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DESCRIPTION OF *PETALIAESCHNA PINRATANAI* SPEC. NOV. FROM NORTHERN THAILAND (ANISOPTERA: AESHNIDAE)

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The new sp. (holotype ♂: Doi Inthanon, Chiang Mai prov., 5-V-1988; deposited in Coll. Pinratana, St Gabriel's College, Bangkok) is described and compared with its congeners. Considering the ♂ paddle-shaped cerci, it appears closely related to the Chinese rather than to the Himalayan congeners.

INTRODUCTION

The genus *Petaliaeschna* was established by FRASER (1927), with *P. fletcheri* as the type species. The latter was later redescribed by FRASER (1936) and ASAHINA (1981) based on the original type material. ASAHINA (1982) described two other *Petaliaeschna* species, viz. *P. lieftincki* and *P. corneliae*, both from a single specimen in the collection of Leiden Museum. Until now the known distribution of this genus has been very limited and discontinuous, with Fraser's species from Assam and Sikkim and Asahina's species from southeastern China (Shaansi and Fukien). The discovery of a new species from northern Thailand, however, suggests that the genus may be more widely distributed in the area between the Himalaya and eastern China. The new species is named, described and compared with the congeners. The characteristics of the genus *Petaliaeschna* are discussed from the point of view of penile glans features.

PETALIAESCHNA PINRATANAI SP. NOV.

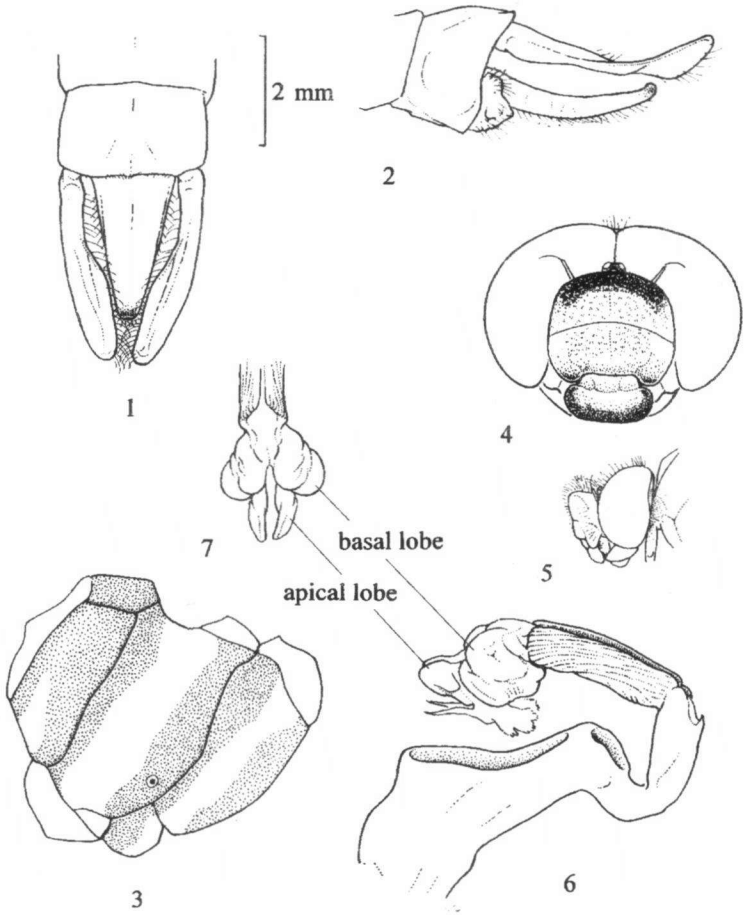
Figures 1-8

M a t e r i a l. — **Holotype** ♂: Doi Inthanon, Chiang Mai prov., northern Thailand, 5-V-1988; — **paratypes** 2 ♂: same data as holotype. The holotype is deposited in Coll. Pinratana, St Gabriel's

College, Bangkok; paratypes at Taiwan Forestry Research Institue (TFRI), Taipei. — Additional material: 1 ♂, same data as holotype, in Coll. Pinratana; status confirmed by Dr Matti Hämäläinen.

E t y m o l o g y. — Named after Bro. Amnuay P i n r a t a n a, who kindly provided his valuable specimens.

DIAGNOSIS. — *P. pinratanai* sp. nov. differs from the known congeners in paddle-shaped male cerci that are stalked at basal 1/2 and expanded at apical 1/2, with roundly blunt apex; antefrons is covered by a dark brownish band on the wrinkled upper 1/3; mesepisternum has an elongate pale spot at lower portion; and anal triangle is three-celled.



Figs 1-7. *Petaliaeschna pinratanai* sp. nov., (Figs 1-5 holotype ♂, — Figs 6-7 paratype ♂): (1) cerci, dorsal view; — (2) ditto, lateral view; — (3) patterns of pterothorax; — (4) head, front, hairs omitted; — (5) head, lateral view; — (6) male glans, left, lateral view, upside down; - (7) ditto, ventral view.

