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International Dragonfly Fund - Report

Journal of the International Dragonfly Fund

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Published: 01.04.2020

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ISSN 1435-3393

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Internet: http://www.dragonflyfund.org/

This series intends to publish studies promoted by IDF and to facilitate cost-efficient and rapid dissemination of odonatological data.

Editorial Work:	Albert Orr, Rory A. Dow, Milen Marinov, Martin Schorr
Layout:	Martin Schorr
IDF-home page:	Holger Hunger
Printing:	Colour Connection GmbH, Frankfurt
Impressum:	Publisher: International Dragonfly Fund e.V., Schulstr. 7B, 54314 Zerf, Germany. E-mail: oestlap@online.de
Responsible editor:	Martin Schorr

Cover picture:	***Nannophya fenshami sp. nov.***
Photographer:	Eddie Tsyrlin

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Nannophya fenshami sp. nov., a tiny dragonfly from an artesian spring wetland in Queensland, Australia (Anisoptera: Libellulidae)

Günther Theischinger
Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia
Email: theischingergunther@gmail.com

Abstract

Nannophya fenshami sp. nov., a tiny libellulid dragonfly is described from an artesian spring wetland in Queensland. Diagnostic characters of male, female and larva are presented and illustrated and the probable affinities of the species are discussed.

Key words: Odonata, Dragonflies, Anisoptera, Libellulidae, *Nannophya fenshami* sp. nov., Queensland, Australia

Introduction

In 2002 I received for identification some dragonfly larvae that had been collected from an artesian spring near Aramac in the Barcaldine region of Central Queensland, Australia. One of the larvae was apparently a species of *Nannophya* Rambur, 1842 but some of its morphological details did not agree with the larvae of *Nannophya australis* Brauer, 1865, *N. dalei* (Tillyard, 1908) or *N. occidentalis* (Tillyard, 1908) as I knew them. Convinced that the larva in question was of an undescribed species, I illustrated and diagnosed the larva and also on several occasions over the next few years attempted to visit the locality. While various contingencies prevented me from reaching the locality, the illustrations of the larva were published in various places (Theischinger & Hawking 2006, Theischinger (2007), Theischinger & Endersby 2014), Ponder et al. (2010). Very recently in 2020, I received a surprise and welcome telephone call notifying me that the locality was now accessible and that possible adults of the larva in question had been collected and sent to the Australian Museum where they were made available to me for study. From the material collected and photographs in life of this tiny, yet distinctive dragonfly, I am able to at last provide the long overdue description of this new species.

Material and methods

The collected material, preserved in ethanol, was handed over to me for study and will subsequently be lodged in the Australian Museum (AM).
For comparative purposes comprehensive material of *Nannophya australis* (from Cape York to the south of Victoria and from Stradbroke Island to Salvator Rosa National Park) (most lodged in AM) was examined.
Descriptive terminology largely follows Chao (1953) and Watson & O'Farrell (1991). Coloration is given as assessed from the preserved material, supplemented by photographs taken in life. Measurements are given in millimetres (mm).

Nannophya fenshami sp. nov.

Figures 1-16

Material

Holotype: ♂ (K.570443), Australia, Queensland, Edgbaston Private Nature Reserve (22°43'S, 145°25'E), 19-ii-2020, Rod Fensham & Boris Laffineur. Deposited in the Australian Museum. Paratypes: 4 ♂♂ (K.393440-K.393443), 2 ♀♀ (K.393444, K.383445), same data as holotype.

Etymology

This species is named for Roderick Fensham who on his own initiative took on the challenge to find the adults of a possibly new species known only from the larva and in recognition of his extensive research on artesian spring wetlands and their biota.

Diagnosis

A very small dragonfly (wingspan less than 30 mm) that can be distinguished from all of its congeners by its almost total lack of (as opposed to a substantial portion of) red on the abdomen of the mature male; by contrast it is bluish pruinose over all of its almost totally black thorax and abdomen. Both sexes apparently with large whitish patch on top of the vertex.

