

**NOTES ON THE *LIBELLAGO* DAMSELFLIES  
OF THE ANDAMAN AND NICOBAR ISLANDS,  
WITH DESCRIPTION OF A NEW SPECIES  
(ZYGOPTERA: CHLOROCYPHIDAE)**

M. HÄMÄLÄINEN

Department of Applied Biology, P.O. Box 27, FIN-00014 University of Helsinki, Finland  
e-mail: matti.hamalainen@helsinki.fi

*Received January 21, 2002 / Reviewed and Accepted April 9, 2002*

*Libellago blanda* (Hagen) and *L. andamanensis* (Fraser) are removed from synonymy with *L. lineata* (Burm.); they are redescribed in both sexes and compared with *L. lineata*. Recently acquired material from the Nicobar Isls (Camorta and Great Nicobar) reveals that the original type series of *Micromerus blandus* consists of 2 close, but distinct spp. A ♂ specimen (in ZMUC) from Nancowry Island is designated as the lectotype of *blanda*. Former syntype ♀♀ from Little Nicobar belong to a new sp., described here as *L. balus* sp.n., holotype (deposited at RMNH, Leiden) of which comes from Great Nicobar Island, Campbell Bay area, 24-XII-2000. ♂♂ of *L. blanda* and *L. balus* sp.n. differ in the colour pattern of abdomen and in the shape of rhinarium. The status of *L. indica* (Fraser) is briefly discussed.

**INTRODUCTION**

The Andamans and Nicobars, also called "The Bay Islands", are remote islands in the Indian Ocean. Especially the Nicobars, the southern group, where the Indian government does not allow foreign visitors at all, is still entomologically rather poorly known. Illustrating our lack of knowledge is the fact that *Libellago blanda* (Hagen in Selys, 1853), the first odonate from these islands and the second in its genus to be described, has remained perhaps the poorest known *Libellago* taxon. It took over 150 years before more specimens of it were collected in the Nicobars.

Due to the courtesy of Dr Prashanth Mohanraj and his wife Dr K. Veenakumari, I have received for study plenty of new *Libellago* material from the area. Also part of the type series of *L. blanda* was studied and a lectotype selected.

## HISTORICAL REVIEW

The first scientific insect collecting in the area took place in January-February 1846, when the Danish corvette "Galathea" visited the Nicobars during its two year expedition around the world. According to data presented by SCHIØDTE (1855), the entomologist of the expedition, Carl Emil Kiellerup, collected a total of 78 odonate specimens representing 15 species from 5 islands. These were sent for study to H.A. Hagen. Hagen's brief original description of *Micromerus blandus* appeared in SELYS LONGCHAMPS (1853). A more detailed description was given in SELYS LONGCHAMPS & HAGEN (1854), where the species was compared with its sole known congener *M. lineatus* (Burmeister, 1839).

FRASER (1924) provided the first treatment of the Andaman dragonfly fauna, reporting on 17 specimens of 9 species collected by N. Annandale from Mt Harriet in the South Andaman Island in November-December 1923. Among the new species described was *Micromerus andamanensis*, based on one single male found at an altitude of 500 ft on a "rocky pool below waterfall" on 30 November 1923.

FRASER (1924) did not compare his *andamanensis* with the description of *blanda* at all. Later FRASER (1928) wrote about *blanda* as follows: "I have not seen this species, which in the Selysian description is said to closely resemble *lineata*, a fact that leads me to describe it as a subspecies of the typical form from Java", i.e. as *Micromerus lineatus blandus*. Also in FRASER's (1934) "The fauna of the British India" volume, *blanda* was treated as a subspecies of *lineata*, but *andamanensis* as a good species. They were now placed in the genus *Libellago* Selys, 1840. Both LIEFTINCK (1932) and LAIDLAW (1950) listed these taxa with the same status as Fraser. However, Lieftinck at least had not studied any material from the Andamans and Nicobars personally.

CHHOTANI et al. (1983) described the first female of *andamanensis* from South Andaman Island. They downgraded *andamanensis* to a subspecies of *L. lineata* (Burmeister, 1839), and thereafter both *blanda* and *andamensis* have been treated as ssp. of *lineata* by the Indian authors (e.g. PRASAD & VARSHNEY, 1995).

In the recent world Odonata catalogues, listing of these taxa has been variable. *L. andamanensis* was listed as a good species by DAVIES & TOBIN (1984) and STEINMANN (1997), but as ssp. of *lineata* in BRIDGES (1994) and TSUDA (2000). *L. blandus* was treated as a synonym of *L. lineata* in DAVIES & TOBIN (1984), BRIDGES (1994) and STEINMANN (1997), but as ssp. of *lineata* in TSUDA (2000). Apparently no dragonfly taxonomist had studied any of the syntype males of *blanda* after its original description until now. Moreover, as both Hagen's descriptions were somewhat incomplete (the colour pattern of the abdomen inadequately described) and FRASER's (1928, 1934) second-hand descriptive notes rather misleading, the existing confusion in literature is understandable. The holotype of *L. andamanensis*, originally placed in the Indian Museum, appears to be lost, but new specimens from the surroundings of the type locality are available.

**MICROMERUS BLANDUS HAGEN in SELYS, 1853**  
 – A COMPOSITE TAXON

*Micromerus blandus* Hagen in SELYS LONGCHAMPS, 1853: 64-65 [orig. descr. of both sexes]; – SELYS LONGCHAMPS & HAGEN, 1854: 234-236, pl. 8, fig. 14 (details of head structures), pl. 14, fig. 7 (male abd. tip and appendages) [more detailed descr. by comparing with *M. lineatus* Burm.].

