IDF

International Dragonfly Fund - Report

Journal of the International Dragonfly Fund

Published 28.04.2015

81

ISSN 1435-3393

The International Dragonfly Fund (IDF) is a scientific society founded in 1996 for the improvement of odonatological knowledge and the protection of species.

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: Martin Schorr, Milen Marinov, Rory Dow

Layout: Bernd Kunz

Indexed by Zoological Record, Thomson Reuters, UK

Home page of IDF: Holger Hunger

Impressum: International Dragonfly Fund - Report - Volume 81

Publisher: International Dragonfly Fund e.V., Schulstr. 7B, 54314 Zerf, Germany.
E-mail: oestlap@online.de

Responsible editor: Martin Schorr

Published: 28.04.2015

Taxonomical notes on *Indolestes* Fraser, 1922 (Lestidae, Zygoptera). 1. *Indolestes gracilis expressior* ssp. nov. from eastern Cambodia

Oleg E. Kosterin

Institute of Cytology & Genetics SB RAS, Acad. Lavrentyev Ave. 10, Novosibirsk, 630090, Russia;
Novosibirsk State University, Pirogova Str. 2, Novosibirsk, 630090, Russia
Email: kosterin@bionet.nsc.ru

Abstract

Indolestes gracilis expressior ssp. nov. is described by a male from Cambodia, Mondulkiri Province, the river upstream of Buu Sraa Waterfall 12°34′ N 107°25′ E. Another male presumably belonging to this subspecies was illustrated from southern Laos in literature. The new subspecies is characterised by more inflated apical part of the cercus than in earlier known subspecies and is thought to range in plateaux of eastern Cambodia ?and southern Laos, although very rare.

Key words: dragonfly, Odonata, Cambodia, *Indolestes gracilis expressior*

Introduction

The genus *Indolestes* Fraser, 1922 has two centres of diversity, in the continental South and South-East Asia and in the Near Oceania (New Guinea with satellite islands and Australia). The genus is moderately diverse in Wallacea (Sulawesi and Lesser Sundas east of Wallace Line) and Oceania but very poorly represented in Sundaland (Malay Peninsula, Sumatra, Java, Borneo, Bali, the Philippines), with just one Bornean species *I. dajakanus* Lieftinck, 1948 (Lieftinck 1954, 1960; Tsuda 2000; Kalkman & Orr 2013) and *I. anomalus* Fraser, 1946 penetrating to Peninsular Malaysia (Ng et al. 2011). The total number of species in the genus is hard to evaluate since a number of them are known from original descriptions only and may be synonyms or subspecies.

While surveying Odonata in Mondulkiri Province in the eastern Cambodia, I collected a single *Indolestes* male specimen very close to *I. gracilis gracilis* (Hagen in Selys, 1862) but with peculiar cerci having somewhat club-like apical portions. Similar appendages are figured for a specimen from southern Laos by Yokoi & Souphanthong (2014). Since this region is remote from the known range of *I. gracilis* spp., a new subspecies is described below.

A taxonomical overview of *Indolestes* species with attenuated cerci

Among continental species of Indolestes there is a group of related species with male cerci apically attenuated in the caudal direction (Figures 1-3). Fraser (1933: 76) metaphorically described this as «the two appendages resembling the arms and hands of a man in the act of diving».

Indolestes birmanus (Selys, 1891)

This species is conventionally mentioned here as its cerci are but very slightly or not at all attenuated in the caudad direction. It is specially considered and its holotype is illustrated in communication by Kosterin & Poggi (2015) in this issue.

Indolestes cyaneus (Selys, 1862)
Figure 1a

More distant from the two following species than they from each other, larger, with more robust cerci, paired black spots on S2-7 and generally much more blue on the abdomen. It has a smaller range confined to the Himalayas in northern and eastern India and Bhutan, with a surely erroneous record from Taiwan (Dow 2009; Joshi & Kunte 2014).

