

STUDIES OF THE SUBTRIBE TACHYINA (COLEOPTERA:
CARABIDAE: BEMBIDIINI) SUPPLEMENT C:
DISCOVERY OF THE SISTER GROUP OF *MIOPTACHYS*
BATES, IN THE AMAZON BASIN—*INPA PSYDROIDES*
A NEW GENUS AND SPECIES

TERRY L. ERWIN

Department of Entomology,
National Museum of Natural History,
Smithsonian Institution,
Washington, DC 20560

ABSTRACT

Inpa psydroides, a new genus and species from near Manaus, Brazil, is described and illustrated. A revised key to New World genera and subgenera of Tachyina is provided, and generic ranges are given to supplement the key. Evolutionary and zoogeographic considerations are discussed with the following conclusions reached. *Inpa* and *Mioptachys*, a sister pair, are exclusively centered in the Neotropics. Their sister group is unknown, but it probably should be sought in Australia. Patterns of Tachyina evolution and distribution lead to a model which predicts greatest diversity in South America and Australia, with decreasing diversity toward peripheral areas. This pattern should prove common for many groups of carabids, particularly those with pre-Tertiary origins.

RESUMO

Inpa psydroides, gen. n., sp. n. das proximidades de Manaus, Amazonas, Brasil, é descrita e ilustrada. Apresenta-se chave atualizada para gêneros e subgêneros de Tachyina e sua distribuição. São ainda discutidos aspectos evolutivos e zoogeográficos e apresentadas as seguintes conclusões. *Inpa* e *Mioptachys*, um grupo irmão ("sister pair"), são exclusiva mente Neotropicais. O grupo irmão ("sister group") desses gêneros provavelmente seria encontrado na Austrália, mas é ainda desconhecido. A distribuição dos Tachyina e seus padrões evolutivos sugerem um modelo que apresentaria diversidade decrescente em direção às áreas periféricas. Esse padrão parece ser comum a muitos grupos de carabídeos, notadamente os de origem pré-Terciária.

While studying the new and expanding collections at the headquarters of INPA (Instituto Nacional de Pesquisas da Amazonia) in Manaus, Brazil, I was startled to discover a specimen representing a hitherto undescribed species of tachyine that defied generic placement. This is the 4th such discovery in the 7 years I have been working on this group of small, yet interesting beetles. Unfortunately only 1 specimen, a female, was present in the collections, and I failed to discover another while collecting in the area. However, its unique characteristics compel me to make this taxon known. This is feasible since I am presently midway into a revision of its sister group, *Mioptachys* Bates, and since I provided a synopsis of the New World tachyine genera previously (Erwin 1974b).

Although the habitat of the single known specimen is not recorded, I believe members of this species live under bark of hardwood trees as the depressed form is typical of subcortical species. Most members of its sister group, *Mioptachys*, live in this habitat.