*Micromerus blandus*: SELYS LONGCHAMPS, 1873: 617 (sep. p. 64) [briefly compared with *M. semiopacus* Selys].

*Micromerus blandus*: SELYS LONGCHAMPS, 1879: 398 (sep. p. 52) [compared with *M. sumatranus* Albarða].

*Micromerus lineatus blandus*: FRASER, 1928: 687 [second-hand descr., downgraded to ssp.].

*Libellago lineata blanda*: FRASER, 1934: 60, 65 [keyed, second-hand descr.].

*Libellago l. lineata*: DAVIES & TOBIN, 1984: 17 [*blanda* listed as junior synonym of *lineata* for the first time].

TYPE MATERIAL OF *MICROMERUS BLANDUS*. – SELYS LONGCHAMPS & HAGEN (1854: 236) state: “M.Hagen a examiné trois mâles de Nangkowry et quatre femelles de Petit Nicobar”. Since only two males from “Nangkovri” and three females from “Nicobar min”, [all having labels “*Micromerus blandus* Hag.” and “Hagen det.”] are available at ZMUC (Copenhagen), Hagen had apparently retained one specimen of both sexes for his collection. However, according to data received from Dr Rosser Garrison, only the female syntype (Nr 12113) is now available at MCZ (Harvard). The whereabouts of the third male is unknown. It may be lost; anyway it is not in coll. Selys at IRSN (Brussels), either. [In fact, SELYS LONGCHAMPS, 1879 wrote that he has not seen this species himself]. Surprisingly, in ZMUC there is also an “extra”, somewhat different looking male specimen placed under the name “*blanda*” from “Lille Nicobar” among the specimens brought by the Galathea expedition. This specimen was not studied by Hagen [no labels by Hagen and not mentioned in SELYS LONGCHAMPS, 1854, nor included in SCHIØDTE, 1855; table on p. 112]. Thus, it is not a syntype.

One of the islands from which the syntype series of *M. blandus* originates, Nancowry, belongs to the “Middle Nicobar” island-group, whereas Little Nicobar belongs to the southern “Great Nicobar”- group. These island groups are separated by the Sombrero Channel (275 m deep), which also kept them separate during periods of the Pleistocene sea level lowerings (max. 160 m) (see RIPLEY & BEEHLER, 1989). Due to a long isolation there are clear differences in the fauna and flora in these island groups. Based on the recently received material, this also applies to the stream damselflies. *Libellago* males from these island groups differ to such an extent that the populations must be considered to represent two distinct species.

Consequently, from the syntypes of *blanda*, males and females belong to different species. I prefer to select a male specimen as the lectotype of *Micromerus blandus*. From the two available male syntype specimens, Dr N.M. Andersen, Senior Curator of ZMUC, sent the better preserved male for me to study and it is designated as the lectotype here.

**Lectotype** (at ZMUC): male specimen bearing old, hand-written, white labels “Nangkovri” / “*Micromerus blandus* Hag. ♂” / “Hagen det.” / and a more recent, hand-written, red label “TYPE, *Micromerus blandus* Hagen 1854”. I have added another red (printed) label “LECTOTYPE. Designated by M. Hämäläinen in 2001. Present name *Libellago blanda* (Hagen in Selys, 1853)”. The lectotype lacks

the right foreleg and both middle legs; otherwise it is a complete mature specimen. Pinned wings spread; colours well preserved; segments 7-10 and appendages slightly mouldy above, heavily so on the underside. The single available syntype male becomes **paralectotype**. The specimen (at ZMUC) bears similar old labels as the lectotype. According to data given by Dr N.M. Andersen its anal appendages are broken, but otherwise it is a complete specimen.

This lectotype selection makes Nancowry Island [also called Nankauri Island] the type locality of *L. blanda*. The former syntype females from Little Nicobar belong to a new species *L. balus* sp.n. described below. From these syntypes I have studied only one female specimen (ZMUC), which bears old, handwritten labels "Nicobar min." / "Micromerus blandus Hag. ♀" / "Hagen det." and a more recent hand written red label "TYPE *Micromerus blandus* Hagen 1854". [Two similarly labelled females are available at ZMUC; one further female at MCZ].

*LIBELLAGO BLANDA* (HAGEN *in* SELYS, 1853), STAT. REV.

Figures 1-2, 6, 13

**Material.** — **Lectotype** ♂ from Nancowry Island (see above). — New material from Camorta Island (all Prashanth Mohanraj leg.): — 5 ♂, 2 ♀, Camorta, "Agriculture Department Farm", 9-I-2001; — 5 ♂, Camorta, Murak, 8-I-2001. — [1 ♂ deposited at RMNH, Leiden; most of the rest remain in author's collection].

**MALE (Lectotype).** — **Head.** — Labium black. Rhinarium (ante- and postclypeus) with anterior side shining black, with brownish borders and with a distinct shining flattened facet; posterior part matt black. Rest of the head matt black, with conspicuous orange yellow markings as follows: a pair of large square-shaped markings in front of antennae; small round dots near the lateral ocelli, a little larger than the ocelli; a rather broad band along occipital margin, anteriorly triangle-shaped in the middle.

**Prothorax** black with orange yellow markings as follows: a broad horizontal band across the anterior lobe; a broad triangle-shaped marking covering most of the posterior lobe.

**Pterothorax** black, with orange yellow stripes and markings. Dorsal carina orange yellow. Narrow antehumeral stripes tapering above, not extending to wing base, where they continue as separate dots. Orange markings on metepisternum are quite similar to those in *L. balus* sp. n. (cf. Fig. 9), but somewhat smaller; a broad marking on metepimeron as in *L. balus* sp. n., somewhat obscured apicad; ventral side black. Legs black, inner side of tibiae creamy white.

