STUDIES OF THE SUBTRIBE TACHYINA (COLEOPTERA: CARABIDAE: BEMBIDIINI) SUPPLEMENT A: LECTOTYPE DESIGNATIONS FOR NEW WORLD SPECIES, TWO NEW GENERA, AND NOTES ON GENERIC CONCEPTS[1]

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ABSTRACT—The New World species-group names of the carabid subtribe Tachyina are arranged alphabetically by genus. Lectotype designation are made where necessary and species are assigned accordingly to their proper genus. Two new genera, **Costitachys** and **Meotachys** are described. Three species described in the genus ***Polyderis***, ***testaceolimbata*** Motschulsky, ***glabrella*** Mots., and ***breviscula*** Mots., are reassigned to the genus ***Perigona*** of the Perigonini. A key is provided to Tachyina genera and notes on generic concepts are given.

INTRODUCTION

The purposes of this paper are to clarify generic concepts in New World Tachyina, designate lectotypes, list synonymies, provide a key to genera, and describe two new genera. All of this became possible after studying the World fauna to determine how New World groups relate to Old World groups. Much of this work has now been done and my series of revisions for the World Tachyina has begun to be issued (Erwin, 1973a, 1974).

The work here has been strictly limited without giving reasons for many of the actions taken. Reasons will be provided in forthcoming revisions where space will allow full development of ideas from facts, and analyses of these facts.

METHODS

During 1971, I was able to study almost all primary type material for New World Tachyina as well as to study numerous Old World forms in the British Museum in London and in the Muséum d'Histoire Naturelle in Paris. I labelled all lectotypes designated below with my own labels, hence these specimens can easily be found.

For the most part, I have been able to synonymize names where appropriate; however, in some genera below further synonymization may be made in my revisionary works now in preparation.

The following abbreviations indicate the various museums and private collections from which specimens were borrowed and in which listed specimens can be found:

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AMNH American Museum of Natural History, New York, New York 10024; L. Herman, Jr.
BMNH British Museum (Natural History), London, England; P. Hammond.
CAS California Academy of Sciences, San Francisco, California 94118; H. B. Leech.
CNC Canadian National Collection of Insects, Biosystematic Research Institute, Ottawa, Ontario; E. C. Becker.
FDAG Florida State Collection of Arthropods, Gainesville, Florida 32601; R. E. Woodruff.
HUB Institut für Spezielle Zoologie und Zoologisches Museum der Humboldt-Universitat zu Berlin, East Berlin, DDR; F. Hieke.
IRSN Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; G. Demoulin.
MCZ Museum of Comparative Zoology, Cambridge, Massachusetts 02138; P. J. Darlington, Jr.
MHNP Muséum National d'Histoire Naturelle, Paris; A. Bons.
MMM Moscow Museum, Moscow, U.S.S.R.; S. I. Kelejnikova.
SRM Swedish Riksmuseum, Stockholm, Sweden; T. Nyholm.
UCBP Paleontological Museum, University of California, Berkeley, California; J. H. Peck.
UMU Zoological Institute, University, Uppsala, Sweden.
USNM Smithsonian Institution, Washington, D. C. 20560.
ZMC Universitetets Zoologiske Museum, Copenhagen; S. L. Tuxen.
ZMHF Universitetets Zoologiske Museum, Helsinki; H. Silfverberg.

In the key and descriptions of new genera I refer to elytral setae by code numbers. Refer to Erwin (1974) for the "map" of elytral chaetotaxy. In the list of species the type locality is cited as given in the original description, or I have added the country if none was given. In some cases, I cite the actual locality label on the type. The genera and species are listed alphabetically and cross referenced bv the older generic name. I cite several cases where the sex of the type specimen was undetermined due to specimen condition. This means that I feared the specimen would disarticulate if relaxed and separated from the card on which it was glued.

Discussion of Genera

Revisions of all genera of Tachyina are now in preparation. Two have been published (Erwin, 1973a, 1974) and one is in press. These studies provide the background for new combinations and different rankings listed below, many of which are not fully explained herein. It is the purpose of this section to acquaint the reader with the generic concepts below and relate these concepts to the world fauna. I discuss only the New World groups in detail here, mentioning the Old World forms where appropriate.

