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Chironomus strenzkei Fittkau – a new Pan-American distribution, with a review of recent similar additions to the Nearctic midges

(Insecta, Diptera, Chironomidae)

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Chironomus strenzkei Fittkau, described from the Neotropics, is for the first time recorded from the Nearctic region (southern California). It is speculated that it is a recent aircraft introduction, with possibly high potential as a nuisance species. A brief review is given of other chironomid species with similar distributions.

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Dedication

This paper is dedicated to a cherished colleague and good friend, the late Frieder Reiss. We remember many professionally rewarding and hospitable days in his company.

Jim and Mary Sublette

Introduction

The chironomid fauna of North America is predominantly indigenous, but most of the genera are shared with the Palaearctic region. However, the Nearctic also has several members in common with or derived from the Neotropical region (e.g. Reiss & Sublette 1985, Wülker et al. 1989, Sublette & Mulla 1991, Sublette et al. 1998, Spies 2000a, b in press). This paper reports on another such species recently discovered in southern California.

Material and methods

Eight adult males of *Chironomus strenzkei* Fittkau were collected with aspirator and sweepnet at the Hyperion wastewater treatment plant, El Segundo, Los Angeles Co., CA, 13.X.1999, leg. M. S. Mulla. These were slide-mounted and analyzed using a modification of the method by Schlee (1966). Voucher specimens are retained by both authors.

Fittkau, 1968: 240.

Background. After Fittkau had discovered the species in Brazil, he sent live larvae to Europe, from which continuous cultures were developed in several laboratories. The earliest authors publishing Fittkau's manuscript name concerned themselves with various aspects of the species' biology, not taxonomy. Consequently, all publications prior to Fittkau (1968) did not formally validate the species name, but instead produced nomina nuda, one (Platzer 1967) even with an erroneous spelling (see Spies & Reiss 1996).

Chironomus strenzkei Sasa, 1978 is a junior homonym which has been replaced by *C. nippodorsalis* Sasa, 1979.

The following is a summary of published information on *C. strenzkei* Fittkau.

Morphology. Platzer-Schultz & Welsch (1969: larval digestive tract ultrastructure); Fittkau (1968: external descriptions for all life stages); Wülker & Morath (1989: larval chromosome banding pattern).

Physiology. Platzer (1967: larval temperature adaptation); Platzer-Schultz (1968a, b, 1970: respiration). Behavior. Syrjämäki (1965, 1967: swarming).

The holotype of *C. strenzkei* Fittkau is deposited at INPA, Manaus, Brazil (Adis et al. 1985). For a list of institutions holding some of the many paratypes see Fittkau (1968: 246).

Identification. The adult male can be readily recognized among Nearctic *Chironomus* by the uniquely marked wings (Fittkau 1968: fig. 1). Members of the *decorus*-group have wings with some dusky veins (Townes 1945), but none with an intensity or distribution as the membrane markings of *C. strenzkei*. A second morphological feature, an anal point that is narrow at the base, is shared in the Nearctic fauna only by *Chironomus riparius* Meigen (Townes 1945) and *Chironomus calligraphus* Goeldi. The male genitalia of the new specimens are in close agreement with the detailed original description (Fittkau 1968, figs 2, 3).

The following compares selected morphometric data from the California population to those given for the type material (Fittkau 1968), with numbers of observations given in parentheses.

	Fittkau (1968)	Present study
Wing length	1.56-2.0 mm (78)	2.04-2.18 (5)
Antennal ratio	2.1-2.6 (60)	2.71-2.95 (5)
Fore leg ratio	1.76 [mean] (40)	1.69-1.78 (4)
Dorsocentral setae	8-14 (29)	12-17 (5)
Prealar setae	4-5 (26)	4-5 (5)
Scutellar setae	[12-26] (31)	16-28 (5)
TIX setae	7-16 (36)	2-6 (5)
Superior volsella setae	7-11 (24)	12-15 (5)
Inferior volsella setae	13-19 (23)	22-24 (5)

Although in many characters the two value ranges do not overlap, nearly all results are consistent with the difference in overall body size (see wing length). Even the notable exception, the low count of TIX setae in the larger California males, is variation to be expected among two widely separated populations from different habitats. The shared genitalic features and wing pattern are considered diagnostic for the species.