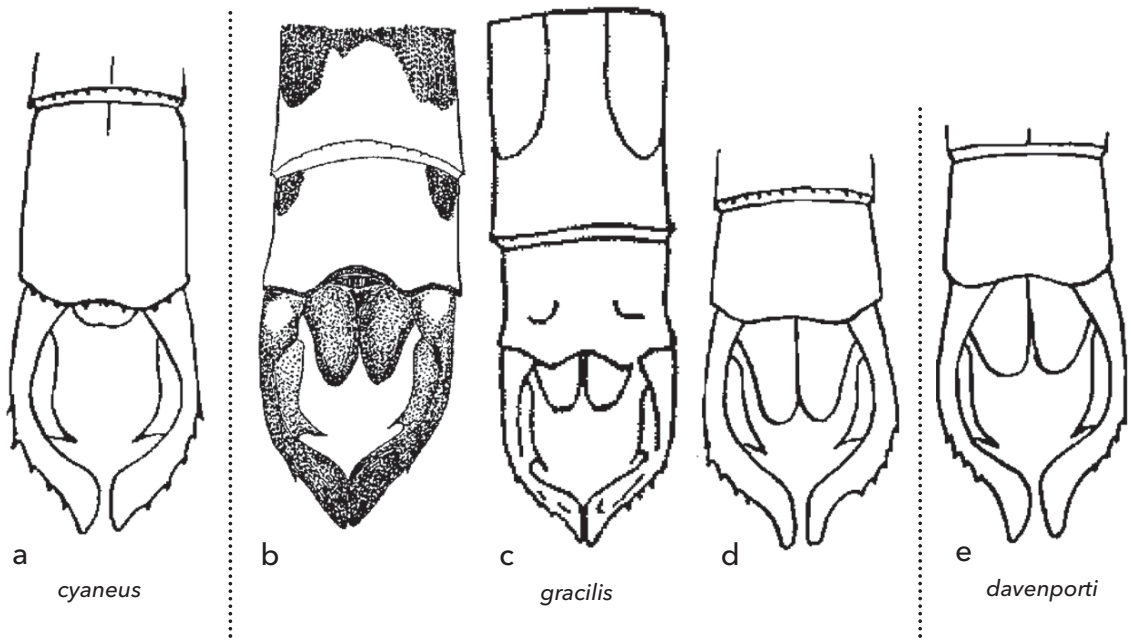

Figure 1. *Indolestes* ♂ taxa as illustrated in literature – anal appendages, dorsal. – a, *I. cyaneus* after Fraser (1933: fig. 34, as *Ceylonolestes cyanea*); - b-d, *I. gracilis gracilis:* b, after Asahina (1976: figs. 10, as *Indolestes gracilis*); c, the type of *Lestes gracilis* from Hagen's collection (after Asahina 1976: fig. 13, as *Indolestes gracilis*); d, after Fraser (1933: fig. 28, as *Ceylonolestes gracilis*). – e, *I. gracilis davenporti*, after Fraser (1933: fig. 31, as *Ceylonolestes davenporti*). Not to scale.

Indolestes gracilis (Hagen in Selys, 1862).
Figure 1b-e

This species has at least two subspecies:

I. *gracilis gracilis* (Figure 1b-d) from Sri Lanka (Ris 1916; Fraser 1933; Dow 2013; Bedjanič et al. 2014);

I. gracilis davenporti Fraser, 1930 (Figure 1e), ranging in Western Ghats (Fraser 1933), southern Hindustan: Shembaganur, Madura, Tamil Nadu State (Ris 1916, as *I. gracilis birmanus* nec Selys, 1891), and a dubious record from Punjab (Prasad & Kumar 1977; Dow 2010).

Indolestes peregrinus (Ris, 1916)
Figure 2a-c

Ranges in Japan, Korea and very widely in China (Wilson 2009). This species has the following synonyms: *Lestes extraneus* Needham, 1930, *Lestes monteili* Navás, 1935, and, probably, *L. coeruleus* Fraser, 1924 (Wilson 2009; Dow 2013). It was first described as a subspecies of the preceding species, as *Lestes gracilis peregrinus* (Ris 1916), basing on the differences in the dark pattern. The main of them are as follows: synthorax dorsal stripe with projections in *peregrinus* versus with straight margins in *gracilis*; abdominal marks separated into anterior and posterior parts in *peregrinus* versus entire in *gracilis* (Ris 1916). However, Asahina (1976) substantiated that *I. peregrinus* and *I. gracilis* are bona species. He pointed out that the above mentioned differences in the body pattern are reliable in spite of variability of its general expression, and added the important difference in the shape of the paraprocts, which is pointed in dorsal view in *I. peregrinus* and rounded in *I. gracilis*.

