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Paracladurinae - new subfamily (Diptera, Trichoceridae)

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Abstract. The genus *Paracladura* BRUNETTI is raised to a subfamily rank within the family Trichoceridae on basis of the morphological features (wing, tarsus, pleurytes, and female genitalia) that separate this group from other members of the family. The species are divided into two groups according to the wing features and Australian Region appears to be a probable genetic centre of the subfamily.

Key words: *Paracladura*, wing, Trichoceridae.

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INTRODUCTION

The genus *Paracladura* was described by BRUNETTI (1911) and comprises recently 30 species. The characters discerning this genus from other Trichoceridae are: a very short first tarsal segment, tibial spurs absent, one large spermatheca and wing venation characters. To this list also the size and shape of meron can be added. All those features separate this genus from the other members of the family and I propose to raise its rank to a subfamily. Thus the family Trichoceridae comprises two subfamilies: Trichocerinae (with the genera: *Trichocera* MEIGEN, *Diazosma* BERGROTH, *Nothotrichocera* ALEXANDER - also see DAHL 1992, this issue) and Paracladurinae (with single genus *Paracladura* BRUNETTI).

Materials. The following types and other specimens were borowed from the ALEXANDER's collection in the Smithsonian Institution, Washington D.C. (abbreviated: SI) and from the Natural History Museum, British Museum in London (NHM): *Paracladura aperta* ALEXANDER, 1922 - holotype, ♂ (SI), *chilensis* ALEXANDER, 1924 - holotype, ♂ (NHM), *complicata* ALEXANDER, 1924 - holotype, ♂ (SI) and ♂ specimen (NHM), *cuneata* ALEXANDER, 1928 - holotype, ♂ (SI), *curtisi* ALEXANDER, 1924 - paratype, ♀ (SI) and ♂ specimen (NHM), *decussata* ALEXANDER, 1924 - holotype, ♂ (SI), *edwardsi* ALEXANDER, 1929 - holotype, ♂ (NHM), *harrisi* ALEXANDER, 1924 - holotype, ♂ (SI), *howesi* (ALEXANDER), 1923 - holotype, ♂ (SI), *kumaonensis* ALEXANDER, 1959 - holotype, ♂ (SI), *latipennis* ALEXANDER, 1930 - holotype, ♂ (SI), *lobifera* (ALEXANDER), 1922 - holotype, ♂ (SI), *lyrifera* (ALEXANDER), 1923 - ♂ specimen (NHM), *macrotrichiata* (ALEXANDER), 1922 - wing fragment (NHM), *maori* (ALEXANDER), 1921 - ca. 15 ♂♂ and ♀♀ (NHM), *obtusicornis* (ALEXANDER),

