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# ZOOTAXA

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## **Cytotaxonomy of the Simuliidae (Diptera): a systematic and bibliographic conspectus**

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## Abstract

An annotated compilation of all chromosomal works (cytoconspectus) on the Simuliidae is presented, covering 577 species including 541 formally named species—24.8% of the world’s extant nominal species—and 36 formally unnamed species. The first published record of polytene chromosomes in a simuliid appeared in 1919, followed by an imposing body of chromosomal research, most notably since 1956. The bibliography assembled here includes 653 works containing novel chromosomal information on the Simuliidae. Cytotaxonomy of the Simuliidae began in 1951 in the Canadian laboratory of Klaus Rothfels and subsequently expanded worldwide. Although chromosomal study has been uneven across species, it has provided a rich database of the genetics of natural populations and much of the foundation for the modern taxonomy and systematics of the family. After peaking in the late 1980s, cytotaxonomic productivity became more sporadic as the molecular movement gained popularity, despite the potential that an integrated chromosomal and molecular approach holds.

**Key words:** bibliography, blackflies, black flies, cytotaxonomy, polytene chromosomes, Simuliidae

### Dedicated to

KLAUS HERMANN ROTHFELS (1919–1986)

Distinguished Cytogeneticist and Father of Cytotaxonomic Studies in Simuliid Systematics

## Introduction

Studies of the elaborately banded polytene chromosomes in larval silk glands revolutionized the taxonomy and systematics of the family Simuliidae. Using the polytene chromosomes, Klaus Rothfels (1956) provided the conceptual framework for the field of endeavor that came to be known as ‘cytotaxonomy.’ By the end of the twentieth century, cytotaxonomy had helped propel the Simuliidae to the vanguard of taxonomically well-known groups of hexapods.

The seminal work of Rothfels (1956) initiated a steady increase in cytotaxonomic studies through the 1980s before eventually declining (Fig. 1). The 1956 work was preceded by a scattering of about 16 chromosomal papers on the Simuliidae, most peripheral to cytotaxonomy, but several of significance in setting the scene. Thirty-eight years after Balbiani’s 1881 discovery of polytene chromosomes in chironomid larvae, Debaisieux and Gastaldi (1919, p. 192) reported polytene chromosomes in the Simuliidae, illustrating a fragment (fig. 19) and noting that the silk gland cells of larvae infected with microsporidia contained “des chromosomes formés de disques empilés.” Geitler (1934) provided the first study focused on polytene chromosomes of the Simuliidae. Painter and Griffen (1937b) and Painter (1939) explored the structural organization of simuliid polytenes, and Griffen (1939) produced the first thesis on simuliid chromosomes. Rothfels & Dunbar (1953) established the staining procedures and early mapping conventions for simuliid polytenes, and Kunze (1953) and Zimring (1953) independently provided the first comparisons of polytenes among simuliid species.