DESCRIPTION. **Holotype** ♂. — H e a d. — Mentum pale yellow; labium pale yellowish-brown with outer half of lateral lobe pale brown. Face generally pale brown; labrum bright yellowish-brown, surrounded by reddish-brown at lateral and lower margins; lateral-lower angles of anteclypeus yellowish-brown. Frons narrow, width smaller than 1/2 of head width across compound eyes. Antefrons bright yellowish-brown and wrinkled, especially on upper 1/3, which is covered by a transverse dark brown band (Fig. 4); lower margin of antefrons pale brown. Upper margin of frons roundly arched, making vertex almost invisible in direct front view; dorsal side of frons pale yellowish-brown, without any dark markings. Brown long hairs present on dorsal side of frons, lateral sides of postclypeus and antefrons (Fig. 5). Vertex very small, pale yellowish-brown, area bordering lateral ocelli darker; dorsum of vertex with a tuft of long hairs. Occiput small, pale yellowish-brown and scattered with brown long hairs. Compound eyes dull green in dead condition and closely contiguous; length of median suture between the eyes 2.5 times as long as the basal width of occiput.

T h o r a x. — Prothorax not examined. Pterothorax deep brown and compact, round-shaped in lateral view; dorsal crest yellow and markedly keeled. Pale yellow elongate spot present on lower portion of mesepisternum. Lateral side of pterothorax with two pale yellow stripes faintly present on mesepimeron and metepimeron; stripe of mesepimeron broader and covering mesinfraepisternum; stripe of metepimeron narrower and covering about central 1/3 of that plate. Posterior 2/3 of metinfraepisternum pale yellow (Fig. 3).

Legs pale yellowish-brown with two rows of reddish-brown long spines present on anterior side of tibiae; intervals between these spines shorter than the length of adjacent spines.

Wings (Fig. 8) entirely hyaline, without any tinges at base. Base of hind wing distinctly petiolate due to the strongly outward obliquity of the inner margin of anal triangle. Veins pale brown; pterostigma dark brown and unbraced, underlaid with 2.5-3.5 cells. Membranule absent. Upper section of arculus situated at or a little distal to level of second primary antenodal. IR2 originated at level of 6th-8th postnodal corssvein; IR3 forked at level of 8th-11th postnodal crossvein and two--celled rows wide at middle between it's branches. Rspl and Mspl straight, separated by one-celled row from IR3 and MA respectively; inferior supplementary vein originated 2-3 cells proximal to the origin of the former. 20 antenodal corssveins in fore wings and 15-16 in hind wings; 16 postnodal crossveins in fore wings and 16-17 in hind wings. Median crossveins 6-7; cubito-anal crossveins 8-9 in fore wings and 6-7 in hind wings. Triangle longer and narrower in fore wings than in hind wings, with 5-6 cells in fore wings and 5 cells in hind wings. Hypertriangle with 4-5 cells in fore wings and 3-4 cells in hind wings. Subtriangle of hind wings larger than that of fore wings, crossed once; subtriangle of fore wings crossed once in left wing and entire in right wing. Anal loop with 6-7 cells and anal triangle with three cells. Tornus right angled, inner margin of anal triangle above it shallowly

Fig. 8. *Petaliaeschna pinratanai* sp. nov., holotype ♂: left wings.

emarginate.

A b d o m e n. – Dark brown, maculations untraceable due to heavy decomposition of specimen. Shape of abdomen slender, moderately inflated on S1 and S2 and smoothly constricted at basal 1/3 of S3; segments behind S3 parallel-sided and becoming a little broader on S8-S10. Auricles pale yellowish-brown, semi-circular in dorsal view and protruding posteroventrally; posterior margin of auricles armed with 8-10 tiny reddish-brown denticles. Cerci about 1.6 times as long as S10, deep brown and paddle-shaped; in dorsal view, basal half of cerci stalked and distal half expanded smoothly and ridged dorsally, being parallel at its widest portion; apex of cerci roundly blunt (Fig. 1). In lateral view, basal 1/5 of cerci broad, lower margin straight after this point and running through its length till middle of apicoventral expansion (Fig. 2). Epiproct pale yellowish-brown and as long as S10; apex of epiproct smoothly curved upward and reaching about basal 5/6 of cerci. Inner margins of cerci and ventral side of epiproct fringed with long hairs, becoming gradually more densely set distad on the former.

The structures of male outer secondary genitalia are basically the same as those in other oriental Brachytroninae (including here only the genera of *Cephalaeschna*, *Periaeschna*, *Gynacanthaeschna*, *Petaliaeschna* and *Caliaeschna*), as shown by ASAHINA (1983) and approaching to the type of *Periaeschna*.