The genus ***Xystosomus*** is the most primitive of the New World Tachyina. ***Tachys trunci*** Darlington, of Queensland, Australia, has

similar character states and may be related. *Xystosomus* contains at least 32 species and has been revised (Erwin, 1973a). Further details may be sought in that paper.

Tachymenis is the only other New World genus with members having a truncate anterior tibial apex. Its members live under bark, in rotten logs or stumps, or in deep leaf litter in cloud forests. I know over 100 species, although only 13 have been described. These beetles are a very common component of the tropical forest ecosystems (dry or wet) and are apparently restricted to hardwoods. Members of one small group of species have reduced eyes and are apterous. There is no Old World counterpart of this group.

The following genera, through *Costitachys,* have members with the anterior tibia notched, but have no mental fovae. The genus *Tachyta* has six New World species with a combined range extended from Alaska to Belize. The group is much more diverse in the Old World with at least 5 African species and 9 Oriental-Australian species. These beetles live under bark of conifers and hardwoods, and at least one Oriental species is arboreal, occurring on leaves in the understory. *Tachyta* is composed of two subgenera, one of which is as yet unnamed (Erwin, 1975, in press).

Elaphropus is extremely large with many diverse groups which I will recognize formally as subgenera. In general, these beetles are convex to subdepressed and have a short, arcuate recurrent groove on the apex of the elytron. The group's greatest diversity is in the Oriental Region and in Africa. Many North and Middle American species are obligatory or facultative myrmecophiles; many others are riparian. The New World species are many in the north, decreasing in number southward toward northern South America where the group is replaced by members of *Pericompsus* in the riparian habitat. Members of some species are found in caves, but are not troglobitic.

The sister groups *Lymnastis* and *Micratopus* are Old and New World counterparts (vicariants), respectively. Their highly modified mouthparts and the single supra-orbital seta caused T. L. Casey (1914) to place them in a tribe of their own. I have studied the single known specimen of the monotypic *Straneoites* of Africa. This bizarre species is intermediate in many respects between *Lymnastis* and *Paratachys.* Further study must be made to elucidate the relationship, however. These deep soil forms are extremely common in some situations, especially at light during dispersal flights. Males were once thought to be rare in *Micratopus* species, but this is due to the lack of secondary sexual characteristics. I know about 40 species of *Micratopus* although only 5 have been described. Two *Lymnastis* occur in the New World, one in Cuba, and one in Hawaii. At least the Hawaiian species was introduced as it occurs in soil around imported nursery stock. The Cuban species is wing dimorphic, however, and should be closely

studied; its possible relationship to the Old World fauna will only be known after further study.

The last genus of this group is *Costitachys,* described herein as new.

All other New World genera have members with a bifoveate mentum and an apically notched anterior tibia. *Paratachys* is by far the largest Tachyina genus in the World; the New World species known to me now number over **300,** most of them undescribed. These species are very similar externally, but the form of the internal sac of the male genitalia is exceptionally diverse from species to species. There are numerous species groups which are easily recognized, although not as easily as in *Elaphropus.* If subgenera were to be used in this group they would necessarily be based on male genitalia, therefore, I will use the species group concept in the revision of this genus. The diversity of species is almost matched by the diversity of habitats in which the species are found. Unlike the more ecologically restricted genera discussed above and below, *Paratachys* members are riparian, in forest floor litter, bogs, swamps, bromeliads, grass roots, and so on.

Members of the genus *Tachys* are halophilous in nature, all species occurring on the sea coast or near inland alkali deposits. Many species are estuarine and some are intertidal. These beetles easily cross salt-water gaps and are established on many islands. The Galapagos and Hawaiian Islands each have one endemic species and the former also have a more widespread species. The majority of species are in North America, but a few occur in the Oriental and Palaearctic Regions.

Pericompsus contains **68** species and has been revised (Erwin, **1974).** Further details may be sought in that paper.