**Wings.** — Hyaline, bases without yellow tint. Tip of forewing with large dark spot, quite similar to *L. balus* sp. n. (cf. Fig. 11), but the apex of forewing somewhat more abruptly rounded. The utmost tips of hindwing obscurely darkened. Pterostigma present only in the hindwing. Venation denser than in *L. lineata*, resembling that of *L. andamanensis* and *L. balus* sp. n. (cf. Figs 10-12). Forewing with 6 antenodals. Hindwing with 6 ante- and 14-15 postnodals; pterostigma black, covering 4-5 underlying cells.

**Abdomen** (Fig. 1). — Less strikingly dorsoventrally depressed than in *L. lineata*,

S3-4 only slightly broader than S2 and S5. Largely orange reddish above and on sides. S1 broadly black at base; S2 with anterior border black, connected to a broad posterior black marking; paired middorsal black spots on S3-7, those on S3-4 fused together, getting smaller in apical segments. Intersegmental rings narrowly black, S8 broadly black posteriorly, S9-10 wholly black. S1-2 and base of S3 broadly black lateroventrally, S4-8 only ventrolateral edges and sternites black. Anal appendages black, of typical shape for the genus. [According to Dr N.M. Andersen, in the paralectotype male the black marks on S4 are not fused; otherwise the colour pattern of abdomen is similar].

Measurements (in mm). — Hindwing 20, abdomen (incl. appendages) 16.

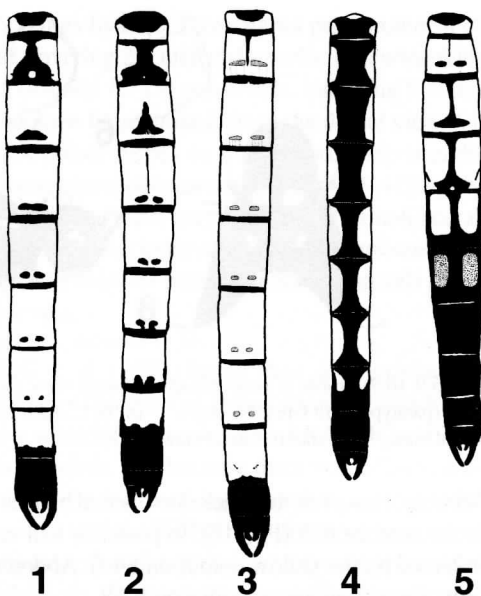
Males from Camorta. —

In two specimens the upper orange

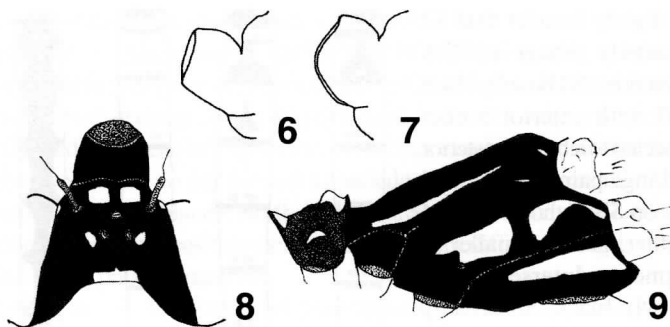
marking on the metepisternum is divided into two parts at the narrowest section. The black abdominal markings (Fig. 2) are more pronounced than in the lectotype. S1 and S2 quite similarly marked to the lectotype, but the black area is a little more extensive. S3-7 with paired black markings, those on S3 fused in all specimens, those on S4 fused in a few specimens and those on S5-7 fused only in one specimen. The paired dorsal spots on S7 are connected to the apical black ring in all specimens, in some specimens also those on S5 and S6. In most specimens, the middorsal carina area is darkened on S3-4, even forming an obscure triangle with the apical marking on S3. Abdominal segments broadly black lateroventrally, also in the apical segments. The dorsal orange colour protruding more ventrad in basal half of S7-8. Usually 6 (5-7) antenodals in both fore- and hindwing; 13-15 postnodals in the hindwing. Pterostigma in hind wing covering 4 (seldom 5) underlying cells.

Measurements (in mm). — Hindwing 18-20, abdomen (incl. appendages) 14-15.5.

FEMALE (first female). — Of the two available females from Camorta, one is somewhat teneral and has become flattened in the envelope, the other one has been selected. They are slightly smaller, but quite similar to those of *L. balus* sp. n. (see below). As in males, the triangular yellowish marking on the hind lobe of prothorax is smaller. Abdomen is quite similarly coloured as in *L. balus* sp. n. females from Great



Figs 1-5. Male abdomen (dorsal view); — (1) *Libellago blanda* (lectotype from Nancowry); — (2) *L. blanda* (Camorta); — (3) *L. balus* sp. n. (paratype from Great Nicobar); — (4) *L. andamanensis* (South Andaman, Garacharma); — (5) *L. lineata* (Java, Bogor),



Figs 6-9. (6-7) Profile of male rhinarium, lateral view: (6) *Libellago blanda* (Camorta); – (7) *L. balus* sp.n. (paratype from Great Nicobar). – (8-9), *L. balus* sp. n. (paratype from Great Nicobar): (8) head, dorsal view; – (9) thorax, lateral view.

Nicobar. However, the black dorsolateral band is slightly narrower and more undulating in the anterior half (Fig. 13); in posterior half without clear sign of becoming wholly indented by the yellow colour on S4-6. Abdomen ventrolaterally broadly black, with only tiny yellowish markings on S7-8.