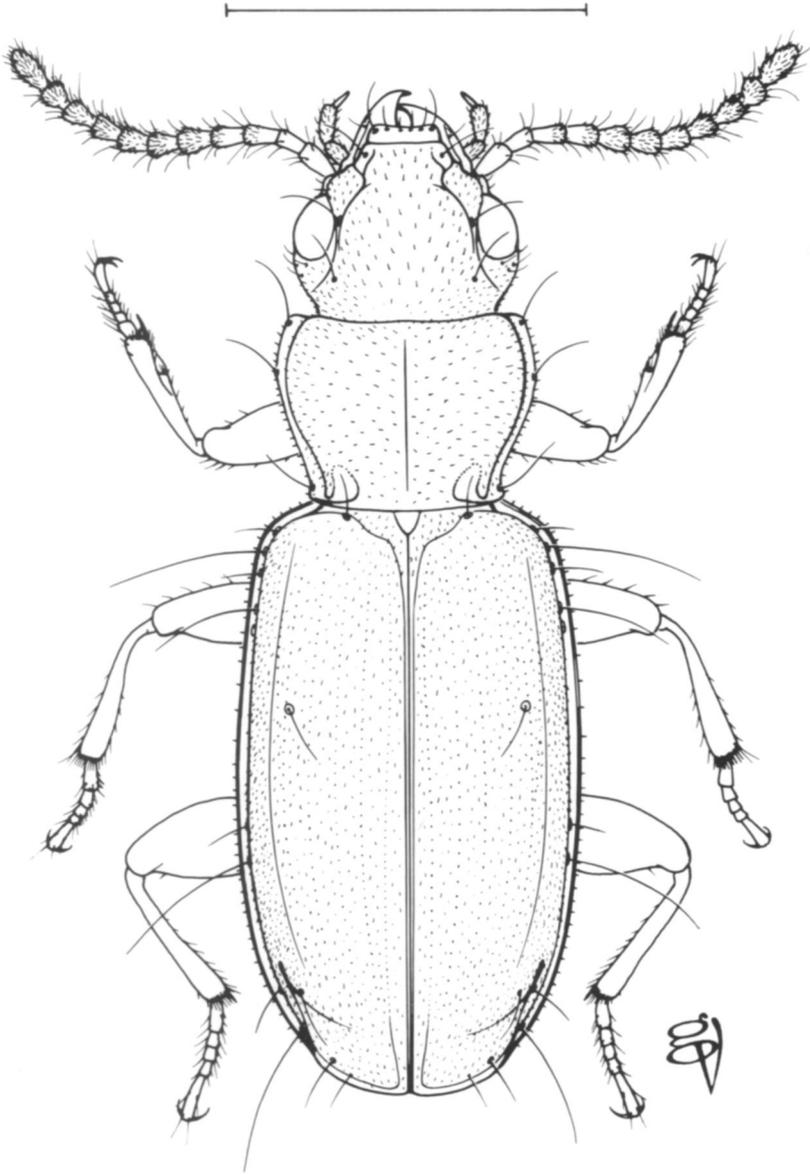


Fig. 1. Habitus of *Inpa psydroides* female, 31 km east of Manaus, Amazonas, Brazil. Line equals 1.0 mm.

Inpa Erwin, new genus

(Figure 1)

Type-species: *Inpa psydroides*, new species, here designated.**Description:** Form (Fig. 1). Elongate and depressed. Head broad and depressed, pronotum constricted behind, elytra markedly flat dorsally.**Diagnostic features:** Anterior tibia truncate apically. Mentum without foveae. Side margins of pronotum moderately reflexed, each with 3 tactile setae. Recurrent groove of elytron long and parallel to side margin. Chaetotaxy formula: Eo 1a, 2a, 3a, 4a, 5a, 6a, 7, 8b, 9; Ed 1, 4c, 6b, 8d. Body with short setae overall. Elytral margin reflexed and edge finely setulose. Male with 1 pair, female with 2 pairs of setae along margin of sternum VI.**Distribution:** Known only from the type locality near Manaus, Brazil.**Etymology:** Acronym, INPA, of the Instituto Nacional de Pesquisas da Amazonia where the type-specimen was discovered.*Inpa psydroides* Erwin, new species

(Figure 1)

Type-specimen: Holotype female in INPA, Manaus, Brazil.**Type-locality:** Kilometer 31 east of Manaus on Highway AM 010, Amazonas, Brazil.**Description:** Head, prothorax, and antennae rufous; appendages, mouthparts, elytra, and postventer testaceous. Head markedly depressed, nearly as wide as pronotum with medium-sized eyes which are "pinched" dorsally where they meet flat frons; postocular area with several setae. Pronotum with 3 pairs of marginal setae; edge microsetulose; prosternum densely setigerous. Elytron with faint traces of striate interneurs, the 6th more deeply impressed than others. Otherwise see generic description and diagnostic features above. Length, 2.94 mm; width, 0.98 mm; depth, 0.37 mm.**Etymology:** Latin, *oides*, meaning likeness to, and *Psydrus*, a genus of carabid beetles in the Nomiini, referring to the fact that this tachyine has a form similar to *Psydrus piceus* of western United States.KEY TO GENERA AND SUBGENERA OF TACHYINA
OCCURRING IN THE NEW WORLD