Members of *Polyderis* are found in all zoogeographic regions and on oceanic islands. These beetles are very small, one species with members being only 0.7 mm in length. It is quite probable that individuals are transported by man in soil and only a worldwide revision will uncover true identities in this genus. I know well over **50** species at this writing, among them many apterous and small-eyed forms.

The remaining New World genera contain small numbers of species. *Liotachys* is monotypic, its single species occurring in the Amazon Basin. *Meotachys* contains about **19** species, **11** of them undescribed. This group has a combined range extended from Mexico to Brazil and is closely related to *Paratachys. Porotachys* is presently known from two species, one in Europe (recently introduced into eastern North America) and one in the Oriental Region.

Species Herein Removed From Tachyina

Bembidium nigriceps Dejean, 1831:44. Lectotype, sex undetermined, here designated, in MHNP. Type-locality.—Georgia, as designated by Lindroth (1968:651). Recognized by LeConte (1848:474) as probably genus *Perigona*; confirmed by Lindroth (1955:22). I agree.

Polyderis testaceolimbata Motschulsky, 1862:33. Lectotype, sex undetermined, here designated, in MMM. Type-locality.—Mobile, Alabama. This is ***Perigona nigriceps*** (Dejean). New synonymy.

Polyderis glabrella Motschulsky, 1862:34. Lectotype, sex undetermined, here designated, in MMM. Type-locality.—Mobile, Alabama. This is ***Perigona nigriceps*** (Dejean). New synonymy.

Polyderis breviuscula Motschulsky, 1862:34. Lectotype, sex undetermined, here designated, in MMM. Type locality.—Panama. This is genus ***Perigona,*** hence ***Perigona breviuscula*** Motschulsky, new combination. This is one of the several species of Central American ***Perigona*** which is apterous, small-eyed, rufo-testaceous, and small (about **3.0** mm).

PROVISIONAL KEY TO THE GENERA OF TACHYINA OCCURRING IN THE NEW WORLD[2]

1. Elytra impunctate, each with 8 longitudinal carinae extended from near base to apex; pronotum with 5 carinae; head with *3* carinae ..... ***Costitachys,*** new genus
— Elytra, pronotum, and head without carinae or if elytra are carinate they are also punctate 2
2. Mentum with *2* deep foveae, each circular or horseshoe shaped 8
— Mentum without deep foveae, but with or without shallow bilateral depressions 3
3(2). Anterior tibia nearly or perfectly truncate apically 4
— Anterior tibia strongly notched apicolaterally 5
4(3). Elytral disc without setae Ed 2 through 6; convex beetles ..... Xystosomus Schaum
— Elytral disc with setae at Ed 3 and 5; convex or depressed beetles with strongly reflexed pronotal margins ..... Tachymenis Motschulsky
5(3). Elytra and abdominal sterna sparsely pubescent, usually rest of surface also; color testaceous to flavotestaceous; head slightly or strongly retracted into pronotum; recurrent groove of elytron absent or barely engraved 6
— Elytra and abdominal sterna not pubescent; color testaceous to black; head not retracted into pronotum; recurrent groove well marked 7
6(5). Apical abdominal sternum of both sexes with 4 long setae along posterior margin, lateral setae sickle-shaped ..... Micratopus Casey
— Apical abdominal sternum of male with 2 long setae, female with 4 setae, setae straight ..... ***Lymnastis*** Motschulsky
7(5). Recurrent groove of elytron short, arcuate, and closer to suture than side margin; form convex or subdepressed ..... ***Elaphropus*** Motschulsky
— Recurrent groove of elytron elongate, straight, and very close to side margin; form depressed ..... Tachyta Kirby
8(2). Recurrent groove of elytron elongate, prolonged anteriorly beyond setae Ed 6 then curved posteriorly in the form of a hook 9
— Recurrent groove of elytron short, arcuate, and not prolonged beyond seta Ed 6, or elongate and close to side margin 10

[2] See Erwin (1974) for discussion of the term interneur.