Measurements (in mm). – Hindwing 18-19, abdomen 13.

DISTRIBUTION. – This species appears to be confined to the "Middle Nicobar" group of the Nicobar Islands and has so far only been recorded from Nancowry and Camorta. It might also occur in Katchall, from where apparently no dragonfly specimens have been collected. From the third (northern) island group "Car Nicobar/Teressa", which also remained separate from the other groups during periods of the Pleistocene sea lowering, no *Libellago* damselflies have yet been found, but dragonflies are known to have been collected so far only in Car Nicobar.

FLIGHT SEASON. – Known records made in January-February.

### *LIBELLAGO BALUS* SP. NOV.

Figures 3, 7-9, 11, 14

*Libellago aurantiaca* [nec. Selys, 1859]: MITRA, 1995: 3 [2 ♂ recorded from "Near Galathea", Great Nicobar, 3-VIII-1984].

Material. – **Holotype** ♂: Great Nicobar Island, "3.5 km from zero point along Campbell Bay – Gorind Nogur Road", 24-XII-2000, Prashanth-Mohanraj leg. (Deposited at RMNH, Leiden). **Paratypes**: 6 ♂, 4 ♀ from the same site as the holotype, 24/27-XII-2000, Prashanth-Mohanraj leg.; – 1 ♂, 1 ♀, Great Nicobar, Campbell Bay, 18/19-XII-1996, K. Veenakumari leg. [1 ♀ at RMNH, most of the other paratypes placed in the author's collection]. **Other material** studied: 1 ♂ [in the Galathea Expedition material at ZMUC], furnished with an old hand-written label "Lille Nicobar, Galatea" (see above); – 1 ♀ (ZMUC), "Nicobar min." [syntype of *Micromerus blandus* sensu Hagen; see above].

Etymology. – The early Arab navigators called the Nicobar Islands by the name "Balus". The islands

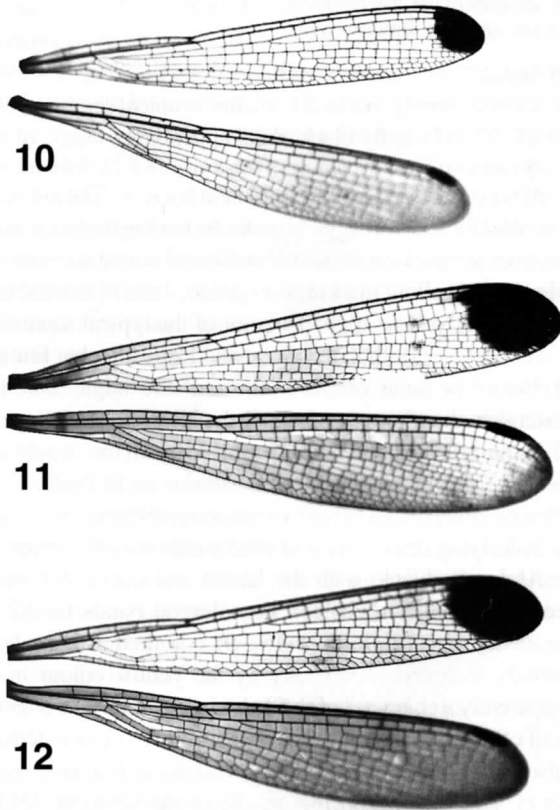
were also known to them as "Megabalu", "Legabalu" and "Nagabalus" (see KLOSS, 1903). The species name is to be considered as a noun in apposition.

**MALE.** — **Head.** — Labium black. Rhinarium (ante- and postclypeus) with anterior side shining black, with brownish borders. Posterior part of rhinarium matt black. Rest of the head matt black, with conspicuous orange yellow markings (Fig. 8): a pair of large square shaped markings in front of antennae; small round dots near the lateral ocelli, double the size of the ocelli; a rather broad band along occipital margin, anteriorly triangle-shaped in the middle. In teneral specimens genae, base of mandibles and the outer side of antennae pedicel partly yellow.

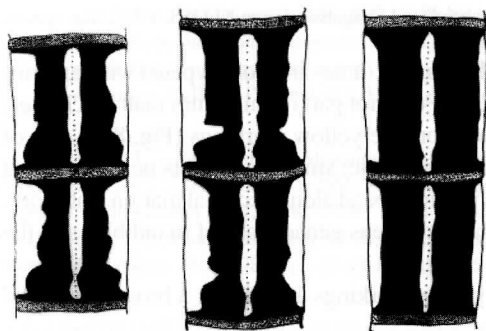
**Prothorax** black with orange yellow markings as follows: a broad horizontal band across the anterior lobe; half-moon shaped markings on sides of the median lobe; a broad triangle-shaped marking covering most of the posterior lobe. Tiny narrow markings on the anterolateral corners of the posterior lobe.

**Pterothorax** black, with orange yellow stripes as in Figure 9. Dorsal carina orange yellow. Narrow antehumeral stripes tapering above, not extending to wing base, where they continue as separate dots. A narrow, short marking also at the upper part of the humeral suture. Metepisternum with large markings; in some specimens the upper part is divided to two sections. A broad marking on metepimeron, somewhat narrowing apicad. Ventral side black. Legs black, inner side of tibiae creamy white.

**Wings.** — Hyaline, bases without distinct yellow tint. Tip of forewings with large dark spot (Fig. 11). Venation denser than in *L. lineata*, resembling that of *L. blanda* and *L. andamanensis* (cf. Figs 10 and 12). Fore- and



Figs 10-12. Male wings: (10) *Libellago lineata* (Thailand, Chon Buri, Bang Phra); — (11) *L. balus* sp. n. (paratype from Great Nicobar); — (12) *L. andamanensis* (South Andaman, Garacharma).



