

***Simulium***  
(insect: dipteran)

**Overview**

Arthropods are coelomate metameric invertebrate animals with a chitinous exoskeleton and jointed limbs. They undergo protostomial embryonic development and grow by cuticular moulting (ecdysis). Three main subphyla are recognized: Chelicerata, Crustacea and Hexapoda. Insects are hexapods with three pairs of uniramous legs, three tagmata (head, thorax, abdomen), ectognathous mouthparts with whole-limb mandibles, and one pair of antennae. Diptera (true flies) have two pairs of wings, but the hindwings are reduced to stabilizing halteres. All species are holometabolans and exhibit complete metamorphosis whereby vermiform larval stages undergo pupation and transform into free-flying adults. Several major parasitic groups are recognized: nematocerans (small slender bodies, long filamentous antennae, narrow wings) and brachycerans (larger bodies, short stout antennae, broad wings); the latter being divided into the Tabanomorpha (larval head capsule sclerotized) and the Muscomorpha (larval head not sclerotized, circular-seamed (cyclorrhaphous) pupae). Nematocerans include the culicids (mosquitoes), ceratopogonids (midges); simuliids (black flies) and psychodids (sand flies): only the females are parasitic and have piercing-sucking mouthparts. Simuliids are small black flies (or buffalo gnats) with humped backs and broad unadorned wings (not patterned or hairy). Larval development requires flowing oxygenated waters such as streams and rivers. Adults have cutting mouthparts and their bites are painful making them significant annoying pests of livestock. Females feed on a variety of mammals and birds, with most species demonstrating some degree of host specificity. Anthropophilic *Simulium* species may cause hypersensitivity reactions in humans (black fly fever) and transmit filarioid nematodes of the genus *Onchocerca*, including the species causing river blindness in Africa.

**Classification:**

Domain: Eukaryota (membrane-bound nucleus)  
 Supergroup: Amorphea (unikonts with single flagellum, or nonflagellated amoebae)  
 Kingdom: Metazoa (multicellular eukaryotes, heterotrophs, notably animals)  
 Group: Protostomia (triploblastic, spiral cleavage)  
 Subgroup: Ecdysozoa (cuticle moulted = ecdysis)  
 Phylum: Arthropoda (chitinous exoskeleton, segmented body, jointed limbs, haemocoel)  
 Subphylum: Hexapoda (three tagmata, three pairs uniramous legs, whole-limb mandibles, Malpighian tubules)  
 Class: Insecta (ectognathous mouthparts (bases lie outside head capsule), single pair antennae, many with wings)  
 Superorder: Holometabola (Endopterygota) (young do not resemble adults, pupae, with internally developing wings)  
 Order: Diptera (true flies, single pair of forewings, hindwings modified into halteres, vermiform larvae)  
 Suborder: Nematocera (midges/mosquitoes, long filamentous antennae, aquatic larvae/pupae)  
 Family: Simuliidae (small black flies/buffalo gnats, characteristic humped backs, wings not patterned or hairy)  
 Genus: *Simulium* (parasitic on skin of mammals/birds)  
 Species: various species cause annoyance and allergic reactions in livestock (and vector other diseases)

**Parasite biodiversity and host range:** Most Metazoa are multicellular triploblastic animals with differentiated tissues, many being bilaterally symmetrical with a body cavity. Most invertebrate animals are protostomes as their embryonic development involves spiral determinate cleavage. Those that moult their external cuticles during their life-cycles (process known as ecdysis) are grouped together in the unique clade Ecdysozoa, including the nematodes (roundworms), onychophorans (velvet worms), tardigrades (water bears) and arthropods (myriapods, chelicerates, crustaceans and hexapods). Arthropods have small segmented bodies encased in chitinous exoskeletons with articulated limbs. Most species are free-living in terrestrial and aquatic habitats, although a small range are ectoparasitic on other animals, some feeding on the blood or skin of vertebrates. Five subphyla are recognized: Chelicerata, Crustacea, Hexapoda, Myriapoda and Trilobita. Insects are hexapods with six legs, three distinct body parts, two antennae and mouthparts with whole-limb mandibles. Insects are the most biodiverse group on the planet, with millions of species described in numerous taxa. Notorious ectoparasitic species belong to four orders in two superorders: the Hemipteroidea (Exopterygota) containing the orders Hemiptera (bugs) and Phthiraptera (lice); and the Holometabola (Endopterygota) containing the orders Siphonaptera (fleas) and Diptera ('true' flies). Flies are small winged holometabolans that undergo complete (holometabolous) metamorphosis with vermiform larvae undergoing pupation in silk cocoons. Thousands of dipteran species have been described throughout the world, most being free-living saprophages (detritivores) but some being parasitic either as adults biting and feeding on hosts (often haematophagous) or producing larvae that invade host tissues (condition known as myiasis). Two major suborders are recognized: the Nematocera (with small bodies, long filamentous antennae, narrow wings and aquatic larvae and pupae); and the Brachycera (with large bodies, short stout antennae often with arista and broad wings).

Major parasitic dipteran families	Biodiversity	Parasitic stages	Status	Pathogenesis*	Disease transmission
Suborder: Nematocera (small midges/mosquitoes, thread-horned with long filamentous segmented antennae (= nemato-cera), aquatic life-cycles (larval/pupal stages associated with water), female adults require blood meal before they can lay eggs) (34 families)					
Culicidae (mosquitoes)	3 subfamilies, 70 genera, 3,500 species	adult ♀	obligate	blood-sucking	viral, protozoal, helminth
Psychodidae (moth flies, sand flies)	5 subfamilies, 150 genera, 3,000 species	adult ♀	obligate	blood-feeding	viral, bacterial, protozoal
Simuliidae (black flies)	3 subfamilies, 30 genera, 2,000 species	adult ♀	obligate	blood-feeding	protozoal, helminth
Ceratopogonidae (biting midges)	4 subfamilies, 110 genera, 6,000 species	adult ♀	obligate	blood-feeding	viral, protozoal, helminth
Suborder: Brachycera (large tabanid/March flies, with stout and fewer antennal segments (= brachy-cera), antennae often with aristae, females with slashing-sponging mouthparts to pierce skin and feed on pool of blood (telmophagy)) (120 families)					
Infraorder: Tabanomorpha (larval head capsule incomplete posteriorly (only anterior parts sclerotized))					
Tabanidae (horse flies, deer flies)	3-5 subfamilies, 133 genera, 4,300 species	adult ♀ [+ larvae]	obligate [accidental]	blood-feeding [GI, UG, TR myiasis]	viral, bacterial, protozoal, helminth
Infraorder: Muscomorpha (Cyclorrhapha) (aristate antennae, setose bodies, cyclorrhaphous pupa)					
Section: Calyptratae (calypters cover halteres)					
Superfamily: Muscoidea (synanthropic flies)					
Muscidae (house flies, stable flies)	9-10 subfamilies, 190 genera, 4,200 species	adult ♀, ♂ [+ larvae]	obligate [accidental]	biting, blood-feeding [CU, GI, TR myiasis]	bacterial, helminth
Superfamily: Oestroidea (cause larval myiases) (6 families)					
Calliphoridae (blow flies)	11 subfamilies, 75 genera, 1,100 species	larvae	facultative, obligate	CU, GI, NP, AU, UG TR, myiasis	-
Sarcophagidae (flesh flies)	3 subfamilies, 108 genera, 2,500 species	larvae	facultative, obligate	TR, GI, CU myiasis	-
Oestridae (bot flies, warble flies)	5 subfamilies, 25 genera, 150 species	larvae	obligate	CU, GI, NP, OC myiasis	-
Superfamily: Hippoboscoidea (pupa-bearers)					
Glossinidae (tsetse flies)	1 genus, 3 species-groups, 25 species	adult ♀, ♂	obligate	blood	protozoal
Hippoboscidae (louse flies, keds)	1-3 subfamilies, 21 genera, 212 species	adult ♀, ♂	obligate	blood	viral, protozoal, helminth