9(8). Elytral intemeur *8* subsulcate posterior to middle with apical portion of sulcus bent medially just posterior of Eo 5 and 6; recurrent groove hooked around Ed 6 ..... *Paratachys* Casey

— Elytral interneur *8* subsulcate but not bent medially near Eo 5 and 6; recurrent groove hooked into Ed 6 or effaced laterad of Ed 6 ..... *Tachys* Stephens

10(8). Pronotum without hind angles, form pedunculate; interneur *8* absent externally ..... *Liotachys* Bates

— Pronotum with hind angles, or at least form not at all pedunculate; interneur 8 entire, or present at least anteriorly and/or posteriorly 11

11(10). Recurrent groove elongate and very close and parallel to side margin ..... *Porotachys* Netolitzky,

— Recurrent groove absent, almost effaced, or short, arcuate, and well-engraved and nearer the suture than to side margin or at least not parallel to side margin 12

12(11). Elytral interneurs punctate or sulcate-striate 13

— Elytral interneurs effaced or very shallowly striate, form small and depressed or subdepressed; color testaceous to flavous .. *Polyderis* Motschulsky

13(12). Elytral intemeur 8 with posthumeral foveae or fovea, usually at basal fourth or middle OR elytron with 8 entirely punctate interneurs ..... *Pericompsus* Leconte

— Elytral interneur 8 without foveae nor elytron with more than 5 interneurs externally visible ..... *Meotachys*, new genus

Genus *Costitachys* Erwin, new genus

Type-species: *Costitachys inusitatus,* new species, here designated.

Description: *Form* (Fig. 1): Broad and subdepressed, Easily recognized from other Tachyina by the carinae of the head, pronotum, and elytra.

Color: Flavotestaceous throughout, antennae slightly paler.

Head: Clypeus and dorsum of head with 3 longitudinally oriented carinae; 1 supra-orbital seta per eye; eyes micro-setiferous; mentum without foveae, with minute tooth along anterior margin; antennae short, extended to base of prothorax, and articles pubescent from 2–11.

Prothorax: With 5 longitudinally oriented carinae; without setae at base or along lateral margin; tibia obliquely notched apically.

Mesothorax: Elytron with 8 longitudinally oriented carinae, sixth continuous with rounded humeral margin; marginal explanation nonsetulose and nonserrate; recurrent groove absent; chaetotaxy formula Eo 1a, 2a, 3a, 4a, 5c, 6b, 7, 8a; Ed 1, 7b.

Abdomen: Last visible sternum of female with 2 setigerous pores; male unknown.

Size: Length, 2.60 mm; width, 1.12 mm.

Distribution: Known only from the type locality of Santarem, Pará, Brazil.

Discussion: Though I have seen only one female specimen, the characteristics are so remarkable in comparison with the world Tachyina