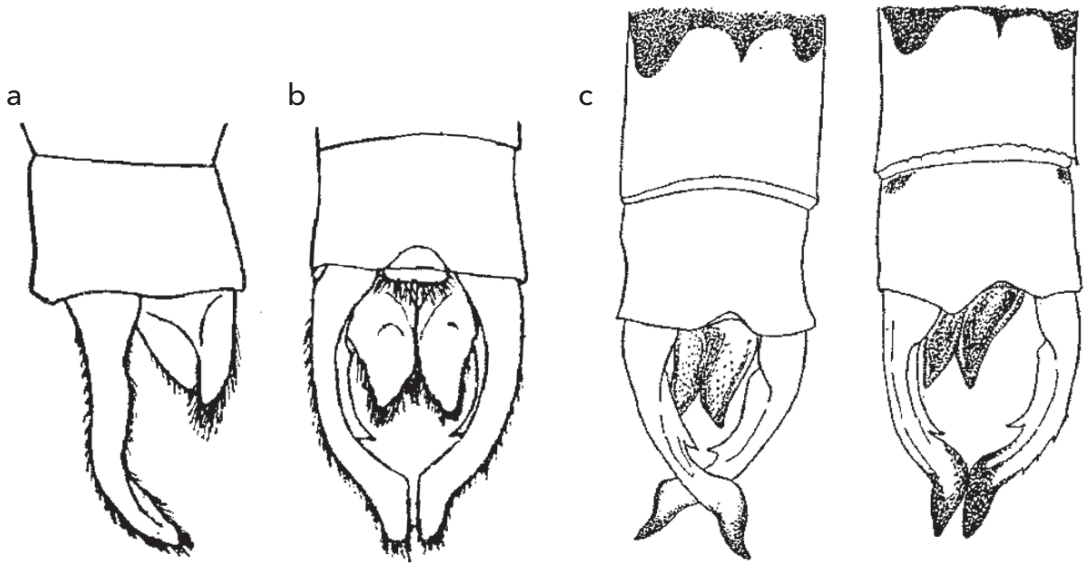

Figure 2. *Indolestes peregrinus* ♂ as illustrated in literature – anal appendages lateral (a), dorsal (b+c). – a, b, after Ris (1916: fig. 2, as *Indolestes gracilis perigrinus*); c, after Asahina (1976: figs 5, 7). Not to scale.

Indolestes guizhouensis Zhou & Zhou, 2005
Figure 3a-c

In the original description this species, recently described from Guizhou (Zhou & Zhou 2005), was compared to *I. gracilis* but not to *I. peregrinus* and *I. birmanus*, that would be more reasonable geographically. S9 was described and shown to be entirely black (Figure 3a) as in *I. birmanus*. The schematic original figures (Figure b, c) do not show well the paraproct shape, while the cerci are shown to have so long proximal part that the inner spine is situated proximally to the middle of their length (distally in other species of the group considered). To clarify the taxonomic position of these specimens, their reexamination of photographs are necessary

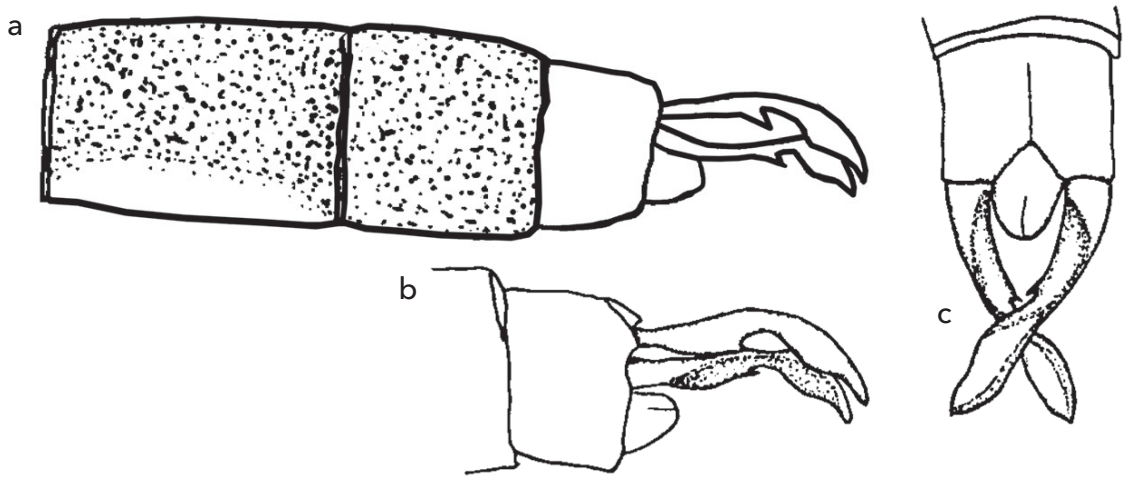

Figure 3. *Indolestes guizhouensis* ♂ as illustrated in literature – a. S8-S10, lateral; anal appendages b. lateral, c. dorsal. – after Zhou & Zhou (2005: figs. 4, 5). Not to scale.