\*type of myiasis: AU = auricular; CU = cutaneous; GI = gastro-intestinal; NP = naso-pharyngeal; OC = ocular; TR = traumatic; UG = uro-genital.

The suborder Nematocera comprises small slender flies that are 'thread-horned' i.e. they possess long filamentous antennae composed of many articulating segments (= nemato-cera). Adults have long narrow wings (with many branching veins) and specialized mouthparts (short or long) with a protective sheath (labium and labellae) protecting feeding stylets (labrum, mandibles, maxillae and hypopharynx) and flanked by 4-5 segmented palps (usually pendulous but slender in mosquitoes). Many species have aquatic life-cycles (larval/pupal stages associated with water) and all undergo complete metamorphosis whereby adults eclose from puparia through longitudinal slits (rather than circular caps like Cyclorrhapha). The suborder contains 7 infraorders: Axymyiomorpha (larvae in decomposing wood); Bibionomorpha (gnats, lovebugs); Blephariceromorpha (mountain midges); Culicomorpha (mosquitoes, midges, black flies); Psychodomorpha (moth flies); Ptychopteromorpha (primitive crane flies); and Tipulomorpha (crane flies). Many species are free-living detritivores but some have adapted to bite vertebrate hosts in order to feed on blood. The infraorder Culicomorpha contains 2 superfamilies: Chironomoidea (biting, non-biting and trickle midges, black flies); and Culicoidea (meniscus midges, phantom midges, frog-biting midges, and mosquitoes). The superfamily Chironomoidea contains 4 families: Ceratopogonidae (biting midges), Chironomidae (non-biting midges), Simuliidae (black flies), and Thaumaleidae (trickle midges).

Members of the family Simuliidae are commonly known as black flies (sometimes called buffalo gnats as well as turkey gnats, jejen, coffee flies, and even ‘sand flies’) but they are not always black in colour. They are distinguished more by their humped thorax, broad non-hairy wings (with veins thickened anteriorly and less than 8 veins reaching the wing margin), short non-hairy antennae (usually with 11 rounded segments), long 5-segmented palps extending beyond the proboscis, and the first abdominal tergite possessing a basal scale fringed with hairs. Over 2,000 species have been described in around 30 genera in 3 subfamilies: Parasimulinae with 1 genus; Prosimulinae with 2 genera; and Simuliinae with 30 genera (including *Simulium*); plus 8 unplaced genera and 7 fossil genera. *Simulium* spp. have a cosmopolitan distribution and are prevalent in areas where flowing water is present (required for larval/pupal stages). Many black fly species are anautogenous as female flies need to feed on vertebrate blood to produce eggs. Collectively, black flies feed on an extensive range of vertebrates (mammals and birds), although some species have strong preferences for particular hosts (often reflected in their common names). The genus *Simulium* (syn. *Asiosimulium*, *Bakerina*, *Choporus*, *Simulia*) contains over 1,700 species, many classified in 60 subgenera. Around 200 species are considered to be significant biting pests of domestic animals and humans, as well as acting as vectors for the transmission of several pathogenic infectious diseases, including onchocerciasis (causing nodular lesions in animals and humans, and river blindness in humans), viral encephalitis and stomatitis in domestic livestock, and leucocytozoonosis in poultry.

<b><i>Simulium</i> species (regional exemplars)</b>	<b>Host preferences</b>	<b>Clinical signs (+ vectorial capacity)</b>	<b>Distribution</b>
<i>S. bovis</i> , <i>callidum</i> , <i>colombaschense</i> , <i>damnosum</i> , <i>equinum</i> , <i>erythrocephalum</i> , <i>exiguum</i> , <i>kurenze</i> , <i>melatum</i> , <i>metallicum</i> , <i>neavei</i> , <i>ochraceum</i> , <i>ornatum</i> , <i>vorax</i> , <i>woodi</i>	domestic and wild mammals (esp. ungulates), including humans	annoyance, pruritus, allergy, petechial haemorrhages (onchocerciasis, myxomatosis)	cosmopolitan
<i>S. arcticum</i> , <i>pecuarum</i> , <i>rostratum</i> , <i>truncate</i> , <i>tuberosum</i> , <i>venustum</i> , <i>verecundum</i> , <i>vittatum</i>	domestic and wild mammals (esp. ungulates, some carnivores, lagomorphs)	annoyance, pruritus, allergy, petechial haemorrhages	Holarctic
<i>S. adersi</i> , <i>anatinum</i> , <i>angustitarse</i> , <i>aureum</i> , <i>johannseni</i> , <i>meridionale</i> , <i>ruggelsi</i> , <i>slossonae</i>	birds (esp. galliforms, anseriforms), some domestic and wild mammals	annoyance, pruritus, allergy, petechial haemorrhages, anaemia (leucocytozoonosis, eastern encephalitis virus)	Holarctic

Full species list (compilation of several on-line data-bases)