Holotype. (dried ethanol preserved specimen, mature) – Male (Figures 3, 4)

Head – Labium very pale brownish yellow, black only broadly along midline; labial palps, basal half of mandibles, labrum, clypeus, frons, and back of the occiput very pale brownish yellow, eyes somewhat darker (certainly discoloured), large, almost semicircular; top face of the bulging vertex markedly paler, almost white. Black coloration restricted to apical half of mandibles, genae, narrow margins of the vertex, occipital triangle and subgenae which have three well-defined small, almost white patches along lateral eye margin. Scape and pedicel black.

Prothorax – Black.

Synthorax – Black, only metapostscutellum yellowish to greyish brown. Legs largely black, with only most of outer face of coxae and trochanters yellowish to pale greyish brown. Wings with bases brownish yellow, humeral plates somewhat paler than the rest, membrane clear and venation black. Pterostigma of both wings overlying approximately one cell, blackish brown to black with proximal ca 1/10 and distal ca 1/4 of length markedly brightened to almost white. Antenodals 5/4; postnodals 4/4; 2 cross-veins in cubital space of hindwing.

Abdomen – Dorsally almost entirely black, brown only along midline and more narrowly along posterior margin of S10, ventrally black with sternite 9, valvulae and bipartite sternite 11 yellowish brown. Anal appendages pale to medium brown. Superiors almost straight in dorsal/ventral view; inferior very wide basally, narrow apically.

Measurements. – Hindwing 13.5 mm, abdomen + appendages 11.5 mm

Female (immature specimens in ethanol) (Fig. 6)

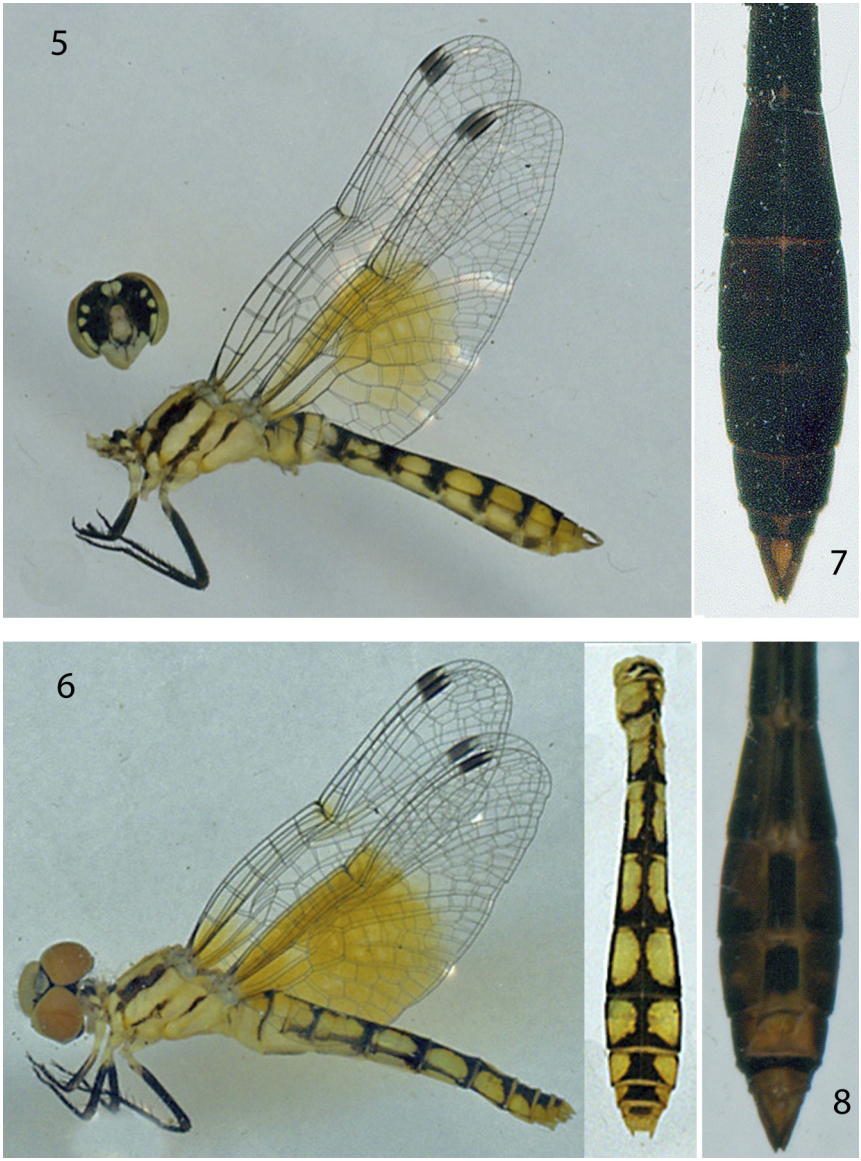
Head – Much as in male.