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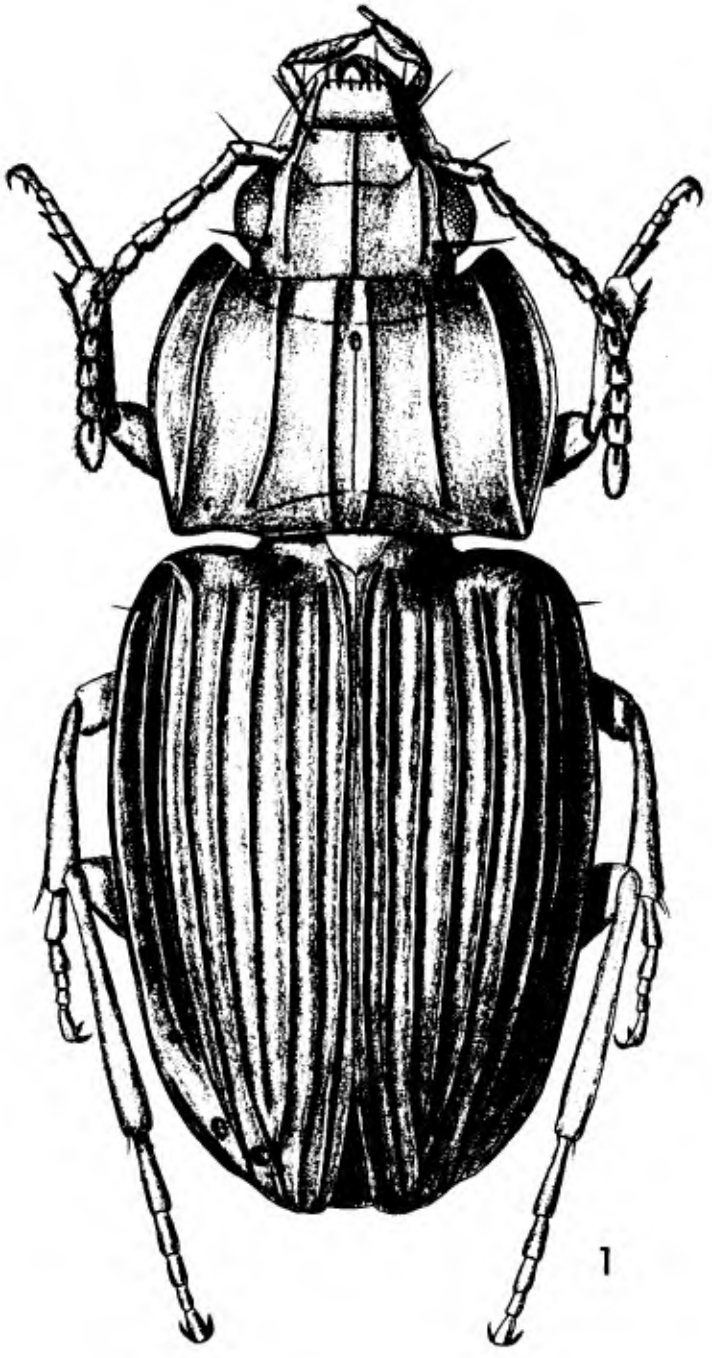
Fig. 1. Habitus of *Costitachys inusitatus,* female, Santarem, Brazil.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that I feel fully justified in describing the new species and erecting the new genus.

Etymology: Latin, *costa,* meaning rib and referring to the longitudinal carinae of the head, pronotum, and elytra; plus *Tachys,* the nominate genus of the subtribe, hence the *Tachys* with ribs.

Costitachys inusitatus Erwin, new species

Fig. 1

Type-specimen: The holotype female is in MCZ; it was collected by F. G. Werner in April, 1963.

Type-locality: Santarem, ParL, Brazil.

Description: Form (Fig. 1): Broad and subdepressed.

Color, head, prothorax, mesothorax, abdomen, and size as described under generic description.

Distribution: Known only from the type locality of Santarem, Pará, Brazil.

Etymology: Latin, *inusitatus,* meaning unusual and referring to the bizarre structure of the dorsal surface of these beetles in relation to other Tachyina.

Genus Meotachys Erwin, new genus

Fig. 2

Type-species: Tachys amplicollis Bates, 1882:142, here designated.

Description: *Form* (Fig. 2): Broad and convex or subdepressed. Easily recognized from other Tachyina by the foveate mentum, short arcuate recurrent groove on the elytral apex, and the medially deflected anterior apex of the posterior section of interneur 8 between Eo setae 5 and 6. In addition the females have 4 setigerous pores arranged in a straight row across abdominal sternum V.

Color: Testaceous, rufotestaceous, or flavous with paler appendages than body. I have specimens of 1 undescribed species with piceous elytra and rufous head and pronotum.

Head: Frontal furrows short and foveate or elongate and extended behind eyes; antennae elongate, extended beyond humerus; mentum bifoveate, anterior edge entire; antennal pubescence on apical half of article 2 and on all of articles 3–11.

Prothorax: Prosternum glabrous; tibia with obliquely notched apex; pronotum with punctate or smooth basal transverse impression.

Mesothorax: Elytra with punctate-striate or striate interneurs; recurrent groove short, arcuate, and extended anteriorly just past Ed seta 7a; chaetotaxy formula Eo 1a, 2b, 3a, 4c, 5b, 6a, 7, 8a, Ed. 1, 3, 5b, 7a, 8; plica present.

Abdomen: Sterna III and IV with or without accessory setae in addition to the regular ambulatory setae; sternum V with short scattered setae, male also with 2 long setae, female with 4 long setae arranged in a transverse row.