<b>Simulium species</b>	<b>Subgenus</b>
<i>S. abadii</i>	<i>Gomphostilbia</i>
<i>S. abatanense</i>	<i>Simulium</i>
<i>S. abbreviatum</i>	<i>Simulium</i>
<i>S. aberrans</i>	<i>Nevermannia</i>
<i>S. acarayense</i>	<i>Xenosimulium</i>
<i>S. acmerium</i>	<i>Nevermannia</i>
<i>S. acontum</i>	<i>Simulium</i>
<i>S. acostai</i>	<i>Simulium</i>
<i>S. acrotrichum</i>	<i>Simulium</i>
<i>S. acutum</i>	<i>Hellichella</i>
<i>S. adamsoni</i>	<i>Inseliellum</i>
<i>S. adelaideae</i>	<i>Inseliellum</i>
<i>S. adersi</i>	<i>Meilloniellum</i>
<i>S. adleri</i>	<i>Gomphostilbia</i>
<i>S. admixtum</i>	<i>Inseliellum</i>
<i>S. adolfoluzzi</i>	<i>Ectemnaspi</i>
<i>S. adornatum</i>	<i>Obuchovia</i>
<i>S. adsonense</i>	<i>Hebridosisimulium</i>
<i>S. adventicium</i>	<i>Simulium</i>
<i>S. aemulum</i>	<i>Simulium</i>
<i>S. aeneifacies</i>	<i>Simulium</i>
<i>S. aequifurcatum</i>	<i>Psaroniocompsa</i>
<i>S. aestivum</i>	<i>Nevermannia</i>
<i>S. africanum</i>	<i>Metomphalus</i>
<i>S. afronuri</i>	<i>Phoretomyia</i>
<i>S. akopi</i>	<i>Cnetha</i>
<i>S. akouense</i>	<i>Metomphalus</i>
<i>S. alajense</i>	<i>Simulium</i>
<i>S. alatum</i>	<i>Nevermannia</i>
<i>S. albanense</i>	<i>Ectemnaspi</i>
<i>S. albellum</i>	<i>Obuchovia</i>
<i>S. alberti</i>	<i>Simulium</i>
<i>S. albicinctum</i>	<i>Pternaspatha</i>
<i>S. albilineatum</i>	<i>Pternaspatha</i>
<i>S. albivirgulatum</i>	<i>Metomphalus</i>
<i>S. albopictum</i>	<i>Xenosimulium</i>
<i>S. alcocki</i>	<i>Pomeroyellum</i>
<i>S. alfurensis</i>	<i>Wallacellum</i>
<i>S. alidae</i>	Unassigned
<i>S. alienigenum</i>	<i>Morops</i>
<i>S. alirioi</i>	<i>Psilopelmia</i>
<i>S. alizadei</i>	<i>Montisimulium</i>
<i>S. allaeri</i>	<i>Pomeroyellum</i>
<i>S. almae</i>	<i>Psilocnetha</i>
<i>S. alpinum</i>	<i>Montisimulium</i>
<i>S. altayense</i>	<i>Gomphostilbia</i>
<i>S. amazonicum</i>	<i>Cerqueirellum</i>
<i>S. ambigens</i>	<i>Freemanellum</i>
<i>S. ambiguum</i>	<i>Simulium</i>
<i>S. ambonense</i>	<i>Gomphostilbia</i>
<i>S. ambositrae</i>	<i>Xenosimulium</i>
<i>S. ammosovi</i>	<i>Nevermannia</i>
<i>S. amurense</i>	<i>Nevermannia</i>
<i>S. anaimense</i>	<i>Ectemnaspi</i>
<i>S. anamariae</i>	<i>Psaroniocompsa</i>
<i>S. anatinum</i>	<i>Hellichella</i>

<i>S. anaticum</i>	<i>Hebridosisimulium</i>
<i>S. anchistinum</i>	<i>Simulium</i>
<i>S. anduzei</i>	<i>Simulium</i>
<i>S. anggiense</i>	<i>Morops</i>
<i>S. angrense</i>	<i>Psaroniocompsa</i>
<i>S. angulistylum</i>	<i>Gomphostilbia</i>
<i>S. angustatum</i>	<i>Nevermannia</i>
<i>S. angusticorne</i>	<i>Nevermannia</i>
<i>S. angustifilum</i>	<i>Simulium</i>
<i>S. angustifrons</i>	<i>Nevermannia</i>
<i>S. angustifurca</i>	<i>Wilhelmia</i>
<i>S. angustipes</i>	<i>Eusimulium</i>
<i>S. angustitarse</i>	<i>Nevermannia</i>
<i>S. annae</i>	<i>Eusimulium</i>
<i>S. annulatum</i>	<i>Pternaspatha</i>
<i>S. annuliforme</i>	<i>Hellichella</i>
<i>S. annulitarse</i>	<i>Schoenbaueria</i>
<i>S. annulum</i>	<i>Hellichella</i>
<i>S. antenusi</i>	<i>Psilopelmia</i>
<i>S. antibrachium</i>	<i>Nevermannia</i>
<i>S. antillarum</i>	<i>Psilopelmia</i>
<i>S. antlerum</i>	<i>Morops</i>
<i>S. antonii</i>	<i>Ectemnaspi</i>
<i>S. anustipes</i>	<i>Eusimulium</i>
<i>S. aokii</i>	<i>Simulium</i>
<i>S. apoense</i>	<i>Gomphostilbia</i>
<i>S. appalachiense</i>	<i>Simulium</i>
<i>S. apricarium</i>	<i>Simulium</i>
<i>S. arabicum</i>	<i>Nevermannia</i>
<i>S. arakawae</i>	<i>Simulium</i>
<i>S. aranti</i>	<i>Phosterodoros</i>
<i>S. arboreum</i>	<i>Simulium</i>
<i>S. arcabucense</i>	Unassigned
<i>S. arcticum</i>	<i>Simulium</i>
<i>S. arcticum</i>	<i>Hellichella</i>
<i>S. arenicola</i>	<i>Eusimulium</i>
<i>S. arfakense</i>	<i>Morops</i>
<i>S. argentatum</i>	<i>Xenosimulium</i>
<i>S. argenteostriatum</i>	<i>Simulium</i>
<i>S. argentipes</i>	<i>Simulium</i>
<i>S. argentipile</i>	<i>Eusimulium</i>
<i>S. argentiscutum</i>	<i>Cerqueirellum</i>
<i>S. argus</i>	<i>Psilozia</i>
<i>S. argyreatum</i>	<i>Simulium</i>
<i>S. argyrocinctum</i>	<i>Simulium</i>
<i>S. arisanum</i>	<i>Simulium</i>
<i>S. arlecchinum</i>	<i>Inseliellum</i>
<i>S. armeniacum</i>	<i>Eusimulium</i>
<i>S. armoricanum</i>	<i>Nevermannia</i>
<i>S. arnoldi</i>	<i>Metomphalus</i>
<i>S. aropaense</i>	<i>Morops</i>
<i>S. arpiense</i>	<i>Eusimulium</i>
<i>S. arpiense</i>	<i>Montisimulium</i>
<i>S. artum</i>	<i>Nevermannia</i>
<i>S. asakoe</i>	<i>Gomphostilbia</i>
<i>S. asishi</i>	<i>Simulium</i>
<i>S. aspericorne</i>	<i>Nevermannia</i>