***Figs 1, 2. Nannophya fenshami* sp. nov., (1) mature male, in life; (2) mature male in its habitat (Photographs by E. Tsyrlin).**

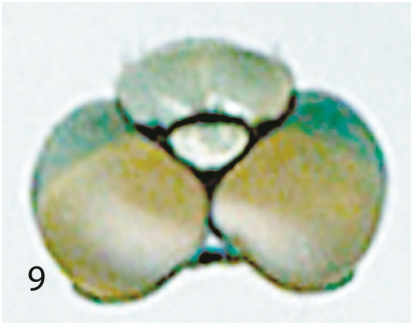
Prothorax – Yellow and black, pattern as in Fig. 6.

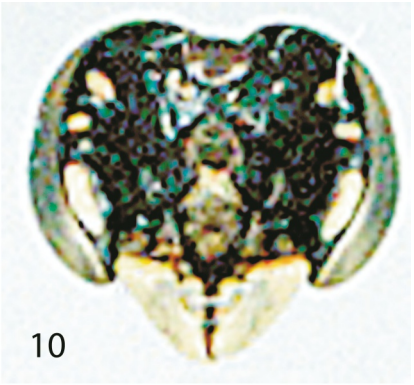
Synthorax – Yellow with black along much of the pleural sutures, pattern as in Fig. 6. Antenodals 5/4; postnodals 4-5/4. Hindwing with distinct yellow basal suffusion to level nodus or beyond.

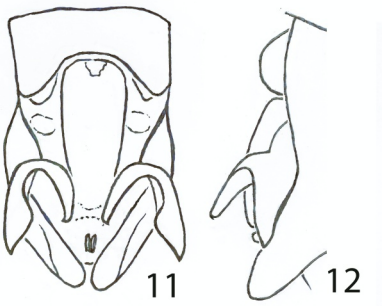
Figs 3, 4. *Nannophya fenshami* sp. nov., holotype male: (3) dorsal; (4) ventral.

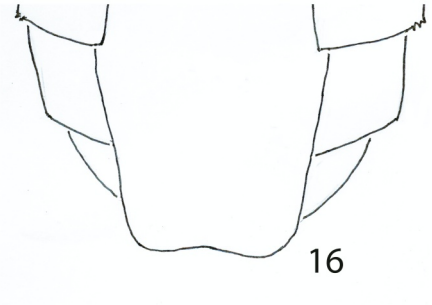


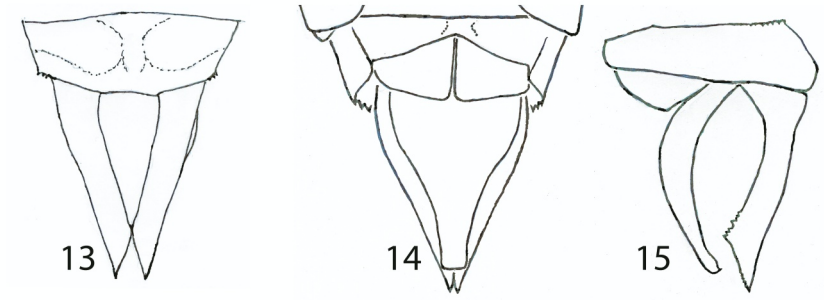
Figs 5-8. *Nannophya fenshami* sp. nov., paratypes: (5) immature male, lateral; (6) immature female, lateral and insert abdomen, dorsal; (7, 8) male, posterior portion of abdomen: (7) dorsal; (8) ventral.