Figs 13-15. Female 4<sup>th</sup> and 5<sup>th</sup> abdominal segment, dorsal view: (13) *Libellago blanda* (Camorta); – (14) *L. balus* sp. n. (paratype from Great Nicobar); – (15) *L. andamanensis* (South Andaman, Beadonobad).

hindwings with 6-7 antenodals. Hindwing with 13-17 postnodals; pterostigma black, covering 3-4 underlying cells.

**A b d o m e n** (Fig. 3). – Even somewhat slimmer in appearance than in *L. blanda*. Largely orange reddish above and on the sides. The black markings are much more reduced than in *L. blanda*. S1 black on lower sides and anteriorly; dorsally the black colour forms a rounded marking. In S2, the narrow basal black ring and the subapical paired marking are

connected by a narrow middorsal dark stripe. S3-8 with obscure paired subapical markings, getting gradually smaller in apical segments. Apex of S8 only very narrowly black. S9-10 wholly black. Anal appendages black, of typical shape for the genus.

**M e a s u r e m e n t s** (in mm). – Hindwing 18.5-21, abdomen (incl. appendages) 15.5-17.

**Male from Little Nicobar.** – The single available mature male differs slightly from the toptotypical males by having the black middorsal stripe on S2 somewhat broader at base and the paired subapical dorsal spots on S3-8 a little more pronounced. Head with yellow markings on genae, base of mandibles and antennae pedicel, also a pair of tiny yellow spots posterior of the typical square markings.

**FEMALE.** – Both in the Great and Little Nicobar females the yellowish markings on the head are quite similar to those of the single male from Little Nicobar, i.e. more extensive than in males from Great Nicobar. In the aged female from Little Nicobar, the shining black anterior side of rhinarium has turned pruinose gray. Colour pattern of pro- and pterothorax quite similar as in male. Legs blackish. Wings hyaline. Pterostigma present in both wings; grayish brown, getting paler apicad, covering usually 4 underlying cells. Fore and hind wings with 6-7 antenodals and 12-16 postnodals.

Abdomen black, with the lateral and dorsal yellow markings much broader and correspondingly the black dorsolateral bands on S2-7 much narrower than in *L. andamanensis* (cf. Figs 14-15). S1 coloured as in male. On S4-6 the black bands are wholly indented subapically by the yellow colour in the Little Nicobar specimen, apparently a character of aged specimens. The lateroventral edge yellowish at the basal half of S5-8; in the Little Nicobar specimen more extensively yellow, narrowly yellow also on S3-4. S8 with a yellow dorsal stripe, not quite reaching to the apex, very narrow short lateral stripes in the middle of the segment. S9 black, with only small lateral yellow spots; in the Little Nicobar specimen also a dorsal spot present. S10 and appendages all black. Intersegmental rings between S8-9 (in some specimens also between S7-8) broadly pale brownish.



Measurements (in mm). — Hindwing 19-21, abdomen 13-14.5.

DISTRIBUTION. — This species appears to be confined to Great Nicobar and Little Nicobar, the southernmost islands of the archipelago, which form the "Great Nicobar" island group. The other islands in this group are so small, that presence of stream damselflies there is very unlikely. Records made in August and December-February.

CONSIDERATIONS ON THE STATUS OF THE NICOBARESE TAXA. — *L. blanda* has become linked and later synonymized with *L. lineata*, solely by misinterpreting the original description, a good reminder of the importance of studying the type material. *L. blanda* is easily separated from *lineata* by its denser venation. The shape of male abdomen is different. In *lineata* the abdomen is dorsoventrally more depressed, the broadest point at S4 being broader or as broad as than the length of S4 (Fig. 5). The abdomen of *blanda* male is of different slimmer shape; S4 being much longer than broad (Figs 1-2). Moreover the colour pattern of abdomen is completely different; the pale markings in *lineata* being cadmium or golden yellow. Whereas in *lineata* male (and also in *indica* male), the wing base shows a clear yellowish tint, and the main veins (especially R+M and veins around quadrangle) are much paler at wing base than apicad, in *blanda* male the wing bases are hyaline and the veins uniformly dark.

The existence of two distinct taxa in the Nicobars is interesting. Besides the differences in the colour pattern of the male abdomen, *L. blanda* and *L. balus* sp. n. differ clearly in the shape of male rhinarium. In *blanda* (Fig. 6), the anterior flattened facet is more pronounced, its shining surface being slightly concave and its lower border forming an obscure ridge against the convex anterior part of the rhinarium. In *L. balus* sp.n. (Fig. 7) the shining facet is less distinctly flattened, its surface being somewhat convex in the lower half, with the edge smoothly connected to the anterior part of rhinarium. In females, the facet is smaller and more similar.

Among the chlorocyphids, it is not easy to define what differences are sufficient to rank a population belonging to a distinct species rather than a subspecies. In this case the structural difference in the shape of male rhinarium points more to the specific difference, than the mere differences in the colour pattern alone. The view is strengthened by the discovery that both in Camorta and Great Nicobar, the same streams are also inhabited by undescribed *Nososticta* species. Based on the striking differences in the structure of male appendages and female prothorax, these superficially similar protoneurids belong to two distinct species, one occurring in Camorta and the other in Great Nicobar. The island groups have remained isolated also during all periods of sea lowering in the Pleistocene era. Thus the isolation has lasted long enough for complete speciation; no gene-flow has been possible between isolated populations of these strictly stationary stream dwellers.