<i>S. asperum</i>	<i>Gomphostilbia</i>
<i>S. assadovi</i>	<i>Montisimulium</i>
<i>S. asulcatum</i>	<i>Montisimulium</i>
<i>S. atlanticum</i>	<i>Dexomyia</i>
<i>S. atlasicum</i>	<i>Simulium</i>
<i>S. atratoides</i>	<i>Gomphostilbia</i>
<i>S. atratum</i>	<i>Gomphostilbia</i>
<i>S. atrum</i>	<i>Simulium</i>
<i>S. atyophilum</i>	<i>Lewisellum</i>
<i>S. audreyae</i>	<i>Pomeroyellum</i>
<i>S. aureliani</i>	<i>Pomeroyellum</i>
<i>S. aureofulgens</i>	<i>Simulium</i>
<i>S. aureohirtum</i>	<i>Nevermannia</i>
<i>S. aureonigrum</i>	<i>Morops</i>
<i>S. aureosimile</i>	<i>Nevermannia</i>
<i>S. aureum</i>	<i>Eusimulium</i>
<i>S. auricoma</i>	<i>Obuchovia</i>
<i>S. auristriatum</i>	<i>Pomeroyellum</i>
<i>S. australe</i>	<i>Nevermannia</i>
<i>S. avilae</i>	<i>Morops</i>
<i>S. awashense</i>	<i>Pomeroyellum</i>
<i>S. ayrozai</i>	<i>Hearlea</i>
<i>S. azerbaijanicum</i>	<i>Eusimulium</i>
<i>S. azorense</i>	<i>Eusimulium</i>
<i>S. baatori</i>	<i>Eusimulium</i>
<i>S. babai</i>	<i>Nevermannia</i>
<i>S. babuyanense</i>	<i>Gomphostilbia</i>
<i>S. bachmanni</i>	<i>Pternaspatha</i>
<i>S. baetiphilum</i>	<i>Phoretomyia</i>
<i>S. baffinense</i>	<i>Hellichella</i>
<i>S. baforti</i>	<i>Nevermannia</i>
<i>S. baglungense</i>	<i>Gomphostilbia</i>
<i>S. bagmaticum</i>	Unassigned
<i>S. bahense</i>	<i>Simulium</i>
<i>S. baiense</i>	<i>Inaequalium</i>
<i>S. baimaii</i>	Unassigned
<i>S. baisasae</i>	<i>Gomphostilbia</i>
<i>S. balcanicum</i>	<i>Wilhelmia</i>
<i>S. baliemense</i>	<i>Morops</i>
<i>S. baltazarae</i>	<i>Simulium</i>
<i>S. balteatum</i>	<i>Boreosimulium</i>
<i>S. banahauense</i>	<i>Simulium</i>
<i>S. banaticum</i>	<i>Simulium</i>
<i>S. banauense</i>	<i>Gomphostilbia</i>
<i>S. banksi</i>	<i>Hebridosisimulium</i>
<i>S. banluangense</i>	<i>Gomphostilbia</i>
<i>S. bannaense</i>	<i>Gomphostilbia</i>
<i>S. bansonae</i>	<i>Morops</i>
<i>S. barabense</i>	<i>Hellichella</i>
<i>S. baracorne</i>	<i>Simulium</i>
<i>S. barbatipes</i>	<i>Pternaspatha</i>
<i>S. barnesi</i>	<i>Simulium</i>
<i>S. barraudi</i>	<i>Simulium</i>
<i>S. barretti</i>	<i>Gomphostilbia</i>
<i>S. bartangum</i>	<i>Montisimulium</i>
<i>S. bataksense</i>	<i>Gomphostilbia</i>
<i>S. batoense</i>	<i>Gomphostilbia</i>
<i>S. bayakorom</i>	<i>Pomeroyellum</i>
<i>S. beaupertyi</i>	<i>Inaequalium</i>
<i>S. beaupertyi</i>	<i>Simulium</i>
<i>S. beiwanense</i>	<i>Eusimulium</i>

<i>S. beltukovae</i>	<i>Nevermannia</i>
<i>S. benjamini</i>	<i>Xenosimulium</i>
<i>S. benquetense</i>	<i>Simulium</i>
<i>S. bequaerti</i>	<i>Pomeroyellum</i>
<i>S. berberum</i>	<i>Simulium</i>
<i>S. berghei</i>	<i>Freemanellum</i>
<i>S. bergi</i>	<i>Simulium</i>
<i>S. beringovi</i>	<i>Argentisimulium</i>
<i>S. bernerii</i>	<i>Phoretomyia</i>
<i>S. bertrandi</i>	<i>Nevermannia</i>
<i>S. bezzii</i>	<i>Simulium</i>
<i>S. biakense</i>	<i>Morops</i>
<i>S. biancoi</i>	<i>Nevermannia</i>
<i>S. bicolense</i>	<i>Gomphostilbia</i>
<i>S. bicoloratum</i>	<i>Psilopelmia</i>
<i>S. bicorne</i>	<i>Nevermannia</i>
<i>S. bicorne</i>	<i>Nevermannia</i>
<i>S. bicornutum</i>	<i>Ectemnaspi</i>
<i>S. bidentatum</i>	<i>Simulium</i>
<i>S. bifenestratum</i>	<i>Chirostilbia</i>
<i>S. bifila</i>	<i>Byssodon</i>
<i>S. biforamiferum</i>	<i>Simulium</i>
<i>S. bifurcatum</i>	<i>Gomphostilbia</i>
<i>S. bimaculatum</i>	<i>Simulium</i>
<i>S. binuanense</i>	<i>Gomphostilbia</i>
<i>S. bipunctatum</i>	<i>Psilopelmia</i>
<i>S. biseriatum</i>	<i>Obuchovia</i>
<i>S. bishopi</i>	<i>Simulium</i>
<i>S. bisnovem</i>	<i>Anasolen</i>
<i>S. biuxinisa</i>	<i>Hemicnetha</i>
<i>S. bivittatum</i>	<i>Psilopelmia</i>
<i>S. blacklocki</i>	<i>Pomeroyellum</i>
<i>S. blancasi</i>	<i>Eremulium</i>
<i>S. blantoni</i>	<i>Notolepria</i>
<i>S. bobpetersoni</i>	<i>Psilopelmia</i>
<i>S. bogusium</i>	<i>Inseliellum</i>
<i>S. boldstemta</i>	<i>Nevermannia</i>
<i>S. bonaerense</i>	<i>Pomeroyellum</i>
<i>S. bonninense</i>	<i>Eusimulium</i>
<i>S. bordai</i>	<i>Pternaspatha</i>
<i>S. borneoense</i>	<i>Nevermannia</i>
<i>S. borunicornutum</i>	Unassigned
<i>S. botulibranchium</i>	<i>Xenosimulium</i>
<i>S. botulus</i>	<i>Morops</i>
<i>S. bovis</i>	<i>Metomphalus</i>
<i>S. brachium</i>	<i>Nevermannia</i>
<i>S. brachyantherum</i>	<i>Eusimulium</i>
<i>S. brachyarthrum</i>	<i>Schoenbaueria</i>
<i>S. brachycladum</i>	<i>Hellichella</i>
<i>S. brachystylum</i>	<i>Montisimulium</i>
<i>S. bracteatum</i>	<i>Eusimulium</i>
<i>S. brandti</i>	<i>Morops</i>
<i>S. bravermani</i>	<i>Wilhelmia</i>
<i>S. brevicorne</i>	<i>Montisimulium</i>
<i>S. brevidens</i>	<i>Nevermannia</i>
<i>S. brevifile</i>	<i>Obuchovia</i>
<i>S. brevifurcatum</i>	<i>Pomeroyellum</i>
<i>S. brevilabrum</i>	<i>Gomphostilbia</i>
<i>S. brevipar</i>	<i>Simulium</i>
<i>S. brevitarase</i>	<i>Nevermannia</i>
<i>S. brevitricatum</i>	<i>Gomphostilbia</i>