1. Elytra impunctate, each with 8 longitudinal carinae extended from near base to apex; pronotum with 5 carinae; head with 3 carinae (Amazon Basin) *Costitachys* Erwin, 1974b
- 1'. Elytra, pronotum, and head without carinae OR if elytra carinate they also bear setigerous punctures 2
- 2(1'). Mentum with 2 deep foveae, each circular or horseshoe shaped 14
- 2'. Mentum without deep foveae, with or without shallow bilateral impressions 3
- 3(2'). Anterior tibia nearly or perfectly truncate apically 4
- 3'. Anterior tibia markedly notched apicolaterally 6
- 4(3). Elytral disc without setigerous pores Ed2 through Ed6; convex beetles, often metallic, shiny, or iridescent (southern Mexico through southern Brazil) *Xystosomus* Schaum, 1859
- 4'. Elytral disc with setae in 3rd or 5th interneur; convex or depressed beetles with markedly reflexed pronotal margins; usually dull from coarse microsculpture, never metallic or iridescent 5

- 5(4'). Elytral disc with setae Ed3 and Ed5 in 3rd interneur; pronotum quadrate; form convex or depressed (southern Canada through northern Argentina) *Mioptachys* Bates, 1882
- 5'. Elytral disc with setae Ed3 and Ed5 in 5th interneur; pronotum markedly constricted toward base; form depressed (Amazon Basin) *Inpa* Erwin, new genus
- 6(3'). Labrum markedly bilobed, covering mandibles; elytra more or less truncate, usually with sparse pubescence; color various, testaceous through flavotestaceous; head slightly or markedly retracted into pronotum; recurrent groove of elytron absent or barely engraved 7
- 6'. Labrum truncate, not covering mandibles; elytra entire, with or without pubescence; color various, testaceous through black; head not retracted into pronotum, recurrent groove well engraved 8
- 7(6'). Apical abdominal sternum of both sexes with 4 long setae along posterior edge, lateral pair sickle-shaped; head with 1 supraorbital seta (southern United States, Illinois/California, through northern Argentina, Antilles)
..... *Micratopus* Casey, 1914
- 7'. Apical abdominal sternum of male with 2 long setae, female with 4 setae, setae straight; head with 2 supraorbital setae (Antilles, Hawaii, Old World)
..... *Lymnastis* Motschulsky, 1862
- 8(6'). Claws denticulate; prosternum plurisetose; form depressed; elytral recurrent groove elongate, straight, and very close to side margin (northern Canada through Belize, Antilles, Old World) *Tachyta* Kirby, 1837
- 8'. Claws simple; prosternum glabrous; form convex or subdepressed; elytral recurrent groove short, usually closer to suture than side margin and arcuate toward midline (except *yunax* group)—*Elaphropus* Motschulsky, 1839 9
- 9(8'). Elytral interneur 8 entire, well impressed or sulcate throughout its length 10
- 9'. Elytral interneur 8 interrupted at middle, well impressed behind humerus and apical third only 13
- 10(9). Elytral recurrent groove straight, closer to side margin (Antilles, Mexico, Panama, Chile, Old World; probably transported by commerce)
..... *yunax* group, *Elaphropus yunax* (Darlington), 1939
- 10'. Elytral recurrent groove arcuate and deeply impressed, closer to suture than side margin 11
- 11(10'). Frons and clypeus with deeply sulcate and markedly convergent furrows; elytron with only interneurs 1 and 2 present (Antilles, Mexico, Old World; probably transported by commerce) Subgenus *Sphaerotachys* G. Müller, 1926
- 11'. Frons and clypeus with normal frontal furrows, not convergent upon clypeus; elytron with more than 2 striate interneurs 12