*LIBELLAGO ANDAMANENSIS* (FRASER, 1924), STAT. REV.

Figures 4, 12, 15

*Micromerus andamanensis* FRASER, 1924: 410, fig. in pl. 24 [orig. descr. of ♂]; — FRASER, 1928: 687-688, fig. in pl. 1 [descr. of ♂].

*Libellago andamanensis*: FRASER, 1934: 60-61, 66 [key, fig., descr.].

*Libellago lineata andamanensis*: CHHOTANI et al. 1983: 467, 468, 471-473, 494 [descr. of the first ♀; downgraded as ssp.; 8 ♂, 4 ♀ listed from different localities in South Andaman, 26-III/18-IV-1964, B.S. Lamba leg.].

**M a t e r i a l.** — (all Prashanth-Mohanraj & K. Veenakumari leg., placed in author's collection). — North Andaman: 2 ♂, Kalighat, 20-X-1996; 1 ♂, Radhonagor, 19-X-1996. — South Andaman: 1 ♂, 1 ♀, Sipighat, dwarf coconut block, 24-VII-1996; 1 ♂, 1 ♀, Garacharma, C.A.R.I. Campus, 1-I-1998 (♀), 28-II-1998 (♂); 1 ♂, Bloomsdale, 5-III-1998; 2 ♀, Chiriyatapa (mangrove forest), 11-III-1998, 3 ♀, Beadonobad stream, 29-I-1998 (1 ♀), 26-III-1998 (2 ♀). — Little Andaman: 4 ♂, 2 ♀, Hut Bay, 8/12-XI-1998.

**M A L E.** — **H e a d.** — Labium largely black, pale at base. Rhinarium (ante- and postclypeus) with anterior side shining black, with brownish borders and with a distinct shining flattened facet; posterior part matt black. Rest of the head matt black, with three pairs of small yellowish rounded markings as follows: between the antennae, on side of the lateral ocelli and as postocular spots. Moreover, the occipital margin narrowly yellow in the middle, in most specimens protruding with a round or triangle shaped extension in the middle.

**P r o t h o r a x** black with yellow markings: a linear marking on anterior lobe, a pair of pearl-shaped markings on sides of median lobe and a pair of round spots on ventrolateral edge of median lobe. A small marking midline in the posterior lobe, of variable (often bell, triangle or droplet) shape.

**P t e r o t h o r a x** jet black, with yellowish stripes, quite similarly patterned to *L. blanda* and *L. balus* sp. n. (cf. Fig. 9). Dorsal carina finely yellow. In teneral specimens the ventral side furnished with two pairs of yellow markings, in older specimens the ventral side black. Legs black, inner (flexor) side of all tibiae pulverulent white. Middle part of the inner side of anterior femora also whitish.

**W i n g s** (Fig. 12). — Hyaline, with a faint yellowish tint at base, somewhat clearer at costal area. Tip of forewing with large black spot (somewhat variable in size), reflecting metallic blue. The utmost tips of hindwing slightly enfumed. Pterostigma present only in the hindwing, black, covering 3-4 underlying cells. Venation denser than in *L. lineata*. Usually 6 (seldom 5 or 7) antenodals in both wings and 12-14 postnodals in hindwing.

**A b d o m e n** (Fig. 4). — Similarly shaped to *L. blanda*. Largely brownish yellow on sides, with broad continuous, black dorsal stripe, regularly broadening around intersegmental rings. Posterior half of S8 and S9-10 all black. Anal appendages black, of the typical shape for the genus.

**M e a s u r e m e n t s** (in mm). — Hindwing 19-21, abdomen (inc. appendages) 14.5-16.

**F E M A L E.** — Head with more yellow markings than in male. Besides the three pairs of spots as in male, there are broad oblique bands on frons. Genae, base of antennae and eye margin also yellow. Borders of anterior surface of rhinarium yellowish and bases of mandibles yellow. Younger females have also labium largely yellow (only tips black) and a pair of yellow dots (sometimes fused) in labrum. Colour pattern of pro- and pterothorax resembles that in male. Legs blackish, slightly pale pruinosed.

Flexor surfaces of femora partly pale. Wings hyaline. Pterostigma pale brownish at basal third, getting creamy white apicad, covering 2-4 underlying cells. Forewing with 6 (seldom 5 or 7) antenodals and 10-15 (usually 12-13) postnodals, hindwing 5-6 and 10-14 (usually 11-12) respectively. Abdomen largely black from the dorsal view. S1 with dorsal side wholly black. The black dorsal stripes on S2-8 broad, quite straight throughout, the yellow middorsal stripe correspondingly narrow (Fig. 15). S9-10 largely black; S9 with yellow lateral dots and a middorsal spot at apex; S10 with small lateral yellow spots. Seen from the lateral view, the yellow interrupted stripe is narrower than in *L. blanda* and *L. balus* sp.n., but the lateroventral margin of S3-7 with still more extensive pale markings than in *L. balus* sp.n.

Measurements (in mm). — Hindwing 19-21, abdomen 13-14.

TAXONOMIC STATUS. — CHHOTANI et al. (1983) based their downgrading of *andamanensis* to a subspecies of *lineata* upon the fact that some characters (markings on frons and fore femora) in their new material were closer to FRASER's (1934) description of *lineata* than that of *andamanensis*, and because there was a "complete range between the two forms in respect of wing markings, number of antenodal crossveins and length of abdomen" as given by FRASER (1934) for these taxa.