Material and methods

Illustrations of morphological details were prepared from serial photographs obtained via lens Zeiss Stemi 2000-C with digital camera Canon PowerShot A640 at the Institute of Cytology and Genetics of Siberian Branch of Russian Academy of Sciences, Novosibirsk. Images with broad focus zones were obtained from serial photos with shifted focus using the program Helicon Focus 5.3 (http://www.photo-soft.ru/helicon focus.html).

Unfortunately, no type specimens were examined, except for *Lestes birmana* Selys, 1891 (see Kosterin & Poggi 2015), and the comparison was based on the published illustrations. Those by Fraser may be too schematic, those by Asahina and Ris are usually very precise. Anyway, I relayed on similarity of drawings from at least two independent sources (Figures 1, 2). In case of *I. gracilis gracilis*, the appendage drawings by Fraser (1933) and Asahina (1976) were very similar. In case of *I. peregrinus*, those by Ris (1916) (of the type specimen) and Asahina (1976) were nearly identical and matched a male specimen which I have from South Korea (Jeju-do Island, Bukjeju-gun, Jocheon-eup, Seonheul-ri, 31 VII 2002, O. Kosterin leg.).

Indolestes gracilis expressior ssp. nov.

Figure 4a-h

Material studied

Holotype ♂, Cambodia, Mondulkiri Province, the river upstream Buu Sraa Waterfall, the left bank at the bridge, 12°33'55'' N 107°25'09'' E, 502 m a.s.l., 9 VI 2014; deposited in Naturalis Biodiversity Centre, Leiden, the Netherlands (RMNH).

Etymology

Expressior is a Latin adjective in gradus comparativus and genus masculinus, meaning 'more expressed', referring to a more expressed differentiation of the apical part of the cercus than in other subspecies.

Male (Figure 4)

Head. Labium bluish in central part, yellowish at margins. Labrum, mandible bases, genae dull bluish (Figure 4a, b). Anteclypeus of the same colour with a small indistinct dark spot at centre, postclypeus mostly dark-bronze with anterior part dull bluish forming a central projection of this colour. Frons, vertex and occiput dark-bronze, there is a pair of greenish spots just below lateral ocelli and another one lateroposteriorly of the former. Antennae blackish-brown (Figure 4b).

Thorax. Prothorax dull bluish with dorsal suture slightly darker brown and a pair of two indistinct bronze dorso-lateral patches (Figure 4c). Posterior lobe slightly raised with smooth margins, light-brown, darker dorsally (Figure 4a, c). Mesostigmal plate broadly-triangular, with a transversal lens-shaped central hollow deepening to its lateral ends, and deep middorsal groove. Central hollow and adjacent anterior margin brown, the rest dark-bronze but with brownish lightenings at sides of middorsal groove (Figure 4c). Synthorax ground colour changes from olivaceus at mesepisternum to dull blue on sides (Figure 4a). There is a broad middorsal dark-bronze band but dorsal ridge narrowly brown. There are elongate black spots at top of humeral and the first lateral sutures and a slight trace of a brownish stripe below mesopleural suture, with a small brown spot with indistinct margins in its dorsal part (Figure 4d). Sclerites at wing bases blue. Coxae and trochanters bluish, rest legs brownish, with outer sides of femora, ventral ribs of tibia, tips of tarsi, spines and hooks blackish (Figure 4a).

Wings hyaline, major veins dark brown, minor ones black. Discoidal cell very narrow, its dorsal side is ca 0.35 as long as ventral side in fw and ca half as long on hw postnodals 10 on fw, 9 on hw. Pterostigmata of folded fore and hind wings disposed exactly near each other. They are ca 2.2 as long as high, accompanied with two cells below, dark-brown, bordering longitudinal veins somewhat swollen and darkened (Figure 4e).