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Fig. 2. Habitus of Meotachys amplicollis, female, El Palmar, Veracruz, Mexico.

considerably during study at those museums. I also wish to thank Drs. George E. Ball, Paul D. Hurd, Jr., and Donald R. Whitehead for reading the manuscript and making very helpful suggestions.

REFERENCES

Alluaud, C. 1933. Etude des ***Tachys*** du sous-genre ***Trepanotachys*** All. Afra. no. 7, p. 17–20.

Barr, T. C., Jr. 1971. *Micratopus* Casey in the United States (Coleoptera: Carabidae: Bembidiinae). Psyche. 78(1–2):32–37.

Bates, H. W. 1871a. Notes on Carabidae, and descriptions of new species (no. 2). Entomol. Mon. Mag. 7:244–248. [Contains descriptions of ***Pericompsus,*** thus is not cited directly herein.]

———. 1871b. Notes on Carabidae, and descriptions of new species (no. 3). Entomol. Mon. Mag. 7:266–269.

———. 1871c. Notes on Carabidae, and descriptions of new species (no. 4). Entomol. Mon. Mag. 8:11–14.

———. 1878. On new genera and species of geodephagous Coleoptera from Central America. Proc. Zool. Soc. London. 1878:587–609.

———, 1882. Insect Coleoptera Carabidae. ***In*** Godman and Salvin, Biologia Centrali-Americana. 1(1):40–152.

———, 1884. Insecta, Coleoptera, Cicindelidae suppl., Carabidae suppl. In Godman and Salvin, Biologia Centrali-Americana. 1(1):257–299.

Bilimek, D. 1867. Farma der Gotte Cacahuamilpa in Mexiko. Verh. zool-bot. Gesellschaft in Wien. 17:901–908.

Blackburn, T. 1878. Characters of new genera and descriptions of new species of geodephaga from the Hawaiian Islands. Entomol. Mon. Mag. 15:156–158.

Blatchley, W. S. 1924. New Coleoptera from southern Florida with notes on other interesting species. Can. Entomol. 56:164–170.

Boheman, C. H. 1858. Coleoptera. Species novas description. ***In*** Kongliga Svenska Fregatten Eugenies resa omkring Jorden . . . zoologi, 1, Insecta. Stockholm, p. 1–112.

Bolivar y Pieltain, C. and J. Hendrichs. 1965. Los Carabidae de la Gruta de Cacahuamilpa (Mexico), con description de ***Agonum*** (***Platynus***) ***bilimeki*** n. sp. y do su larva. Ciencia. 23(6):225–232.

Britton, E. B. 1948. The carabid Tribes Harpalini, Lebiini, and Bembidiini in Hawaii (Coleoptera). Proc. Hawaiian Entomol. Soc. 13(2):235–254.

Casey, T. L. 1884. Contributions to the descriptive and systematic coleopterology of North America. I. II. Philadelphia, p. 1–198.

———. 1914. Some observations on the Carabidae including a new subfamily. Memoirs on the Coleoptera. Lancaster, Penn. 5:25–44.

———. 1918. A Review of the North American Bembidiinae. Memoirs on the Coleoptera. 8:1–223.

Chaudoir, M. de. 1846. Enumération des Carabiques et Hydrocanthares recueillis pendant un voyage au Caucase. . . . Kiew, p. 1–268.

———. 1868. Observations synonymiques sur les Carabiques de l'Amerique septentrionale et descriptions de'espèces nouvelles de ce pays. Rev, et Mag. Zool. 20(2):211–217.

Csiki, E. 1928. Coleopterorum catalogus, pars 97, Carabidae: Mormoly-cinae, Harpalinae 1. W. Junk, Berlin. p. 1–226.

Darlington, P. J., Jr. 1934. New West Indian Carabidae with a list of the Cuban species. Psyche. 41(2):66–131.

————. 1935. West Indian Carabidae II: Itinerary of 1934; Forests of Haiti; New species; and a new key to *Colpodes*. Psyche. 42(4):167–215.

————. 1939. West Indian Carabidae. V. New forms from the Dominican Republic and Puerto Rico. Memo. Soc. Cubana Hist. Nat. 13:79–101.