Direct comparison of the present specimens of *andamanensis* with *lineata* specimens from Java (type locality), Peninsular Malaysia, Thailand, Nepal and Taiwan showed striking structural differences. In *lineata* male, the abdomen is more flattened. Although there seem to be some geographical variation in the proportions of the abdominal segments of *lineata* male, the broadest point at base of S4 is always at least nearly as broad as S4 is long (Fig. 5), whereas in *andamanensis* S4 is much longer than broad (Fig. 4). The colour pattern of the male abdomen is very distinct. Moreover, *andamanensis* has clearly denser venation in both sexes (cf. Figs 10, 12) and the apical dark patch in the forewing of male is more extensive. Wings of male *lineata* are distinctly tinted by yellow at base, those of *andamanensis* only slightly, the colour contrast being rather imperceptible. These differences leave no doubt of the correctness of Fraser's original decision to describe *andamanensis* as a good species.

*L. blanda*, *balus* and *andamanensis* appear to be closer to each other than to *lineata*. Although they share some common characters, like dense venation, shape of male abdomen and similar colour pattern of pterothorax, some other details like the differences (striking in *andamanensis*) in colour pattern of male abdomen indicate that they are distinct, good species.

Unfortunately, in his illustrations of the colour pattern of different *Libellago* species, FRASER (1924, 1928, 1934) did not consider the shape of abdomen adequately. In FRASER (1924), all abdomens were of the typical "*lineata*-shape". In FRASER (1934), abdomens of *lineata* and *andamanensis* are misleadingly uniformly slim.

Females of most *Libellago* species (as chlorocyphids in general) are very difficult to tell apart, since their colour pattern is often similar and variable due to age. However, as in males, the denser venation provides an easy way to separate *andamanensis* female from *lineata*. *L. andamanensis* female differ from *blanda* and *balus* by having less

extensive yellow markings in abdomen (cf. Figs 13-15).

DISTRIBUTION. — According to RIPLEY & BEEHLER (1989), all islands of the Andamans, with the exception of the small and isolated Narcondam and Barren Islands, would have formed an entity during the periods of sea level lowering in the Pleistocene era. Thus the Andamans can be expected to have a more uniform fauna than the Nicobars.

This seems to fit also to our present knowledge of *L. andamanensis*. It has so far been recorded from three islands: North Andaman, South Andaman and Little Andaman. No clear constant differences between specimens from different islands can be traced on the basis of the present material.

FLIGHT SEASON. — Apparently all year around, recorded in January-April, July, October-November.

#### LIBELLAGO TAXA ERRONEOUSLY LISTED FROM THE ANDAMANS AND NICOBARS

Once a distributional record is published, it seems easily to continue its existence in the "distribution range" chapters of subsequent publications, even when proven incorrect. For this reason, I attempt to remove the following range records from "circulation". Besides *andamanensis*, *blanda* and *balus* sp. n., no other *Libellago* taxa are known to occur in the Andamans and Nicobars, respectively.

*LIBELLAGO LINEATA* (BURMEISTER, 1839). — LIEFTINCK (1932) lists the Andamans as within the range of *L. lineata* (incl. ssp. *blanda*, *indica* and *lineata*), although *andamanensis* was listed separately as a good species from the Andamans. PRASAD & VARSHNEY (1995) gives the Andaman Islands as within the range of *L. l. lineata*. Both these listings may refer to the note in FRASER'S (1924) introduction: "There are, however, in the Natural History Museum in London (BMNH) collection some specimens of *Micromerus* labelled by R. Martin as varieties of *M. lineatus* Burm." Unfortunately Fraser did not consider the possibility of their being *andamanensis*. Mr David T. Goodger, Curator at the Department of Entomology, kindly informed me that there are two specimens from the Andamans furnished with Martin's label "*lineatus* form *ceylonicus* Martin m.s." and that they are, in fact, presently placed under the name *Libellago andamanensis* (Fraser) in the collection drawer. At present, both specimens are badly damaged, i.e. missing their abdomens, but at least one is identifiable as male.

PRASAD & VARSHNEY (1995) erroneously list also the Nicobars within the range of *L. lineata andamanensis*.

*LIBELLAGO AURANTIACA* (SELYS, 1859). — It is obvious, that the two male specimens listed by MITRA (1995) as *Libellago aurantiaca* (Selys) from "Near Galathea", Great Nicobar Island, 3-VIII-1984, in fact belong to *balus* sp.n. These specimens are deposited in the National Zoological Collection, Zoological Survey of India, Calcutta. Indeed, by using FRASER'S (1934) key, male *balus* keys out as *aurantiaca*. However, *aurantiaca* is much smaller insect, with S9-10 also partly red. Based on the structure of ante- and postclypeus (see below) *balus* and *aurantiaca* are not closely related.

## REMARKS

LIEFTINCK (1950, footnote on p. 632) pointed out the interesting fact that there are differences in the configuration of the projecting rhinarium (ante- and postclypeus) in *Libellago* species. Some species (in both sexes) have a distinctly flattened anterior facet between the anteclypeus and the basal portion of postclypeus; in some species this facet is absent and in a few species the situation is somewhat intermediate. *L. blanda*, *L. balus* and *L. andamanensis* belong to the group which have the flattened anterior facet, like e.g. *L. lineata*, *L. indica* (Fraser, 1928), *L. greeni* (Laidlaw, 1924), *L. adami* Fraser, 1939 and *L. semiopaca* (Selys, 1873). On the other hand, e.g. in *L. aurantiaca* (Selys, 1859), *L. hyalina* (Selys, 1853), *L. stigmatizans* (Selys, 1859), *L. sumatrana* (Albarda in Selys, 1879) and *L. rufescens* (Selys, 1873), the facet is absent. Obviously, this character could be used in defining sister-species within the genus.