<i>S. bricenoi</i>	<i>Hemicnetha</i>
<i>S. bronchiale</i>	<i>Simulium</i>
<i>S. brunhesi</i>	Unassigned
<i>S. brunneum</i>	<i>Nevermannia</i>
<i>S. bryopodium</i>	<i>Nevermannia</i>
<i>S. buckleyi</i>	<i>Nevermannia</i>
<i>S. bucolicum</i>	<i>Gomphostilbia</i>
<i>S. buettikeri</i>	<i>Wilhelmia</i>
<i>S. buisseti</i>	<i>Edwardsellum</i>
<i>S. buissoni</i>	<i>Inseliellum</i>
<i>S. bujakovi</i>	<i>Boophthora</i>
<i>S. bukovskii</i>	<i>Simulium</i>
<i>S. bulbiferum</i>	<i>Nevermannia</i>
<i>S. bulbosum</i>	<i>Montisimulium</i>
<i>S. bulla</i>	<i>Simulium</i>
<i>S. bullatum</i>	<i>Simulium</i>
<i>S. burchi</i>	<i>Hearlea</i>
<i>S. burgeri</i>	<i>Nevermannia</i>
<i>S. burmense</i>	<i>Nevermannia</i>
<i>S. burtoni</i>	<i>Gomphostilbia</i>
<i>S. bustosi</i>	<i>Simulium</i>
<i>S. butwalense</i>	<i>Gomphostilbia</i>
<i>S. buxtoni</i>	<i>Byssodon</i>
<i>S. cabrerai</i>	<i>Wallacellum</i>
<i>S. caesariatum</i>	<i>Inseliellum</i>
<i>S. cagayanense</i>	<i>Gomphostilbia</i>
<i>S. caledonense</i>	<i>Nevermannia</i>
<i>S. callidum</i>	<i>Psilopelmia</i>
<i>S. callipygium</i>	<i>Hebridosisimulium</i>
<i>S. canadense</i>	<i>Hearlea</i>
<i>S. candelabrum</i>	<i>Nevermannia</i>
<i>S. canescens</i>	Unassigned
<i>S. cangshanense</i>	<i>Eusimulium</i>
<i>S. canlaonense</i>	<i>Simulium</i>
<i>S. canonicola</i>	<i>Nevermannia</i>
<i>S. caohaiense</i>	<i>Odagmia</i>
<i>S. capricorne</i>	<i>Hearlea</i>
<i>S. caprii</i>	<i>Pternaspatha</i>
<i>S. carbunculum</i>	<i>Nevermannia</i>
<i>S. carinatum</i>	<i>Wallacellum</i>
<i>S. carolinae</i>	<i>Hearlea</i>
<i>S. carpathicum</i>	<i>Nevermannia</i>
<i>S. carthusiense</i>	<i>Nevermannia</i>
<i>S. castaneum</i>	<i>Inseliellum</i>
<i>S. cataractarum</i>	<i>Inseliellum</i>
<i>S. catariense</i>	<i>Pomeroyellum</i>
<i>S. catleyi</i>	<i>Gomphostilbia</i>
<i>S. caucasicum</i>	<i>Simulium</i>
<i>S. cauchense</i>	<i>Coscaroniellum</i>
<i>S. caudisclerum</i>	<i>Nevermannia</i>
<i>S. cavum</i>	<i>Metomphalus</i>
<i>S. celebesense</i>	<i>Wallacellum</i>
<i>S. celsum</i>	<i>Simulium</i>
<i>S. centrale</i>	<i>Gomphostilbia</i>
<i>S. cerqueirai</i>	Unassigned
<i>S. cerradense</i>	<i>Coscaroniellum</i>
<i>S. cervicornutum</i>	<i>Pomeroyellum</i>
<i>S. cervus</i>	<i>Morops</i>
<i>S. ceylonicum</i>	<i>Gomphostilbia</i>
<i>S. chainarongi</i>	<i>Simulium</i>
<i>S. chairuddini</i>	<i>Nevermannia</i>

<i>S. chaliowae</i>	<i>Simulium</i>
<i>S. chamlongi</i>	<i>Simulium</i>
<i>S. chaowaense</i>	<i>Gomphostilbia</i>
<i>S. chaquense</i>	<i>Cerqueirellum</i>
<i>S. cheesmanae</i>	<i>Inseliellum</i>
<i>S. chelevini</i>	<i>Boophthora</i>
<i>S. chelevini</i>	<i>Schoenbaueria</i>
<i>S. cheni</i>	<i>Eusimulium</i>
<i>S. chenzhouense</i>	<i>Nevermannia</i>
<i>S. cheongi</i>	<i>Gomphostilbia</i>
<i>S. Chiangmaiense</i>	<i>Simulium</i>
<i>S. chiharucae</i>	<i>Hellichella</i>
<i>S. chilianum</i>	<i>Xenosimulium</i>
<i>S. chiriquiense</i>	<i>Hearlea</i>
<i>S. chitoense</i>	<i>Nevermannia</i>
<i>S. chlorum</i>	<i>Simulium</i>
<i>S. cholodkovskii</i>	<i>Simulium</i>
<i>S. chomustachi</i>	<i>Gomphostilbia</i>
<i>S. chongqingense</i>	<i>Gomphostilbia</i>
<i>S. chongqingense</i>	<i>Simulium</i>
<i>S. choohotei</i>	<i>Simulium</i>
<i>S. chovdica</i>	<i>Nevermannia</i>
<i>S. chowettani</i>	Unassigned
<i>S. chowi</i>	<i>Montisimulium</i>
<i>S. christophersi</i>	<i>Simulium</i>
<i>S. chromatinum</i>	<i>Simulium</i>
<i>S. chromocentrum</i>	<i>Simulium</i>
<i>S. chubarevae</i>	<i>Nevermannia</i>
<i>S. chumporeense</i>	<i>Gomphostilbia</i>
<i>S. chungi</i>	<i>Simulium</i>
<i>S. chutteri</i>	<i>Metomphalus</i>
<i>S. claricentrum</i>	Unassigned
<i>S. clarkei</i>	<i>Hellichella</i>
<i>S. clarki</i>	<i>Xenosimulium</i>
<i>S. clarum</i>	<i>Psilopelmia</i>
<i>S. clathrinum</i>	<i>Morops</i>
<i>S. clavibranchium</i>	<i>Inaequalium</i>
<i>S. clavum</i>	<i>Morops</i>
<i>S. clibanarium</i>	<i>Inseliellum</i>
<i>S. coalitum</i>	<i>Pomeroyellum</i>
<i>S. coarctatum</i>	<i>Simulium</i>
<i>S. codreanui</i>	<i>Nevermannia</i>
<i>S. colasbelcouri</i>	<i>Metomphalus</i>
<i>S. colombaschense</i>	<i>Simulium</i>
<i>S. concavustylum</i>	<i>Eusimulium</i>
<i>S. concludium</i>	<i>Inseliellum</i>
<i>S. confusum</i>	<i>Simulium</i>
<i>S. congareenarum</i>	<i>Hellichella</i>
<i>S. conicum</i>	<i>Nevermannia</i>
<i>S. connae</i>	<i>Inseliellum</i>
<i>S. consimile</i>	<i>Simulium</i>
<i>S. continii</i>	<i>Obuchovia</i>
<i>S. contractum</i>	<i>Simulium</i>
<i>S. contrerense</i>	<i>Hearlea</i>
<i>S. conundrum</i>	<i>Simulium</i>
<i>S. copleyi</i>	<i>Phoretomyia</i>
<i>S. corbis</i>	<i>Simulium</i>
<i>S. cormonsi</i>	<i>Ectemnaspi</i>
<i>S. corniferum</i>	<i>Nevermannia</i>
<i>S. corpulentum</i>	<i>Simulium</i>
<i>S. costalimai</i>	<i>Simulium</i>