Abdomen. Ground colour dull blue at S1-S3 (Figure 4a) changing to brownish at S5-S8 (partly shown in Figure 4f) but again greyish blue at S9-S10 (Figure 4g, h). Tergites

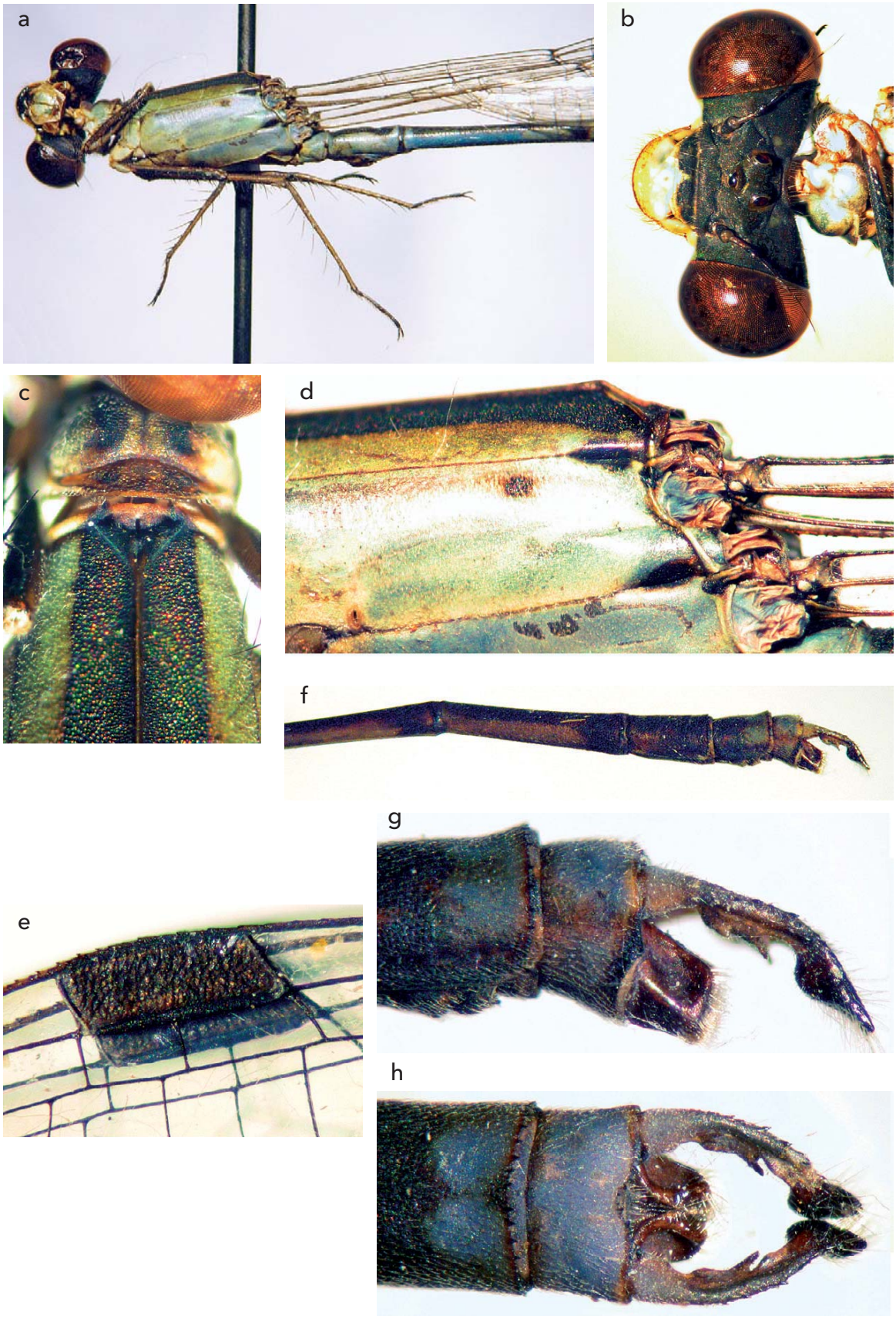

Figure 4. Details of *Indolestes gracilis expressior* ♂ ssp. nov. – a, head, thorax and abdominal segments 1-2; b, head, dorsal view; c, prothorax and synthorax dorsum, dorsal view; d, top of synthorax, lateral view; e, pterostigmata; f, S6-S10 of abdomen; g, anal appendages, lateral view; h, the same, dorsal view. Not to scale.