FRASER (1928) described *indica* as a subspecies of *lineata*. Most authors, including those of all "world Odonata catalogues", have followed Fraser's original view, although Lieftinck consistently considered *indica* as a good distinct species, also justifying his opinion (see LIEFTINCK, 1940, p. 88; 1955, p. 68; 1971, p. 206). Recently, also DE FONSEKA (2000) listed *indica* as a good species. I agree with this view, but think that *indica* is closer to *lineata* than are *blanda*, *balus* and *andamanensis*.

There is obvious variability of *L. lineata* within its vast range, e.g. specimens from Nepal and Taiwan are larger than those from the southern areas, also slight differences in the shape of abdomen exist. This variability should be studied.

## ACKNOWLEDGEMENTS

I am very grateful to Dr PRASHANTH MOHANRAJ and Dr K. VEENAKUMARI (Port Blair, Andamans) for providing me with specimens from the Andamans and Nicobars. My sincere thanks are due to the following museum curators and colleagues for sending specimens for loan and/or for valuable information: Dr N.M. ANDERSEN (ZMUC, Copenhagen), Mr M. BEDJANIČ (Fram, Slovenia), Dr R. GARRISON (Azusa, California), Mr D.T. GOODGER (BMNH, London) and Dr J. VAN TOL (RMNH, Leiden).

## REFERENCES

- BRIDGES, C.A., 1994. *Catalogue of the family-group, genus-group and species-group names of the Odonata of the World*. (3rd edn). Bridges, Urbana/IL.
- CHHOTANI, G., A.R. LAHIRI & T.R. MITRA, 1983. Contribution to the Odonate (Insecta) fauna of the Andaman and Nicobar Islands with description of two new species. *Rec. zool. Surv. India* 80: 467-494.
- DAVIES, D.A.L. & P. TOBIN, 1984. *The dragonflies of the world: a systematic list of the extant species of Odonata*, Vol. 1: *Zygoptera, Anisozygoptera*. Societas Internationalis Odonatologica, Utrecht.
- DE FONSEKA, T., 2000. *The dragonflies of Sri Lanka*. WHT Publications, Colombo.
- FRASER, F.C., 1924. Report on a collection of dragonflies (Odonata) from the Andaman Islands. *Rec. Ind. Mus.* 26(5): 409-413, pl. 24 excl.
- FRASER, F.C., 1928. Indian dragonflies, 30. *J. Bombay nat. Hist. Soc.* 32: 683-691, pls. 1-3 excl.

- FRASER, F.C., 1934. *The fauna of British India, including Ceylon and Burma. Odonata*, Vol. 2. Taylor & Francis, London.
- KLOSS, C.B., 1903. *In the Andamans and Nicobars: adventures in ethnology and natural history*. Murray, London.
- LAILAW, F.F., 1950. A survey of the Chlorocyphidae (Odonata: Zygoptera), with diagnosis of proposed new genera, and description of a new geographical subspecies. *Trans. R. ent. Soc. Lond.* 101(8): 257-280.
- LIEFTINCK, M.A., 1932. Notes on the genus *Libellago* Selys, with descriptions of two new species (Odon.). *Konowia* 11(1): 1-11.
- LIEFTINCK, M.A., 1940. On some Odonata collected in Ceylon, with descriptions of new species and larvae. *Ceylon J. Sci. (B)* 22(1): 79-117, pl. 1 excl.
- LIEFTINCK, M.A., 1950. Additions to the odonate fauna of South East Asia, with descriptions of two new genera and three new species. *Treubia* 20(3): 631-645.
- LIEFTINCK, M.A., 1955. Synopsis of the dragonflies (Odonata) of Ceylon. *Zool. Meded. Leiden* 33(5): 67-87.
- LIEFTINCK, M.A., 1971. Odonata from Ceylon. *Ent. scand. (Suppl.)* 1: 188-207.
- MITRA, T.R., 1995. Additions to the odonate fauna of the Great Nicobar Island, Indian Ocean. *Opusc. zool. flumin.* 129: 1-6.
- PRASAD, M. & R.K. VARSHNEY, 1995. A check-list of the Odonata of India including data on larval studies. *Oriental Insects* 29: 385-428.
- RIPLEY, S.D. & B.M. BEEHLER, 1989. Ornithogeographical affinities of the Andaman and Nicobar Islands. *J. Biogeogr.* 16: 323-332.
- SCHIÖDTE, J.C., 1855. Beretning om Galatea-Expeditionens udbytte af Odonater. *Overs. K. danske Vidensk. Selsk. Forh.* 1855: 108-125.
- SELYS LONGCHAMPS, E. de, 1853. Synopsis des caloptérygines. *Bull. Acad. r. Belg.* 1(20 (Annexe): 1-73.
- SELYS LONGCHAMPS, E. de, 1873. Appendice aux troisièmes additions au Synopsis des caloptérygines. *Bull. Acad. r. Belg.* (II) 36: 610-619.
- SELYS LONGCHAMPS, E. de, 1879. Quatrièmes additions au Synopsis des caloptérygines. *Bull. Acad. r. Belg.* (II) 47: 349-409.
- SELYS LONGCHAMPS, E. de & H.A. HAGEN 1854. Monographie des caloptérygines. *Mem. Soc. r. Sci. Liege* 9: 1-191, pls 1-14.
- STEINMANN, H., 1997. *World catalogue of Odonata*, Vol. 1: *Zygoptera*. De Gruyter, Berlin-New York.
- TSUDA, S., 2000. *A distributional list of world Odonata*. Tsuda, Osaka.