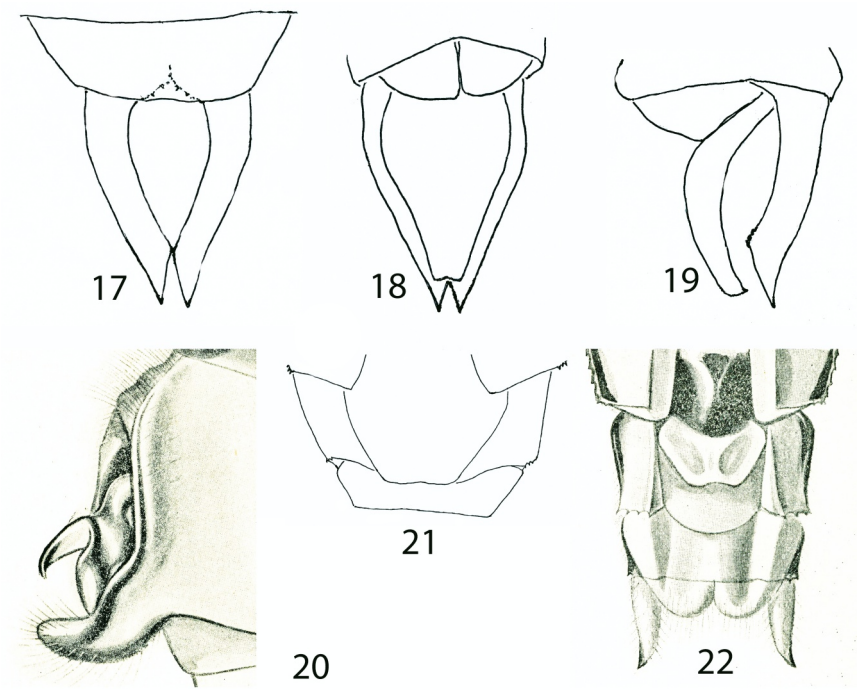








Figs 9-16. ***Nannophya fenshami*** **sp. nov., paratypes: (9-15) male: (9, 10) head: (9) dorsal; (10) caudal; (11, 12) secondary genitalia: (11) ventral; (12) lateral; (13-15) anal appendages: (13) dorsal; (14) ventral; (15) lateral; (16) female, vulvar scale, ventral.**



***17-22. Nannophya australis* Brauer: (17-20) male: (17-19) anal appendages: (17) dorsal; (18) ventral; (19) lateral; (20) secondary genitalia, lateral; (21, 22) female, ventral: (21) vulvar scale; (22) posterior abdominal segments (20, 22) modified from Ris (1909).**

Abdomen – Largely yellow, dorsally with very distinct black markings including mid-dorsal, lateral and distal elements, connected in most segments, as in Fig. 6 plus insert. Vulvar scale long and almost parallel sided to slightly tapered with lateral margins almost straight. Anal appendages yellow.

Measurements. – Hindwing 12.0-13.5 mm, abdomen 11.0-12.0 mm.

Variability

Mature and immature specimens are available, all preserved in ethanol.

The coloration of the male body is either largely yellow with a black pattern (Fig. 5), the wings with similar yellow suffusion as in female, or the body is almost completely black (with pruinescence having disappeared in ethanol) and wings clear as given for the holotype (Figs 3, 4). In life the mature male is covered by a very intense bluish grey pruinescence all over except for head, legs, wings and anal appendages which appear vivid red (Fig. 1). Five postnodals are present but rare in the odd fore- and hindwing.