Distribution. Amazon lowlands from Pucallpa, Peru to Belém, Brazil (Fittkau 1968); U.S.A., southern California (present paper).

Ecology. Fittkau (1968) found *C. strenzkei* only in small, artificial water bodies with high nutrient levels, e.g. in mud and algae accumulating in the bilge water of dugout canoes. The original habitat was interpreted to be stagnant, eutrophic small waters as are common in the periodically inundated lower Amazon. The larvae are able to survive very high temperatures and low oxygen levels by aggregating at the water-air interface. The life cycle can be completed in as short a time as 10-12 days (Fittkau 1968).

Discussion

With its ecological preferences and adaptations as outlined above, *C. strenzkei* has the potential to survive throughout the southern United States and other lower temperate and subtropical areas where, for example, sewage oxidation ponds make potentially productive breeding sites. One possible consequence is that it causes significant pest swarm problems around these facilities. Since the species' vagility would be aided by the numerous small water bodies available in urban areas (pet watering dishes, flower pot basins, ornamental pools, empty containers, etc.) *C. strenzkei* could eventually become a nuisance around human settlements as well.

The present new record is the second case (see Sublette & Mulla 1991) of a Chironomini species that, in light of the major airports and ship docking facilities in southern California, has probably been introduced via ship or aircraft within the past decade. There it has joined an assemblage of eurythermic, eutrophic species including others which arrived, also from Neotropical regions, at an earlier time. Examples are *Chironomus anonymus* Williston (Wülker et al. 1989) and *C. calligraphus* Goeldi, known from southern California since the 1960's as *Chironomus* sp. 51 and 52, respectively. Recent introduction is likely because intensive collecting in southern California failed to turn up *C. strenzkei* until the last decade. *Goeldichironomus amazonicus* (Fittkau), a species that probably has a comparable mode of origin, has also been reported for the first time from the Nearctic Region within the past decade (Sublette & Mulla 1991. These earlier studies included year-round monitoring of several experimental ponds with different trophic levels on the campus of the University of California at Riverside, as well as research on various urban water bodies including flood control and waste water disposal systems. Representative publications include Anderson et al. (1965), Bay et al.(1966), Bath & Anderson (1969), Grodhaus (1963a, b; 1967), Mulla (1974), and Mulla et al. (1971). A recent account of nuisance species in urban southern California is given by Spies (2000b) whose collections also did not include *C. strenzkei*.

Several chironomid genera have been biogeographically classified as 'Pan-American' (Reiss & Sublette 1985), because representatives of theirs occur in at least parts of each of the New World subregions. Most such distributions are probably due to primarily Neotropical species whose natural ranges extend to include marginal populations in the southern Nearctic. Two recently added examples are *Rheotanytarsus hamatus* Sublette & Sasa (U.S.A.: AZ), and *Polypedilum obelos* Sublette & Sasa (U.S.A.: AZ, NM) (Sublette et al. 1998, first author's unpublished records). The latter species is of interest as one of several *Polypedilum* from the southern U.S. with pictured wings (Townes 1945), a feature abundantly represented in the Neotropical region (Sublette & Sasa 1994, Bidawid & Fittkau 1995, Bidawid-Kafka 1996). An additional four new pictured-wing species of *Polypedilum* are known to the first author, one each from Texas and Arizona, and two from New Mexico. As these occur in rather remote areas none is interpreted as being a recent immigrant.

Parachironomus is a genus abundantly represented in the Neotropical region, and moderately abundant in the Nearctic. Several of its members from across the southern U.S. are clearly related to similar Neotropical species described by Spies et al. (1994). Some synonymies may result when more material becomes available. Spies (2000a) lists several new records for the Nearctic region, including new Pan-American distributions. An additional record is: *P. supparilis* Edwards, var. *centralis* Spies et al. – U.S.A., FL, W. Palm Beach, Morrison Field, 3 males, 1.-3.I1943 (USNM, JES collections).

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