1-7 with solid dark-bronze to blackish dorsal stripes. That on S2 shaped as squid body with a tail directed anteriorly. Those on S2-S7 are constricted anteriorly, before tergite anterior margins, marked with black rings, and rather indistinctly expanding to tergite ventral margins posteriorly (Figure 4a, f). S8 dark with indistinct lateral brownish patches in its anterior half (Figure 4f). S9 blackish with a pair of indistinct greyish-blue spots at posterior margin, nearly fused to each other, occupying half of its length. S10 greyish blue above changing through reddish-brown to blackish below (Figure 4h).

Cerci about twice as long as S10. In dorsal view (Figure 4h), their outer outline (bearing sparse robust spines) smoothly curving towards each other to distinct apical portions occupying about 1/3 of the cercus projection to the central axis. Apical portions drop-shaped, rounded proximally, bluntly pointed distally, directed caudally but very slightly diverging. Inner outline of cerci elaborate: narrowing at ca 1/5 of their length, then with a ventro-adaxial ledge ending with a long process, then slightly broadening again; cercus apical portion forms a prominent rounded backward 'heel'. In lateral view (Figure 4g), cercus dorsal outline nearly straight at basal 2/3 then bends down. Cercus ventral outline narrowing at basal 1/4, ventro-adaxial ledge with a subbasal blunt spine (not seen in dorsal view) and apical process; cercus apical portion hoof- or pen-like, with a rounded base and attenuated apex, occupies 1/3 of cercus length. Cercus dorsal side greyish blue, apical portion blackish-brown, rest brown (Figure 4g, h). Paraprocts light-brown, thrice as short as cerci, rounded in dorsal view, trapezoid in lateral view, their dorsolateral side deeply concave with semicircular ridges occupying the concavities (Figure 4g, h).

Measurements [mm] – hw 18; abd (without apps) 29; total length (with apps) 38.

Female unknown

Differential diagnosis and remarks

The shape of the cerci of the new subspecies (Figure 4h) is close to that of *I. gracilis* spp. (Figure 1b-e) and *I. peregrinus* (Figure 2). However, the apical portion of the cerci is curiously inflated basally in dorsal view, forming a prominent 'heel' protruding medio-anteriorly. So the cerci resemble rather legs and feet of a man in the act of brass swimming than the arms and hands of a man in the act of diving, as in the mentioned species. None of so far described taxa of *Indolestes* displays this shape of the cercus apical part, modification of which in the new subspecies looks most pronounced as compared to the related taxa. In other subspecies of *I. gracilis, I. peregrinus* and *I. cyaneus*, the inner outline of the cercus at the apical portion base in dorsal view just turns caudad without a concavity before the apical part to form the 'heel'. Drawings of the appendages of *I. gracilis* spp and *I. peregrinus* from Ris (1916), Fraser (1933) and Asahina (1976) are reproduced in Figures 1b-e + 2a-c. *Indolestes cyaneus* has more robust cerci with a less attenuated and inflated apical part (Figure 1a) (Fraser 1933). The coloration of the cerci, with distinctly darker apical portion, is as in *I. peregrinus*

(Asahina 1976), while in *I. gracilis gracilis* they are almost dark throughout (Fraser 1933; Asahina 1976). However this character may vary with age, individually and geographically. The paraprocts in *I. gracilis expressior* ssp. nov. (Figure 4h) are bluntly rounded in dorsal view, as should be in *I. gracilis*.

The body coloration and pattern, with straight margins of the synthorax median black band and the solid abdominal black markings not divided into anterior/posterior or left/right parts, is similar to those in *I. gracilis* and contrasted to *I. peregrinus* (Asahina 1976). Moreover, reduction of the humeral spots is similar to the nominotypical subspecies *I. g. gracilis* from Sri Lanka. Lieftinck (1940) pointed that in that subspecies, these spots are variable from complete absence to 3-4 isolated spots or even fused into irregular fascia (as in *I. g. davenporti* and *I. birmanus*). The small spot below the mesopleural suture in the holotype of *I. gracilis expressior* ssp. nov. (Figure 4d) is brown and diffuse at margins, as it often happens with a variable, environmentally induced melanisation in some damselflies, e.g. in northern populations of *Enallagma cyathigerum* Charpentier, 1840 in Eurasia (Kosterin & Zaika 2010).