VARIATION IN PARATYPES. — General features are the same as in the holotype. The abdominal patterns are also indiscernible owing to their heavy postmortem condition, but a pale dorsal longitudinal stripe and a pair of pale transverse MD spots are visibly present on S2. The deep brown colour of metepimeron of paratypes are faded out posteriorly into pale yellow. The venational characters of the two paratypes read as follows: IR2 originated at the level of 7th-9th postnodal crossvein;

IR3 forked at the level of 8th-11th postnodal crossvein. 20-24 antenodal crossveins in fore wings and 16-17 in hind wings; 16-18 postnodal crossveins in fore wings and 15-18 in hind wings. Median crossveins 5-8; cubito-anal crossveins 7 in all wings. Triangles with 5-6 cells in forewings and 5 cells in hind wings; hypertriangle with 4-6 cells in forewings and 3-4 cells in hind wings; subtriangle generally entire (3:1, N=4) in fore wings and crossed once in hind wings. Anal loop with 6-7 cells; anal triangle with three cells but four cells in the left hind wing of one paratype.

Measurements (mm). — Holotype: abd. + cerci. 46, hindwing 38, pterostigma of fore wing 1.9 and hind wing 2.3. — Paratypes: abd. + cerci. 44-45 (not accurate since the abdomens of two specimens were distorted), hind wing 38-39, pterostigma of fore wing 2.0 and hind wing 2.3-2.5.

DISCUSSION

P. pinratanai differs from its known congeners by the diagnostic characters mentioned above. It has paddle-shaped male cerci, similar to those in *P. corneliae* and *P. lieftincki*. In this feature, the new species is most similar to the latter, which is the largest in size in the genus. In *P. lieftincki*, however, the cerci are stalked at basal 1/3 (at 1/2 in *P. pinratanai*) and expanded at apical 2/3, being more strongly attenuate towards apex, and the apicoventral expansion is more slender than in *P. pinratanai*. The new species also shares the small size and short pterostigma with *P. corneliae*. These similarities combined suggest that *P. pinratanai* is more closely related to the two Chinese allies than to *P. fletcheri*, which has slender blade-shaped male cerci with pointed apex.

THE CHARACTERISTICS OF THE GENUS *PETALIAESCHNA* FROM THE POINT OF VIEW OF PENILE GLANS STRUCTURE

According to FRASER (1927) and ASAHINA (1982), *Petaliaeschna* is differentiated from the other oriental Brachytroninae mainly on wing characters, including distinctly stalked wing base (except *P. lieftincki*), unbraced pterostigma and obsolete or very vestigial membranule. The strongly keeled and pale coloured dorsal carina is also characteristic. However, after close inspection of the male secondary genitalia in *P. pinratanai*, another important diagnostic character of the genus was found in the probably unique shape of male penile glans (apical or fourth segment of vesicula spermalis). The glans of *Petaliaeschna*, as shown in *P. pinratanai* (Figs 6, 7) is medially unfused, as in the other oriental Brachytroninae, composed of two parts: the more highly chitinized hood or receptacle-shaped basal lobes and the protruding apical lobes. The apical lobes are composed of sponge-like soft tissues, fringed on the basodorsal surface, and armed with a pair of short styli-like processes that are not homologous to the glans flagella of the other oriental Brachytroninae, as shown by ASAHINA (1983).

From Asahina's figures and the material studied (including *Periaeschna magdalena* Martin, *Cephalaeschna risi* Asahina and *Caliaeschna microstigma*

Selys), the flagella of the oriental Brachytroninae are embedded on the dorsal surface of the glans, protruding ventrad, and are visible from ventral view. They are strongly chitinized, hence their texture is hard. In *Petaliaeschna,* the dorsal paired processes are structurally a prolongation of apical lobes, which are soft and can not be seen from a direct ventral view. The highly developed basal lobes of *Petaliaeschna*'s glans are markedly differentiated from the apical lobes and are enclosing the base of the latter. The feature is not found in other oriental Brachytroninae not even in other aeshnids. The structures are vestigial in other oriental Brachytroninae, except in *Caliaeschna*, represented only by a small basoventrolateral protuberance of soft or membranous tissues on the glans in *Periaeschna* and possibly also in *Gynacanthaeschna*, but almost obsolete in *Cephalaeschna* whose glans are possibly most "primitive" in the group. In *Caliaeschna*, the basal and apical lobes are not as conspicuously differentiated from each other like in *Petaliaeschna*, but they are still easily recognizable by their different texture, and share more structural similarities with *Petaliaeschna* than with the other oriental Brachytroninae. Another common penile character of oriental Brachytroninae, not shared by *Petaliaeschna* and *Caliaeschna*, are the paired deep-coloured and chitinized patches on the base of the ventral glans surface. Although the lack of this structure, paired long flagella and the unique glans shape suggest that *Petaliaeschna* is the most advanced genus in the oriental Brachytroninae, yet a comprehensive study of adult and larval morphology in the subfamily is required before the problem could be reasonably settled.

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