23, 24. *Nannophya australis* Brauer: (17) male; (18) female (Photographs by R. Richter).

The measurements range between 12.0 and 14.0 mm for hindwing length, between 11.0 and 12.5 mm for length of abdomen + appendages.

Habitat

Nannophya fenshami sp. nov. occurs in artesian spring wetlands dominated by low mat-forming species such as *Cyperus laevigatus* and *Eriocaulon carsonii* and tussocks up to 1m high, including *Sporobolus pamelae* and *Schoenus falcatus*. Rossini et al (2018) highlight the importance of artesian spring wetlands as habitat for endemic species, as well the importance of Edgbaston as having the highest concentration of endemic species throughout the Great Artesian Basin. The dragonfly *Nannophya fenshami* sp. nov. is the most recent example.

Differential diagnosis

Based on larval characters *N. fenshami* sp. nov. with an uninterrupted fringe of more than 50 setae of similar length along distal border of labial palp (Theischinger 2007, under *Nannophya* ?sp. nov.) is most distant from *Nannophya australis* (ca 20 setae in groups of 2, one long, one short). Both *N. dalei* and *N. occidentalis* have more than 30 setae, mostly in groups of 3, 1 long, and 2 short.

The adult of *N. fenshami* sp. nov. has 2 cross-veins in the cubital space of hindwing matching only the similar sized *N. australis*, whereas the much larger *N. dalei* and *N. occidentalis* and the smaller *N. paulsoni* have only 1 cubital cross-vein. From this it appears that *N. fenshami* sp. nov. is closest to *N. australis*.

The mature male of *N. fenshami* sp. nov. (Fig. 1) has all of the abdomen except for the anal appendages black, covered by pruinescence, whereas abdominal segments S6-10 plus anal appendages are overwhelmingly bright red without any sign of pruinescence in *N. australis* (Fig. 23). Pruinescence playing a role in species recognition and taxonomy is well known from Australian genera of Argiolestidae (e.g. *Austroargiolestes, Griseargiolestes*), Coenagrionidae (e.g. *Agriocnemis*) and Libellulidae (e.g. *Diplacodes, Orthetrum*) (Theischinger & Hawking 2006). There are also some structural differences between *N. fenshami* and *N. australis* but they are relatively slight and hard to discern. In the male the genital lobe is straight and symmetrical, the superior anal appendages are straighter and slimmer, the inferior appendage is basally wide and apically narrow (Figs 11-15); in the female of *N. fenshami* the vulvar scale is long and slightly tapered with lateral margins nearly straight (Fig. 16), whereas in *N. australis* the genital lobe of the male is slightly bowed and asymmetrical (Fig. 20), the superior anal appendages are more curved, the inferior appendage is basally narrower and apically wider (Figs 17-19) and vulvar scale of the female is shorter, distinctly tapered and with lateral margins distinctly curved (Figs 21, 22).

Differences in coloration include a largely pale labium with only black along midline and a large almost semicircular whitish patch on top of the vertex in *N. fenshami* versus labium all dark and a whitish dorsal patch on top of the vertex small (male) or lacking (female) in *N. australis*.

Acknowledgements

I wish to thank all persons involved in helping or trying to help with the discovery of this beautiful and one of the world's smallest and possibly most geographically restricted dragonfly species, and I can only hope that I remember and list them all. They are Winston Ponder, Andrew Davis, Elizabeth Jefferys, Edward Tsyrlin, Boris Laffineur, Rod Fensham, John Cann, Russell Cox, Derek Smith, Reiner Richter, Zac Billingham and my wife Christine. Special appreciation goes to Rod Fensham for initiating the search for the adults of this species nearly two decades after the larva had been diagnosed and succeeding in finding them, and to Eddie Tsyrlin who kindly permitted the use of his photographs that had been taken earlier. Reiner Richter kindly supplied photographs in life of *Nannophya australis*. Bush Heritage Australia is acknowledged for allowing access to the Nature Reserve at Edgbaston.

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