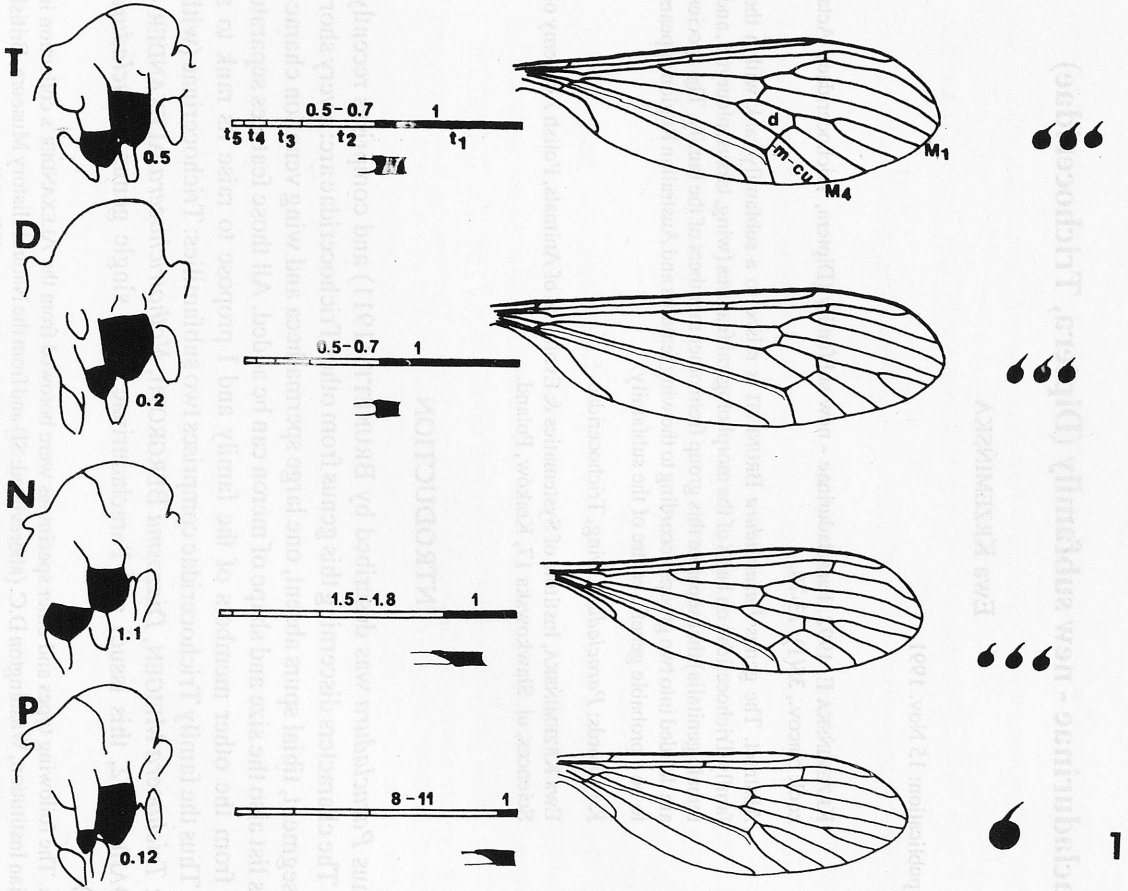

Fig. 1. Comparison of the meron size and shape, wings, tarsomeres proportions and spermathecae number in: T - *Trichocera*, D - *Diazosma*, N- *Nothotrichocera*, P - *Paracladura*. Size of meron is expressed as fraction of katepisternum. First tarsomere is filled black and proportion of first to second tarsomere (t1:t2) is given. Shape of the joint between them is enlarged below.

1922 - ♂ specimen (NHM), *patagonica* ALEXANDER, 1929 - holotype, ♂ (NHM), *pirioni* ALEXANDER, 1929 - holotype, ♂ (SI), ♂ specimen (NHM), *scimitar* ALEXANDER, 1969 - holotype, ♂ (SI), *spicata* ALEXANDER, 1969 - holotype, ♂ (SI), *superbiens* ALEXANDER, 1960 - holotype, ♀ (SI). The collection of specimens of *P. trichoptera* (OSTEN-SACKEN), 1877 was borrowed from Dr Paul Arnaud. The wing venation of the remaining species was judged from the authors' descriptions and drawings, see text.

Characteristics of the subfamily (Fig. 1).

a). Wing: in the Paracladurinae two branches of Mb, ie. M_{1+2} and M_{3+4} separate at the low angle, so that the former branch is not conspicuously raised over the level of Mb. The fork of M_{3+4} is shaped similarly and the first section of M_3 is not arcuated as in other genera. Thus the d cell (if present) has distinctly different shape, narrow and pointed proximally, its both long edges parallel. Cross-vein m-cu is shifted to the wing centre. Second anal vein (A_2) is very close to wing margin and runs parallel to it. Wing angle is not developed. All these features are unique to the taxon. Within the Trichocerinae the genus *Nothotrichocera* reminds somewhat the Paracladurinae in having the anal angle poorly developed and A_2 more close to wing margin than the remaining genera.

b). Meron: Paracladurinae are characterized by the smallest meron within the entire family. In Fig. 1 its size is approximately expressed as the fraction of the katepisternum size. All thorax pleurytes are more elongated than in the other members of the family.

c). Leg: first tarsal segment of the Paracladurinae is extremely short, reaching about 1/10 of the second tarsomere (BRUNETTI 1911) and it is likely that the joint between these two segments does not work (I have never seen a leg bent in this place). Thus the tarsus of Paracladurinae has probably only four working segments instead of five. The shape of this joint is oblique ("first segment of tarsi (...) is articulated obliquely with the second", EDWARDS 1928), similar to that in the *Nothotrichocera* and different from those in the remaining genera.

d). Spermatheca: the females of the *Paracladura* have only one large spermatheca, which is an exception not only in the family but also a great rarity in the entire suborder Tipulomorpha. Also in the numerous fossil representatives of the family Trichoceridae, of the age reaching Lower Jurassic, one spermatheca was never stated by us (KRZEMIŃSKI, DAHL, KRZEMIŃSKA - in preparation).