Yokoi & Souphanthong (2014: fig. 4) provided a drawing of the appendages of a male of «*Indolestes* sp. 3» (Figure 5) from Paksong, Bolaven Plateau, Champasak Province, southern Laos. Their shape is very similar to *I. gracilis expressior* ssp. nov., so that specimen most probably represents the same subspecies. Unlike the here described holotype, the photo of the general habitus of this specimen shows a complete humeral stripe (Ibid.: pl. 1). However, the great variation of the humeral pattern is common in Sympecmatinae and observed in *I. gracilis gracilis* (Lieftinck, 1940), hence is expected in *Indolestes gracilis expressior* as well, perhaps depending on environmental conditions.

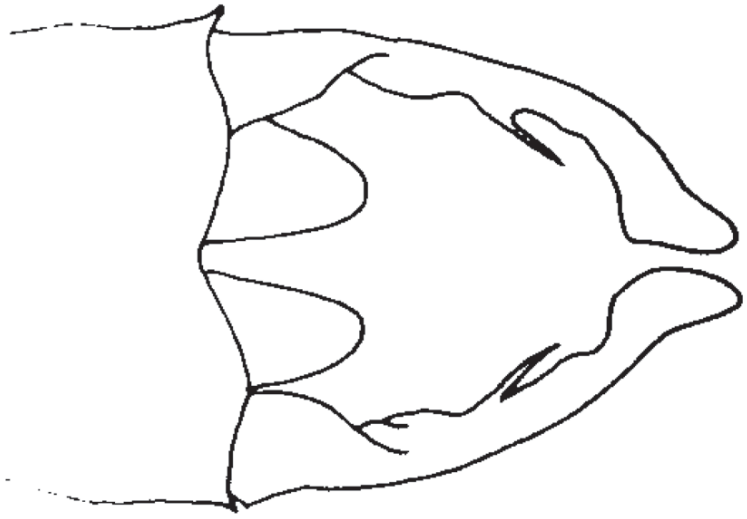

Figure 5. Male anal appendages, dorsal. – *Indolestes ?gracilis expressior* ♂ ssp. nov. after Yokoi & Southpanthong (2014: fig. 4, as *Indolestes* sp. 3).

Distribution

The subspecies is known from eastern Cambodia and (tentatively) southern Laos.

Habitat

The holotype was startled from a bush branch in a secondary growth at the left bank of the large river which form the well-known Buu Sraa Waterfall. There were also some shallow stagnant pond and pools nearby. This place was at 502 m a.s.l. (as to Google Earth) and was surrounded by countryside but close to the evergreen forest in the river valley downstream of that place. The Laotian male presumably of this new subspecies was collected at 1310 m a.s.l. (Yokoi & Souphanthong 2014). The nomino-typical Sri Lankan subspecies inhabits mountains, with localities between 1800 and 2500 m a.s.l. (Bedjanič et al. 2014: 76-77).

Discussion

I. gracilis sensu lato ranges from Sri Lanka through western (Western Ghats) and southern (Tamil Nadu State) India (Ris 1916, Fraser 1933), while *I. peregrinus* ranges from S China to Korea and Japan (Asahina 1976; Wilson 2009). East Cambodia is situated far to the east from the range of the former and far to the south from the range of the latter. Hence *I. gracilis expressior* subsp. nov seems to represent the hitherto unknown south-eastern, Indochinese subspecies of this species, characterised by a more elaborated shape of the cerci with a more modified apical part.

No *Indolestes* spp. have been reported for Vietnam (Do & Dang 2006). Yokoi & Souphanthong (2014) listed three not identified *Indolestes* spp. from Laos, with their «*Indolestes* sp3» most probably representing *I. gracilis expressior* ssp. nov. Since subspecies is an entity of intraspecies variation, specifically geographical variation, it is undesirable to describe a subspecies by one or two specimens. However, I am quite convinced in existence of this Indochinese taxon because of the unique apical part of the cercus in an area so remote from other subspecies. Of course, further specimens are needed to reveal the variation of the new species and its range and to finally prove its distinctness. Quite likely, it may appear bona species. Note, however, that this was the first and only *Indolestes* specimen obtained on my five 2-3 week long expeditions to Cambodia in 2010-2014, that is they are very rare. To postpone the description until a consider-able collection accumulates from Cambodia would mean for a long time to operate in discussions of the fauna of Cambodia with an unnamed taxon, among so many others of Indochinese Odonata (e.g. Yokoi & Souphanthong 2014), that is inconvenient.