- 12(11'). Elytron with 5 or more well impressed interneurs on disc (Pacific Northwest, east to Utah, Old World; probably transported by commerce)
 Sugenus *Tachyura* Motschulsky, 1862
- 12'. Elytron with 2 well impressed interneurs, segment of 3rd impressed between Ed2 and Ed5 only (Antilles, Chile, Old World; probably transported by commerce).....
 Subgenus *Tachyphanes* Jeannel, 1946
- 13(9'). Suture between mesepisternum and metasternum perforate, hole large and deep, 1 or 2 present; pronotum markedly constricted behind (west central and northern South America, Old World) Subgenus *Tachylopha* Motschulsky, 1862
- 13'. Suture between mesepisternum and metasternum not perforate, but may have several small foveae; pronotum at most cordiform, usually more transverse (Canada through northern South America) Subgenus *Barytachys* Chaudoir, 1868
- 14(2). Recurrent groove of elytron elongate, prolonged anteriorly beyond seta Ed6 then curved posteriorly in form of a hook OR if not hooked then specimen from sea coast, dorsal surface with coarsely granulate microsculpture and elytra not carinate..... 15
- 14'. Recurrent groove of elytron short, arcuate, and not prolonged beyond seta Ed6, or elongate and close to side margin, or absent 16
- 15(14). Elytral interneur 8 subsulcate posterior to middle with apical portion of shallow sulcus bent medially just posterior of Eo5 and Eo6; recurrent groove hooked around Ed6 (Canada through Argentina, Hawaii, Old World).....
 *Paratachys* Casey, 1918
- 15'. Elytral interneur 8 subsulcate but not bent medially near Eo5 and Eo6; recurrent groove hooked into Ed6 or effaced laterad of Ed6, IF effaced, specimen from sea coast and with granulate microsculpture (Canada through Brazil, Antilles, Galapagos, Hawaii, Old World; some intertidal)
 *Tachys* Stephens, 1829
- 16(14'). Pronotum without hind angles, form pedunculate; interneur 8 absent externally (Brazil, Venezuela) *Liotachys* Bates, 1871
- 16'. Pronotum with hind angles, or at least form not at all pedunculate; interneur 8 entire, or present at least anteriorly and/or posteriorly 17
- 17(16'). Recurrent groove elongate and very close and parallel to side margin (northeastern United States and Canada, Old World)..... *Porotachys* Netolitzky, 1914
- 17'. Recurrent groove either absent, almost effaced, or short, arcuate, and well engraved and nearer suture than side margin or at least not parallel to side margin 18

- 18(17'). Elytral interneurs punctate or sulcate-striate 19
- 18'. Elytral interneurs effaced or very shallowly striate; form small and depressed or subdepressed; color testaceous or flavous (Canada through Argentina, Antilles, Hawaii, Old World)..... *Polyderis* Motschulsky, 1862
- 19(18). Elytral interneur 8 without foveae, elytron with no more than 5 interneurs externally visible (southern Mexico through southern Brazil) *Meotachys* Erwin, 1974b
- 19'. Elytral interneur 8 with posthumeral foveae or fovea, usually at basal fourth or middle OR elytron with 8 entirely punctate interneurs—*Pericompsus* LeConte, 1851 20
- 20(19'). Interneur 8 with a deep, nearly perforate fovea at or just anterior to middle of elytron; elytron also with 2 various-sized subhumeral foveae; elytral seta Eo4 at position "d" (northern United States through Argentina, Antilles)
..... *Pericompsus, sensu stricto*
- 20'. Interneur 8 not foveate at or near middle of elytron; if foveate posterior to humerus, then foveae shallow and bear setae or, if perforate, fovea small and at basal fourth near seta Eo4c (Mexico through Argentina, Antilles).....
..... Subgenus *Eidocompsus* Erwin, 1974a