————. 1962. The carabid beetles of New Guinea. Part I. Cicindelinae, Carabinae Harpalinae through Pterostichini. Bull. Mus. Comp. Zool. 126(3): 321–564, 4 plates.

Dejean, P. F. M. A. 1831. Species général des Coléoptères. 5:1–VIII, 1–883.

Duftshmid, C. E. 1812. Faunae Austriae. 2. Linz, p. 1–VIII, 1–311.

Erwin, T. L. 1971. Fossil Tachyine beetles from Mexican and Baltic amber with notes on a new synonym of an extant group (Col. Carabidae). Entomol. Scand. 2:233–236.

————. 1973a. Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part I. A revision of the neotropical genus *Xystosomus* Schaum. Smiths. Contr. Zool., No. 140.

————. 1973b. Nomenclatorial notes on the Tachyini (Coleoptera: Carabidae). Proc. Entomol. Soc. Wash. 75(1):125.

————. 1974. Studies of the Subtribe Tachyina (Coleoptera: Carabidae: Bembidiini), Part II. A revision of the New World-Australian genus *Pericompsus* LeConte. Smiths. Contr. Zool., *in press.*

Fall, H. C. 1907. Descriptions of new species. *In* Fall and Cockerell, the Coleoptera of New Mexico. Trans. American Entomol. Soc. 33:218–272.

Fleautiaux, E. and A. Sallé. 1889. Liste des colbpteres de la Guadeloupe et descriptions d'especes nouvelles. Ann. Soc. Entomol. France. 9:351–484.

Germain, P. 1906. Apuntes entomolójicos. Anal. Univ. Chile. 117:589–653.

Gyllenhal, L. 1810. Insecta Suecia I. Skara and Leipzig, p. I–XX, 1–660.

Hayward, R. 1900. A study of the species of *Tachys* of boreal America. Trans. Amer. Entomol. Soc. 26:191–239.

Hope, F. W. 1838. The Coleopterist's Manual. II. London, p. 1–168.

Jeannel, R. 1932. Revision du genre *Limnastis*. Société entomologique France, Paris Livre centenaire 1932:167–187.

————. 1941. Faune de France 39. Coléoptèrea Carabiques. Paris. I, 571 p.

————. 1946. Faune de l'Empire Francais VI. Coléoptères Carabiques de la Region Malgache. Paris, p. 1–372.

————. 1962. Les Trechides de la Paleantarctide Occidentale. Biologie de l'Amérique Australe Etudes sur la Faune du Sol. Paris. VII:529–655.

Jensen-Haarup, A. C. 1910. New species of Coleoptera from west Argentina. Deutsche Entomol. Zeit. 1910:541–554.

Kirby, W. 1837. The Insects. *In* J. Richardson, Fauna Boreali-Americana 4. Norwick, p. 1–325.

Kult, K. 1961. Beitrag zur Kenntnis der Tachyiini aus Iran (Coleoptera, Carabidae). Stutt. Beit. Natur. 57:1–4.

LaFerté-Senectère, M. F. T. de. 1841. Description de dix Carabiques nouveaux du Texas et d'une espèce nouvelle de Buprestide de France. Rev. Zool. 1841: 37-51, 95-96.

LeConte, J. L. 1848. A descriptive catalogue of the geodephagous Coleoptera inhabiting the United States east of the Rocky Mountains. Ann. Lyceum Nat. Hist. New York. 4:173–474.

———. 1851. Descriptions of new species of Coleoptera, from California. Ann. Lyceum Nat. Hist. New York. 5:125–184, (1852) 185–216.

———. 1863. New species of North American Coleoptera. 1. Smithsonian Misc. Coll. no. 167, p. 1–86.

Lindroth, C. H. 1953. Kirby's types of North American Carabidae. Proc. Royal Entomol. Soc. London (Series B). 22:167–177.

———. 1955. Dejean's types of North American Carabidae. Opusc. Entomol. 20:10–34.

———. 1966. The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska. Part 4. Opusc. Entomol. Suppl. 29, p. 409–648.

———, 1968, The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska. Part 5. Opusc. Entomol. Suppl. 33, p. 649–944.