Acknowledgements

This work was supported by International Dragonfly Fund (IDF) and Russian State project VI.53.1.3. I am greatly indebted to Martin Schorr, Noppadon Makbun and Matti Hämäläinen for great help with literature, and to Milen Marinov for detailed and thoughtful comments to the initial draft of the paper.

References

Asahina S. 1970. Burmese Odonata collected by Dr. Arthur Svihla. Japanese Journal of Zoology 16: 99-126.

Asahina S. 1976. Notes on Chinese Odonata. V. Some Odonata from Hunan and Hupeh Provinces. Kontyû 44: 1-12.

Bedjanič, M., K. Coniff, K., N. van der Poorten N. & A. Šalamun. 2014. Dragonfly Fauna of Sri Lanka. Distribution and biology, with threat status of its endemics. Pensoft, Sofia

Do M.C. & T.T. H. Dang 2006. Checklist of Dragonflies from Vietnam. Vietnam National University Publisher, Hanoi.

Dow, R.A. 2009. *Indolestes cyaneus*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 15 II 2015.

Dow, R.A. 2010. *Indolestes gracilis*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 15 II 2015.

Dow, R.A. 2013. *Indolestes coeruleus*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 15 II 2015.

Fraser, F.C. 1933. The fauna of British India, including Ceylon and Burma. Odonata. Vol. I. Taylor and Francis, London.

Hämäläinen, M. & A. Pinratana. 1999. Atlas of the dragonflies of Thailand. Distribution maps by provinces. Brothers of St. Gabriel in Thailand, Bangkok.

Joshi, S. & K. Kunte. 2014. Dragonflies and damselflies (Insecta: Odonata) of Nagaland, with an addition to the Indian odonate fauna. Journal of Threatened Taxa 6: 6458-6472.

Kalkman V. & A. Orr. 2013. Field guide to the damselflies of New Guinea. Brachytron 16 supplement: 3-120.

Kosterin, O.E. & R. Poggi. 2015. Taxonomical notes on *Indolestes* Fraser, 1922 (Lestidae, Zygoptera). 2. *Indolestes birmanus* (Selys, 1891) is bona species. International Dragonfly Fund Report 81: 13-20.

Kosterin, O.E. & V.V. Zaika. 2010. Odonata of Tuva, Russia. International Journal of Odonatology 13: 277-327.

Lieftinck, M.A. 1940. On some Odonata collected in Ceylon, with descriptions of new species and larvae. Ceylon Journal of Sciences (B) 22: 79-117.

Lieftinck, M.A. 1954. Handlist of Malaysian Odonata. A catalogue of dragonflies of Malay Peninsula, Sumatra, Java and Borneo, including adjacent small islands. Treubia 22, supplement: xiii + 202 pp.

Lieftinck, M.A. 1960. Handlist of Malaysian Odonata. A catalogue of dragonflies of Malay Peninsula, Sumatra, Java and Borneo, including adjacent small islands. Nova Guinea, Zoology 8: 127-171.

Ng J.F., R.W. Dow &, Choong C.Y. 2011. New records of Odonata (Insecta) from the Cameron Highlands, with first records of two species for Malaysia. Journal of Science and Technology in Tropics 7: 9-16.

Prasad, M. & A. Kumar. 1977. Report on the collection of dragonflies (Odonata: Insecta) from Punjab, India. Part I. Newsletter of Zoological Survey of India 3: 309-312.

Ris, F. 1916. H. Sauter's Formosa-Ausbeute. Odonata. Supplementa Entomologica 5: 1-81.

Selys Longchamps, E. de 1891. Viaggio di Leonardo Fea in Birmanie e regioni vicine, XXXII, Odonates. Annali del museo civico de storia naturale di Genova 10: 439-518.

Tsuda S. 2000. A Distributional List of World Odonata. Privately published, Osaka.

Wilson, K.D.P. 2009. *Indolestes peregrinus*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 26 II 2015.

Zhou X. & Zhou W.-b. 2005. A new species of the *Indolestes* from Guizhou Province of China (Odonata: Lestidae). Wuyi Science Journal 21: 13-21.