PHYLOGENETIC AND EVOLUTIONARY CONSIDERATIONS

Mioptachys members retain the plesiotypic character state of truncate anterior tibiae along with members of *Xystosomus*, *Inpa*, and "*Tachys*" *trunci* Darlington, of Queensland, Australia. All of these taxa have arboreal members and are in fact predominately tied to life in the canopy or undercanopy. The relationships of "*Tachys*" *trunci* are obscure and I defer discussion of that species until later; it is not related to *Mioptachys-Inpa* stock. Neither is *Xystosomus*. I pointed out already (Erwin 1973) that *Xystosomus* is intermediate in many aspects between Tachyina and Bembiidina. The *Mioptachys-Inpa* lineage seems however, to be clearly a Tachyina group, although it retains numerous primitive features. An earlier search for the sister group of *Mioptachys* (Erwin 1974b) ended in failure.

The discovery of *Inpa* in the Amazon Basin demonstrates that the entire group is exclusively Neotropically centered (only 1 species is found north of middle Mexico). The question of *Mioptachys-Inpa* sister stock now sits unresolved. Based on a suite of structural characteristics, it is unlikely that it is *Xystosomus* or "*Tachys*" *trunci*. One might expect Africa to be a possible source, but that continent's Tachyina fauna is fairly well known and must be considered depauperate at best, only *Elaphropus* having much diversity. Where then do we look? I think Australia is the likely candidate.

The patterns of Tachyina evolution and distribution I presently see and understand lead me to the following model. The group as a whole arose and began to diversify in the western part of Gondwana just prior to or

during the initial rifting of South America and Africa. A few stocks penetrated eastward through rift barriers and others were able to move south-eastward toward and into Australia. A period of isolation and radiation occurred before African stocks moved northward into the Palaearctic and Oriental Regions, and into North America. At this time South American stocks were moving into North America too. Australian stocks moved northward much later when that continent reached proximity with the Indo-Australian archipelago, and some others moved into Australia from the African stocks then occupying the Oriental Region. If this scenario is correct we would expect to find old and diverse stocks in South America and Australia with fewer and fewer lineages represented in peripheral areas increasingly distant from the primary center of South America. This does seem to be the pattern, and I predict it will be similar in many groups of carabids, that is, radiation in and away from the present New World tropics into peripheral areas, and subsequent radiation in these areas with secondary movements into temperate zones. A thorough knowledge of the Neotropical fauna must be acquired before we can further assess the hypothesis presented here.

ACKNOWLEDGEMENTS

I wish to thank my wife, La Verne, and D. Thompson for help working over South American collections; curators B. C. Ratcliffe and N. D. Penny of INPA for their aid during my visit there; and M. E. Jorge, São Paulo, for translation of the abstract into Portuguese. I also thank Smithsonian staff members G. L. Venable for the illustration and J. A. Fortin and A. L. Halpern for typing the MS.

LITERATURE CITED

- BATES, H. W. 1871. Notes on Carabidae, and descriptions of new species (no. 3). *Ent. Mon. Mag.* 7:266-269.
- BATES, H. W. 1882. Insect Coleoptera Carabidae. *In* Godman and Salvin, *Biologia Centrali-Americana*, 1(1):40-152.
- CASEY, T. L. 1914. Some observations on the Carabidae including a new subfamily. *Memoirs on the Coleoptera*. Lancaster, Penn. 5:25-44.
- CASEY, T. L. 1918. A Review of the North American Bembidiinae. *Memoirs on the Coleoptera*. Lancaster, Penn. 8:1-223.
- ERWIN, T. L. 1973. Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part I. A revision of the neotropical genus *Xystosomus* Schaum. *Smiths. Contr. Zool.*, 140:1-39.
- ERWIN, T. L. 1974a. Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part II. A revision of the New World-Australian genus *Pericompsus* LeConte. *Smiths. Contr. Zool.* 162:i-iii, 1-96.
- ERWIN, T. L. 1974b. Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini) Supplement A: Lectotype designations for the New World species, two new genera, and notes on generic concepts. *Proc. Ent. Soc. Wash.* 76(2):123-154.
- KIRBY, W. 1837. The Insects. *In* J. Richardson, *Fauna Boreali-Americana* 4. Norwick, p. 1-325.
- JEANNEL, R. 1946. Faune de l'Empire Francais VI. Coléoptères Carabiques de la Region Malgache. Paris, p. 1-372.