<i>S. costaricense</i>	<i>Xenosimulium</i>
<i>S. costatum</i>	<i>Nevermannia</i>
<i>S. cotabatoense</i>	<i>Simulium</i>
<i>S. cotopaxi</i>	<i>Pternaspatha</i>
<i>S. courtneyi</i>	<i>Daviesellum</i>
<i>S. couverti</i>	<i>Nevermannia</i>
<i>S. covagarciai</i>	<i>Simulium</i>
<i>S. covagarciai</i>	Unassigned
<i>S. craigi</i>	<i>Nevermannia</i>
<i>S. crassicaulum</i>	<i>Nevermannia</i>
<i>S. crassifilum</i>	<i>Simulium</i>
<i>S. crassimanum</i>	<i>Simulium</i>
<i>S. crassum</i>	<i>Hellichia</i>
<i>S. cremnosi</i>	<i>Simulium</i>
<i>S. crenobium</i>	<i>Nevermannia</i>
<i>S. cristalinum</i>	<i>Hemicnetha</i>
<i>S. cristatum</i>	<i>Morops</i>
<i>S. croaticum</i>	<i>Simulium</i>
<i>S. crocinum</i>	<i>Simulium</i>
<i>S. crosskeyi</i>	<i>Metomphalus</i>
<i>S. croxtoni</i>	<i>Nevermannia</i>
<i>S. cruszi</i>	<i>Simulium</i>
<i>S. cryophilum</i>	<i>Nevermannia</i>
<i>S. cuasiexiguum</i>	<i>Notolepria</i>
<i>S. cuasisanguineum</i>	<i>Cerqueirellum</i>
<i>S. cuneatum</i>	<i>Cerqueirellum</i>
<i>S. curriei</i>	<i>Hellichia</i>
<i>S. curvans</i>	<i>Nevermannia</i>
<i>S. curvastylum</i>	<i>Gomphostilbia</i>
<i>S. curvistyle</i>	<i>Simulium</i>
<i>S. curvitarise</i>	<i>Simulium</i>
<i>S. curvum</i>	<i>Gomphostilbia</i>
<i>S. dahestanicum</i>	<i>Wilhelmia</i>
<i>S. dailekhense</i>	<i>Simulium</i>
<i>S. daisense</i>	<i>Simulium</i>
<i>S. dalmati</i>	<i>Hearlea</i>
<i>S. daltanhani</i>	Unassigned
<i>S. damascenoi</i>	<i>Psaroniocompsa</i>
<i>S. damingense</i>	<i>Simulium</i>
<i>S. damnosum</i>	<i>Edwardsellum</i>
<i>S. dandrettai</i>	<i>Psilopelmia</i>
<i>S. danense</i>	<i>Metomphalus</i>
<i>S. danijari</i>	<i>Montisimulium</i>
<i>S. darjeelingense</i>	<i>Gomphostilbia</i>
<i>S. dasguptai</i>	<i>Nevermannia</i>
<i>S. davaoense</i>	<i>Gomphostilbia</i>
<i>S. dawaense</i>	<i>Metomphalus</i>
<i>S. deagostinii</i>	<i>Pternaspatha</i>
<i>S. debacli</i>	<i>Simulium</i>
<i>S. debegene</i>	<i>Freemanellum</i>
<i>S. decafile</i>	<i>Montisimulium</i>
<i>S. decafiliatum</i>	<i>Montisimulium</i>
<i>S. decimatam</i>	<i>Simulium</i>
<i>S. decimfiliatum</i>	<i>Montisimulium</i>
<i>S. decollectum</i>	<i>Nevermannia</i>
<i>S. decolletum</i>	Unassigned
<i>S. decorum</i>	<i>Simulium</i>
<i>S. decuplum</i>	<i>Gomphostilbia</i>
<i>S. definitum</i>	<i>Simulium</i>
<i>S. defoliarti</i>	<i>Simulium</i>
<i>S. degrangei</i>	<i>Simulium</i>

<i>S. dehnei</i>	<i>Hemicnetha</i>
<i>S. dekeyseri</i>	<i>Chirostilbia</i>
<i>S. delatorrei</i>	<i>Hearlea</i>
<i>S. delfinadoae</i>	<i>Simulium</i>
<i>S. delizhanense</i>	<i>Nevermannia</i>
<i>S. delponteianum</i>	<i>Cerqueirellum</i>
<i>S. demutaense</i>	<i>Morops</i>
<i>S. dendrofilum</i>	<i>Schoenbaueria</i>
<i>S. denistylum</i>	<i>Gomphostilbia</i>
<i>S. dentatum</i>	<i>Simulium</i>
<i>S. dentaturum</i>	<i>Nevermannia</i>
<i>S. dentulosum</i>	<i>Anasolen</i>
<i>S. deserticola</i>	<i>Simulium</i>
<i>S. desertorum</i>	<i>Simulium</i>
<i>S. desirei</i>	Unassigned
<i>S. diamantinum</i>	<i>Pternaspatha</i>
<i>S. diaznajerae</i>	<i>Xenosimulium</i>
<i>S. diceros</i>	<i>Phoretomyia</i>
<i>S. dieguerense</i>	<i>Edwardsellum</i>
<i>S. digitatum</i>	<i>Simulium</i>
<i>S. digrammicum</i>	<i>Simulium</i>
<i>S. dinellii</i>	<i>Psilopelmia</i>
<i>S. discrepans</i>	<i>Simulium</i>
<i>S. disneyi</i>	<i>Morops</i>
<i>S. distinctum</i>	<i>Chirostilbia</i>
<i>S. diversibranchium</i>	<i>Inaequalium</i>
<i>S. dixiense</i>	<i>Phosterodoros</i>
<i>S. djafarovi</i>	<i>Nevermannia</i>
<i>S. djallonense</i>	<i>Pomeroyellum</i>
<i>S. djebaglense</i>	<i>Montisimulium</i>
<i>S. dogieli</i>	<i>Hellichia</i>
<i>S. doipuiense</i>	<i>Simulium</i>
<i>S. dojeycorium</i>	<i>Inseliellum</i>
<i>S. dola</i>	<i>Gomphostilbia</i>
<i>S. dolini</i>	<i>Argentisimulium</i>
<i>S. dolomitense</i>	<i>Nevermannia</i>
<i>S. donovani</i>	<i>Eusimulium</i>
<i>S. downsi</i>	<i>Psilopelmia</i>
<i>S. dubitskii</i>	<i>Phoretodagmia</i>
<i>S. duboisi</i>	<i>Nevermannia</i>
<i>S. dudgeoni</i>	<i>Gomphostilbia</i>
<i>S. dugesi</i>	<i>Psilopelmia</i>
<i>S. dukei</i>	<i>Phoretomyia</i>
<i>S. dumogaense</i>	<i>Simulium</i>
<i>S. dunfellense</i>	<i>Nevermannia</i>
<i>S. dunhuangense</i>	<i>Wilhelmia</i>
<i>S. duodecimcornutum</i>	<i>Montisimulium</i>
<i>S. duodecimum</i>	<i>Pomeroyellum</i>
<i>S. duodenicornium</i>	<i>Thyrsopelma</i>
<i>S. duolongum</i>	<i>Gomphostilbia</i>
<i>S. duplex</i>	<i>Hellichia</i>
<i>S. dureti</i>	<i>Pternaspatha</i>
<i>S. dussertorum</i>	<i>Inseliellum</i>
<i>S. dycei</i>	<i>Morops</i>
<i>S. earlei</i>	<i>Hemicnetha</i>
<i>S. egregium</i>	<i>Simulium</i>
<i>S. ekomei</i>	<i>Pomeroyellum</i>
<i>S. ela</i>	<i>Gomphostilbia</i>
<i>S. elatum</i>	<i>Nevermannia</i>
<i>S. elburnum</i>	<i>Nevermannia</i>
<i>S. elongatum</i>	<i>Simulium</i>