Wing patterns, distribution and dispersion routes.

Thirty species of the subfamily are distributed along the Pacific coasts of all continents. Among the patterns of wing venation two main types can be distinguished:

- A. (Asiatic): cross-vein r-m beyond the fork of Mb; d cell closed (cross-vein m-m always present);
- C. (Chilean): r-m in or very close to the fork of Mb; d cell open.

The Asiatic type is distributed in New Zealand, Asia and North America and represented by the following species:

- New Zealand: *decussata*, *howesi*, *lyrifera*, *obtusicornis*.
- Asia, China: *omeiensis* (drawing in ALEXANDER 1935); Taiwan: *flavoides* (drawing in ALEXANDER 1923), *cuneata*; Japan: *nipponensis* (drawings in ALEXANDER 1930 and TOKUNAGA 1938), *latipennis*, *imanishii* TOKUNAGA 1938 (author's

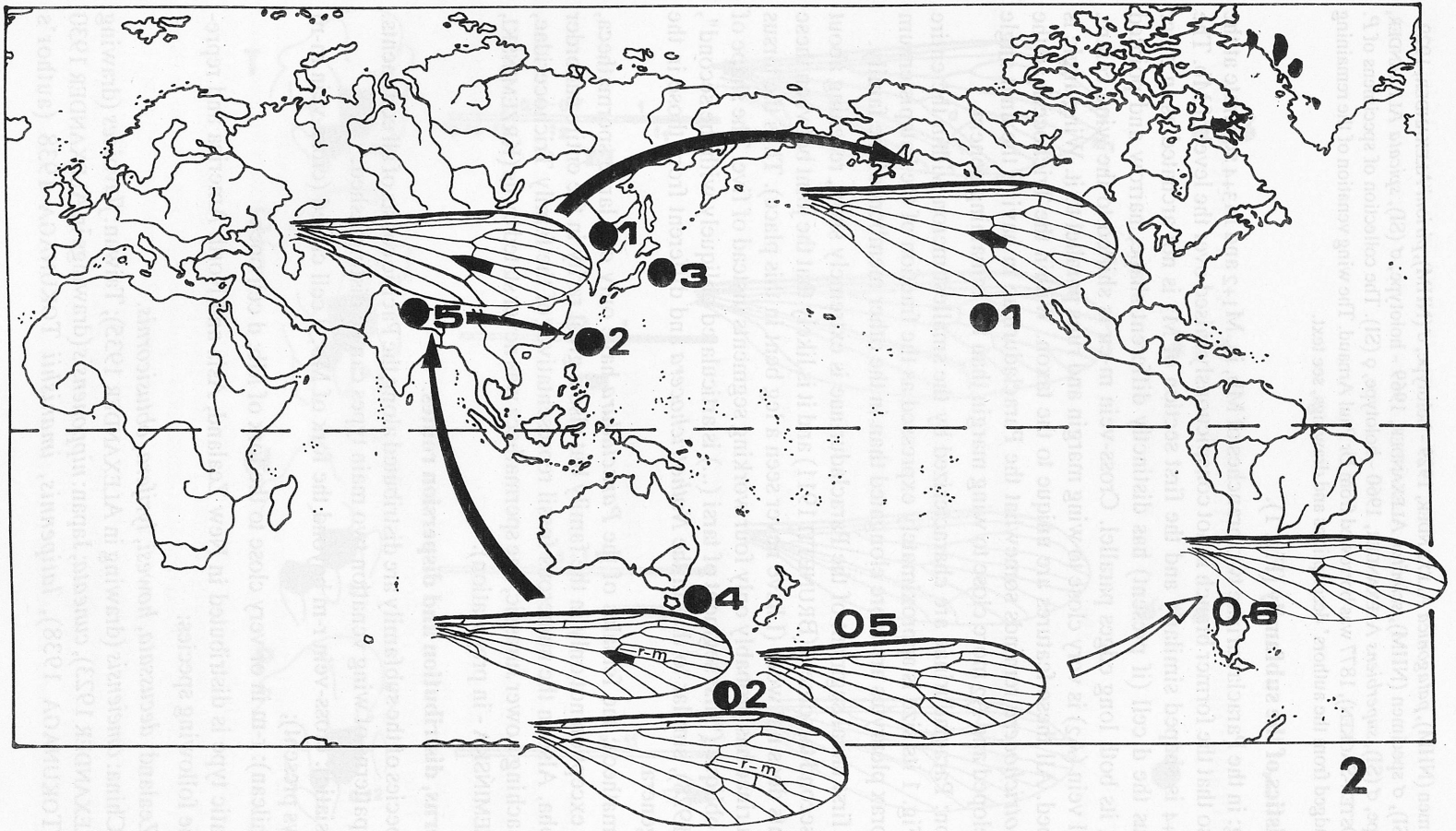

Fig. 2. Wing patterns and possible routes of dispersion of Paracladurinae: filled circle - type A, empty circle - type C, half filled circle - type C(d); numbers = numbers of species occuring in the given region.

drawing); region south of Himalayan Mts: *kumaonensis* (Nepal), *superbiens* (Sikkim), *gracilis* BRUNETTI 1911, *elegans* BRUNETTI 1911, *flava* (BRUNETTI) 1912.

(The last three species from Darjeeling, India, were not available to me, nor the drawings were provided. However, author's descriptions allow to classify the type of wings to A. According to him, all the three species have the "venation normal" (*flava*), or "in accordance with the generic description" (*elegans, gracilis*) which states: "anterior cross-vein (..) meeting the discal cell before its middle" (BRUNETTI, 1911).

– North America, west coast: *trichoptera.*

The Chilean type is distributed in New Zealand and Chile and represented by the species listed:

– New Zealand: *aperta, complicata, curtisi.*

– Chile: *chilensis, edwardsi, patagonica, pirioni, scimitar, spicata.*

Only in New Zealand both types are present. Moreover, an intermediate type can be distinguished there:

Type C (d) - Chilean, but with d cell closed; however, the presence of m-m is not an established feature, since this cross-vein is absent in one or both wings of some specimens, and very faint. Here belong the species: *antipoda* MIK, 1881 (author's and ALEXANDER's (1964) drawings), *harrisi, maori, lobifera.*