- LECONTE, J. L. 1851. Descriptions of new species of Coleoptera from California. *Ann. Lyceum Nat. Hist. New York.* 5:125-184, (1852) 185-216.
- MOTSCHULSKY, T. V. de. 1839. Coléoptères du Caucase et des provinces Transcaucasiennes décrits par T. Victor. *Bull. Soc. Imp. Nat. Moscow.* 12:68-93.
- MOTSCHULSKY, T. V. de. 1862. *Etudes entomologiques.* 11. Dresden, p. 1-55.
- MÜLLER, G. 1926. I Coleotteri della venezia giulia. Part I. Adephaga *Studi entomologici.* 1(2):1-306.
- NETOLITZKY, F. 1914. Die Bembidiini in Winklers Catalogus. I-II. *Ent. Blät.* 10:50-55, 164-176.
- SCHAUM, H. R. 1863. Beiträge zur Kenntniss einiger Carabiden-Gattungen. *Berl. Ent. Zeitschr.* 7:67-92.
- STEPHENS, J. F. 1829. Illustrations of British Entomology or a synopsis of indigenous insects. *Mandibulata.* II, p. 1-200.



LITERATURE NOTICES

Fauna of the USSR: Darkling Beetles, by G. S. Medvedev. 1977. vii and 386 pp., illus. Published for the U. S. Department of Agriculture, Agriculture Research Service and National Science Foundation, Washington, D.C., by the Indian Scientific Documentation Centre, New Delhi. Available from the U.S. Department of Commerce, Technical Information Service, Springfield VA 22161. (Translated from the Russian: Fauna of USSR. Coleoptera, vol. 19, no. 2. Darkling Beetles (Tenebrionidae), Subfamily Opatrinae. Tribes Platynotini, Dendarini, Pedinini, Dissonomini, Pachypterini, Opatrini (part) and Heterotarsini. By G. S. Medvedev. 1968. 285 pp., illus. Izd-vo "Nauk", Leningrad, USSR.)

The Zophosini (Coleoptera:Tenebrionidae) of Western Southern Africa, by Mary-Louise Penrith. 1977. *Combebasia*, Memoir No. 3, 291 pp., illus. (State Museum, Windhoek 9100, South-West Africa.)

Handbooks for the Identification of British Insects, Volume 5, Part 10, Coleoptera, Tenebrionidae, by M. J. D. Brendell. 1975. 29 pp., illus. (Royal Entomological Society of London, 41 Queen's Gate, London SW7 5HU, England. £1.20.)

Revision de la Familia Cerambycidae (Coleoptera, Phytophagoidea), by Fernando de Zayas. 1975. 443 pp., illus. Academia de Ciencias de Cuba, Instituto de Zoologia, Havana. The title should be Cerambycidae de Cuba; on Cuba there are 242 species, in 84 genera, in 40 tribes, in 3 subfamilies.

A Checklist of Names for 3,000 Vascular Plants of Economic Importance, by Edward E. Terrell. 1977. U.S.D.A. Agric. Handbook No. 505, 201 pp. (Available from Superintendent of Documents, Washington DC 20402. \$3.50.) Gives scientific, common, and family names; cross-indexed; a quick and inexpensive means of getting correct host plant names.