Lindroth, C. H. and R. Freitag. 1969. North American ground-beetles (Coleoptera, Carabidae, excluding Cicindelinae) described by Thomas Say: Designation of lectotypes and neotypes. Psyche. 76(3):326–361.

Lucas, P. H. 1846. Exploration scientifique de l'Algérie. Zoologie. Historie naturelle des animaux articulés. 2:1–590.

Motschulsky, T. V. de. 1839. Coléoptères du Caucase et des provinces Transcaucasiennes dbcrits par T. Victor. Bull. Soc. Imp. Nat. Moscow. 12:68–93.

———. 1846. Die Coleopterologischen Verhaeltnisse und die Kafer Russlands. 1. Insecta Carabica. Moskva, p. 1–VII, 1–91, Tub. II–X.

———. 1851. Bnumeration des nouvelles espèces de Coléoptères. Bull. Soc. Imp. Nat. Moscow. 24(2):479–511.

———. 1862. Etudes entomologiques. 11. Dresden, p. 1–55.

Miiller, G. 1926. I Coleotteri della venezia giulia. Part 1. Adephaga Studi entomologici. 1(2):1–306.

Mutchler, A. J. 1924. Coleoptera from the Williams Galapagos Expedition. Zoologica. 5(20):219–224.

———. 1934. New species of Carabidae from Puerto Rico. American Mus. Nov. 686:1–5.

Netolitzky, F. 1914. Die Bembidiini in Winklers Catalogus. 1–11. Entomol. Blät. 10:50–55, 164–176.

Nicolai, E. A. 1822. Dissertatio inauguralis sistens Coleopterorum species Agri Halensis. Halle, p. 1–44.

Nietner, J. 1858. Descriptions of new Ceylon Coleoptera. Ann. Mag. Nat. Hist. 2:418–431.

Notman, H. 1919. Records and new species of Carabidae. Jour. New York Entomol. Soc. 27:225–237.

———. 1922. New species of Carabidae, Staphylinidae, and Elateridae. Bull. Brooklyn Entomol. Soc. 17:99–108.

Putzeys, J. A. A. H. 1874. Notice sur les cicindèles et carabiques recueillis dans l'Ile Antigoa par M. Purves. Ann. Soc. Entomol. Belg. 17:117–119.

Sahlberg, R. F. 1844a. In faunam insectorum rossicam symbola, novus ad Ochotsh lectos Carabicomm species. Ada Soc. Fenn. 1844:1–69.

———. 1844b. Coleoptera diebus 15–27. Decembris anni 1839 ad Rio Janeiro lecta. Acta Soc. Scien. Fennicae. 2(1):499–522.

Say, T. 1823. Descriptions of insects of the families of Carabici and Hydrocanthari of Latreille, inhabiting North America. Trans. American Phil. Soc. (N.S.) 2 (1825). Philadelphia, p. 1–109.

———. 1834. Descriptions of new North American insects and observations on some already described. Trans. American Phil. Soc. 4:409–470.

Schaum, H. R. 1863. Beiträge zur Kenntniss einiger Carabicinen-Gattungen. Berl. Entomol. Zeitschr. 7:67–92.

Sharp, D. 1886. On New Zealand Coleoptera, with descriptions of new genera and species. Trans. Royal Dublin Soc. 3(2):374.

Stehr, W. C. 1946. Tachyura *barnesi* n. sp. (Bembidiini, Carabidae, Coleoptera). Ohio Jour. Sci. 46(5):284.

Stephens, J. F. 1829. Illustrations of British Entomology or a synopsis of indigenous insects. Mandibulata. II, p. 1–200.

Steinheil, E. W. 1869. Symbolae ad historiam coleopterorum Argentinae meridionalis, ossia elenco dei coleotteri raccolti dal professeore Pelegrino Strobel, durante il suo soggiorno in Buenos Aires e nei viaggi de la intrapresi a Mendoza e nel Chili, indi a Bahia Blanca ed al Carmen de los Patagones; e descrizione delle specic nueve. Atti della Soc. Ital. Sci. Nat. 12:238–260.