<i>S. emarginatum</i>	<i>Hellichella</i>
<i>S. emiliae</i>	<i>Obuchovia</i>
<i>S. empascae</i>	<i>Chirostilbia</i>
<i>S. empopomae</i>	<i>Freemanellum</i>
<i>S. enciso</i>	<i>Psilozia</i>
<i>S. englundii</i>	<i>Inseliellum</i>
<i>S. eouzani</i>	<i>Metomphalus</i>
<i>S. ephemerophilum</i>	<i>Simulium</i>
<i>S. ephippoidum</i>	<i>Simulium</i>
<i>S. epistum</i>	<i>Gomphostilbia</i>
<i>S. equinum</i>	<i>Wilhelmia</i>
<i>S. erectum</i>	<i>Nevermannia</i>
<i>S. erimoense</i>	<i>Eusimulium</i>
<i>S. erythrocephalum</i>	<i>Boophthora</i>
<i>S. escomeli</i>	<i>Psilopelmia</i>
<i>S. estevezi</i>	<i>Hearlea</i>
<i>S. ethelae</i>	<i>Hearlea</i>
<i>S. ethiopiense</i>	<i>Lewisellum</i>
<i>S. euryadmiculum</i>	<i>Hellichella</i>
<i>S. euryplatatum</i>	<i>Eusimulium</i>
<i>S. evelynae</i>	<i>Morops</i>
<i>S. evenhuisi</i>	<i>Inseliellum</i>
<i>S. evillense</i>	<i>Pomeroyellum</i>
<i>S. exasperans</i>	<i>Inseliellum</i>
<i>S. excisum</i>	<i>Hellichella</i>
<i>S. exiguum</i>	<i>Notolepria</i>
<i>S. exile</i>	<i>Simulium</i>
<i>S. eximium</i>	<i>Simulium</i>
<i>S. exulatum</i>	<i>Eusimulium</i>
<i>S. faheyi</i>	<i>Morops</i>
<i>S. falcoe</i>	<i>Nevermannia</i>
<i>S. falculatum</i>	<i>Hemicnetha</i>
<i>S. fallisi</i>	<i>Hellichella</i>
<i>S. fangense</i>	<i>Nevermannia</i>
<i>S. fanjingshanense</i>	<i>Gomphostilbia</i>
<i>S. fararae</i>	<i>Inseliellum</i>
<i>S. farcimine</i>	<i>Morops</i>
<i>S. fenestratum</i>	<i>Simulium</i>
<i>S. ferganicum</i>	<i>Simulium</i>
<i>S. feuerborni</i>	<i>Nevermannia</i>
<i>S. fibrinflatum</i>	<i>Phosterodoros</i>
<i>S. fidum</i>	<i>Gomphostilbia</i>
<i>S. fimbriatum</i>	<i>Morops</i>
<i>S. fionae</i>	<i>Unassigned</i>
<i>S. flaveolum</i>	<i>Simulium</i>
<i>S. flavicans</i>	<i>Simulium</i>
<i>S. flavidum</i>	<i>Simulium</i>
<i>S. flavigaster</i>	<i>Simulium</i>
<i>S. flavinotatum</i>	<i>Nevermannia</i>
<i>S. flavipes</i>	<i>Nevermannia</i>
<i>S. flavipictum</i>	<i>Xenosimulium</i>
<i>S. flavoantennatum</i>	<i>Schoenbaueria</i>
<i>S. flavocinctum</i>	<i>Gomphostilbia</i>
<i>S. flavum</i>	<i>Simulium</i>
<i>S. flexibranchium</i>	<i>Eusimulium</i>
<i>S. florae</i>	<i>Nevermannia</i>
<i>S. floresense</i>	<i>Gomphostilbia</i>
<i>S. fluviatile</i>	<i>Nevermannia</i>
<i>S. fontanum</i>	<i>Simulium</i>
<i>S. fontinale</i>	<i>Nevermannia</i>
<i>S. fontium</i>	<i>Nevermannia</i>