The last, not mentioned species is *P. macrotrichiata.* Judging from a wing fragment with radial and partially medial field retained, the vein r-m is beyond the Mb fork, but the d cell is absent. Thus the species may represent a second intermediate type.

Summarizing, among the species from New Zealand the greatest variability in wing venation is observed. Thus Australian Region is apparently the centre of origin of the group (Paracladurinae are also present in the continent of Australia; the rich, not determined yet materials are being studied by me). It may be added that among the fossil materials of Trichoceridae from Asia, Europe and North America, of the age reaching Lower Jurassic, there were never found the wings resembling the Paracladurinae.

From Australian region the species were spreading in two main directions: representants of Chilean group immigrated to the South America, probably through the connections between the continents, existing still in the Cretaceous, while Asia was probably invaded by the representants of type A, via the continent of India that reached Asia in the Lower Eocene. The only North American species, *trichoptera*, belongs apparently to the A group and attained this continent through the Bering land connection. Thus both American continents were reached independently, South from the south, and North from the north.

ALEXANDER's ideas were quite different: "The peculiar relationship long known to exist between Chile and Western North America is shown in the present group by the occurence of a single species, *P. trichoptera* (OSTEN-SACKEN), in the western United States". And, according to him, from there the ancestors of the Asiatic group of species came to Asia: "The remaining five species pertain to the Indo-Japanese fauna and may well have reached their present domain from western North America via the Bering land-bridge." (ALEXANDER 1929).

Concerning the phylogeny of the group, its relations to the other representants of the family, at the present it can be said only that Paracladurinae are closer to *Nothotrichocera* that to the remaining two genera. A more detailed look at the problem will be possible after completing the study on all known fossil Trichoceridae (KRZEMIŃSKI, DAHL, KRZEMIŃSKA - in preparation), since we know now that among these materials there are the representatives of new genera and even a subfamily and the phylogenetical considerations should include also these.

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