it appears as two major divisions. Larger anterior division flush against the anterior edge of the segment, posterior division ends $1/5$ short of posterior margin of segment. Segments 8-10 black middorsally. Segment 8 with two lateral, bright yellow markings. Small, square spot approximates midlateral anterior margin, larger second spot on extreme posterior ventrolateral corner of segment. Segment 9 with similar, but smaller posterior ventrolateral



Figs. 1-8. *Progomphus bellei* sp.n., holotype male (Figs. 1-7), allotype female (Fig. 8): (1) tenth abdominal segment and caudal appendages, dorsal view; — (2) the same, lateral view; — (3) the same, ventral view; — (4) male accessory genitalia, ventral view; — (5) the same, lateral view; — (6) penis, lateral view; — (7) diagram of pterothorax; — (8): vulvar lamina, ventral view.

yellow spot. Segment 10 entirely black. Segment 1 with well developed midventral process. Accessory genitalia shown in Figures 4-6. Posterior hamules black at tip fading to brown at base. Peduncle of penis brown. Superior caudal appendages (Fig. 1-3) brown basally, changing to bright

yellow posteriorly (dotted line on Figure 1 indicates color change). Denticles on ventral carina of superior appendages in single row (11 on left, 10 on right). Right superior appendage tipped in black, left yellow. Inferior appendages black, three well developed denticles on medially directed tips. Lamina supra-analis prominent in dorsal view, with thick brown setae.

Female (allotype taken in copulation with holotype male). — Total length 55 mm; abdomen 41 mm; hind wing 37 mm; costal edge of pterostigma in fore wing 6 mm.

Coloration very similar to male, exceptions as follows: ventrolateral markings on segments 4-9 more extensive. Segment 10 with small yellow spot anterior to the base of each abdominal appendage. Abdominal appendages yellow, without basal brown of male. Lamina supra-analis well developed, visible in dorsal or ventral view. Vulvar lamina (Fig. 8) about 1/5 length of segment 9 with rounded, V-shaped median excision.

Wing coloration same as in male. Basal subcostal crossvein present. Pterostigma surmounting 8-9 cells. Antenodal and postnodal crossveins of the first series 15:10, 17:8/12:10, 13:11, in fore and hind wings, respectively. Triangles three-celled in fore wings, two-celled in hind wings. All subtriangles two-celled, in hind wing, one cell greatly reduced relative to the other. Trigonal interspaces same arrangement as in male. Each hind wing with six paranal cells.

Considerable variation in venation was observed in the paratype specimens. Antenodal crossveins of fore wings ranged from 14-17, hind wings 11-14; postnodals of forewings 7-12, hind wings 8-12. Triangles of fore wing usually three-celled but occasionally four. Hind wing triangles were more variable with two to four cells. Subtriangles occasionally with one or three cells. Trigonal interspace of hind wing rarely with five cells adjacent to the triangle.

P. bellei appears to be more closely related to *P. alachuensis* than to any other North American species. Males can be separated from *alachuensis* by the longer lamina supra-analis and the sharply contrasting black and yellow color pattern of abdominal segments 7 and 8. *P. bellei* also has less brown on the superior caudal appendages. *P. bellei* is similar to *obscurus* in color of the caudal appendages and pattern of segments 7 and 8, but *obscurus* has much shorter, wider superior caudal appendages. We described the vulvar lamina of *bellei* as having a V-shaped median excision, indicating that the arms diverge posteriorly; in *alachuensis*, the arms are parallel, whereas in *obscurus* they vary from approximately parallel to slightly divergent.

BELLE's key (1973, p. 202) can be modified as follows to accept *bellei*:

- 24 Denticles on ventral carina of superior caudal appendages of male scattered; abdominal segment 7 of female with a dorsal rectangular yellow spot confined to basal third, not

- confluent with lateral pale spot **obscurus**
- Denticles on ventral carina of superior appendages in a single line (occasionally some scattering posteriorly); abdominal segment 7 of female with dorsal yellow marking extending posteriorly to at least half the length of the segment, often confluent with lateral yellow area 24A
- 24A Basal brown of superior caudal appendages, viewed dorsally, extends 1/2 or more of appendage length; female caudal appendages brown; vulvar lamina U-shaped . **alachuensis**
- Basal brown of superior caudal appendages, viewed dorsally, extends 1/4 or less of length; female caudal appendages bright yellow; vulvar lamina V-shaped **bellei**

At the Juniper Creek type locality, most *bellei* have been taken from a sandy-bottomed beaver pond on a small tributary to Juniper Creek. *P. obscurus* is also abundant at this locality, but appears to be confined to the tributary below the dam. During the time that their flight seasons overlapped there was considerable interaction between the two species near the beaver dam.

P. bellei has been taken at some very small sandy tributaries such as the roadside ditches along Hwy. 20 near Juniper Creek that contain permanent, sandy trickles. *P. bellei* has also been seen and collected at a number of clear, sandy-bottomed lakes (such as Mystic Lake) in the Florida panhandle region. White Lake, in North Carolina, is very similar in appearance to Mystic Lake.

The factors involved in habitat segregation between *bellei* and *obscurus* were not determined. A summary of habitat selection by *Progomphus* species in Florida follows: *bellei* inhabits small sandy streams and sandy lakes and ponds in northwest Florida; *obscurus* occupies sandy streams throughout the northern half of the state; *alachuensis* inhabits sandy lakes in northeast Florida and lakes and streams in south Florida (BYERS, 1939). A thorough, detailed study of habitat segregation in areas of sympatry and allopatry may reveal examples of competitive displacement.

P. bellei has been reared and the larva will be described in a later paper. Mature larvae collected in March emerge in mid-April in the laboratory and probably in late April in nature. The earliest flight date is 25 May, the latest 6 August, with the flight season peaking in June.

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