<i>S. forcipatum</i>	<i>Simulium</i>
<i>S. fossatae</i>	<i>Inseliellum</i>
<i>S. fragai</i>	<i>Metomphalus</i>
<i>S. freemani</i>	<i>Hemicnetha</i>
<i>S. friederichsi</i>	<i>Gomphostilbia</i>
<i>S. friedlanderi</i>	<i>Chirostilbia</i>
<i>S. frigidum</i>	<i>Simulium</i>
<i>S. fucense</i>	<i>Nevermannia</i>
<i>S. fujianense</i>	<i>Simulium</i>
<i>S. fuliginis</i>	<i>Pomeroyellum</i>
<i>S. fulvipes</i>	<i>Simulium</i>
<i>S. furcillatum</i>	<i>Ectemnaspi</i>
<i>S. furculatum</i>	<i>Nevermannia</i>
<i>S. fuscatum</i>	<i>Unassigned</i>
<i>S. fuscicorne</i>	<i>Nevermannia</i>
<i>S. fuscinerve</i>	<i>Nevermannia</i>
<i>S. fuscitarse</i>	<i>Simulium</i>
<i>S. fuscopilosum</i>	<i>Simulium</i>
<i>S. fuscum</i>	<i>Simulium</i>
<i>S. futaense</i>	<i>Metomphalus</i>
<i>S. fuzhouense</i>	<i>Simulium</i>
<i>S. gabaldoni</i>	<i>Psilopelmia</i>
<i>S. gabovae</i>	<i>Simulium</i>
<i>S. gagiduense</i>	<i>Morops</i>
<i>S. gallinum</i>	<i>Inseliellum</i>
<i>S. galloprovinciale</i>	<i>Obuchovia</i>
<i>S. ganalesense</i>	<i>Xenosimulium</i>
<i>S. garipepsense</i>	<i>Afrosimulium</i>
<i>S. garmsi</i>	<i>Pomeroyellum</i>
<i>S. garniense</i>	<i>Nevermannia</i>
<i>S. gatchaliani</i>	<i>Simulium</i>
<i>S. geigy</i>	<i>Pomeroyellum</i>
<i>S. gejjelense</i>	<i>Nevermannia</i>
<i>S. germuense</i>	<i>Wilhelmia</i>
<i>S. ghoomense</i>	<i>Montisimulium</i>
<i>S. gibense</i>	<i>Metomphalus</i>
<i>S. giganteum</i>	<i>Hemicnetha</i>
<i>S. gilleti</i>	<i>Pomeroyellum</i>
<i>S. gimpuense</i>	<i>Gomphostilbia</i>
<i>S. glatthaari</i>	<i>Nevermannia</i>
<i>S. globosum</i>	<i>Simulium</i>
<i>S. goeldii</i>	<i>Xenosimulium</i>
<i>S. goinyi</i>	<i>Lewisellum</i>
<i>S. gokarnaense</i>	<i>Simulium</i>
<i>S. golani</i>	<i>Wilhelmia</i>
<i>S. gombakense</i>	<i>Morops</i>
<i>S. gomphocorne</i>	<i>Nevermannia</i>
<i>S. gonzalezherrejoni</i>	<i>Psilopelmia</i>
<i>S. gonzalezi</i>	<i>Notolepria</i>
<i>S. gorokae</i>	<i>Morops</i>
<i>S. gouldingi</i>	<i>Nevermannia</i>
<i>S. gracile</i>	<i>Nevermannia</i>
<i>S. gracilipes</i>	<i>Crosskeyellum</i>
<i>S. gravelyi</i>	<i>Simulium</i>
<i>S. grenieri</i>	<i>Unassigned</i>
<i>S. gribae</i>	<i>Simulium</i>
<i>S. griseicolle</i>	<i>Byssodon</i>
<i>S. griseifrons</i>	<i>Simulium</i>
<i>S. grisescens</i>	<i>Simulium</i>
<i>S. griseum</i>	<i>Psilopelmia</i>
<i>S. griveaudi</i>	<i>Xenosimulium</i>

<i>S. grossifilum</i>	<i>Simulium</i>
<i>S. guamense</i>	<i>Inseliellum</i>
<i>S. guaporense</i>	<i>Psaroniocompsa</i>
<i>S. guerrerense</i>	<i>Hemicnetha</i>
<i>S. guerreroi</i>	<i>Xenosimulium</i>
<i>S. guianense</i>	<i>Trichodagmia</i>
<i>S. guimari</i>	<i>Eusimulium</i>
<i>S. guniki</i>	<i>Gomphostilbia</i>
<i>S. gurneyae</i>	<i>Simulium</i>
<i>S. gusevi</i>	<i>Simulium</i>
<i>S. gutsevitchi</i>	<i>Byssodon</i>
<i>S. guttatum</i>	<i>Pomeroyellum</i>
<i>S. gviletense</i>	<i>Montisimulium</i>
<i>S. gyas</i>	<i>Metomphalus</i>
<i>S. gyorkosae</i>	<i>Gomphostilbia</i>
<i>S. hackeri</i>	<i>Simulium</i>
<i>S. hadiae</i>	<i>Gomphostilbia</i>
<i>S. haematopotum</i>	<i>Psilopelmia</i>
<i>S. hagai</i>	<i>Morops</i>
<i>S. hailuogouense</i>	<i>Montisimulium</i>
<i>S. halmaheraense</i>	<i>Morops</i>
<i>S. hargreavesi</i>	<i>Metomphalus</i>
<i>S. harrisoni</i>	<i>Pomeroyellum</i>
<i>S. haysi</i>	<i>Phosterodoros</i>
<i>S. hechti</i>	<i>Simulium</i>
<i>S. hectorvargasi</i>	<i>Pternaspatha</i>
<i>S. heishuiense</i>	<i>Montisimulium</i>
<i>S. heldsbachense</i>	<i>Gomphostilbia</i>
<i>S. hematophilum</i>	<i>Simulium</i>
<i>S. hemicyclium</i>	<i>Gomphostilbia</i>
<i>S. henanense</i>	<i>Nevermannia</i>
<i>S. hengshanense</i>	<i>Simulium</i>
<i>S. heptapotamicum</i>	<i>Byssodon</i>
<i>S. heptaspicae</i>	<i>Anasolen</i>
<i>S. herreri</i>	<i>Pternaspatha</i>
<i>S. hessei</i>	<i>Freemanellum</i>
<i>S. hibernale</i>	<i>Simulium</i>
<i>S. hiemale</i>	<i>Simulium</i>
<i>S. hieroglyphicum</i>	<i>Hemicnetha</i>
<i>S. hightoni</i>	<i>Lewisellum</i>
<i>S. himalayense</i>	<i>Simulium</i>
<i>S. hinmani</i>	<i>Hemicnetha</i>
<i>S. hirosii</i>	<i>Gomphostilbia</i>
<i>S. hirsutilateris</i>	<i>Freemanellum</i>
<i>S. hirsutum</i>	<i>Meilloniellum</i>
<i>S. hirticranium</i>	<i>Inseliellum</i>
<i>S. hirtinerve</i>	<i>Simulium</i>
<i>S. hirtipannum</i>	<i>Simulium</i>
<i>S. hirtipupa</i>	<i>Xenosimulium</i>
<i>S. hispaniola</i>	<i>Simulium</i>
<i>S. hispidum</i>	<i>Inseliellum</i>
<i>S. hisseteum</i>	<i>Pomeroyellum</i>
<i>S. hoffmanni</i>	<i>Xenosimulium</i>
<i>S. hoiseni</i>	<i>Gomphostilbia</i>
<i>S. hongpingense</i>	<i>Simulium</i>
<i>S. horacioi</i>	<i>Simulium</i>
<i>S. horocochuspi</i>	<i>Pternaspatha</i>
<i>S. horokaense</i>	<i>Simulium</i>
<i>S. howletti</i>	<i>Simulium</i>
<i>S. huaimorense</i>	<i>Gomphostilbia</i>
<i>S. huairayacu</i>	<i>Trichodagmia</i>

<i>S. huangshanense</i>	<i>Simulium</i>
<i>S. huemul</i>	<i>Pternaspatha</i>
<i>S. hukaense</i>	<i>Inseliellum</i>
<i>S. humerosum</i>	<i>Simulium</i>
<i>S. hunanense</i>	<i>Gomphostilbia</i>
<i>S. hunteri</i>	<i>Simulium</i>
<i>S. ibarakiense</i>	<i>Nevermannia</i>
<i>S. ibariense</i>	<i>Simulium</i>
<i>S. ibericum</i>	<i>Obuchovia</i>
<i>S. ibleum</i>	<i>Nevermannia</i>
<i>S. ichnusae</i>	<i>Cnetha</i>
<i>S. ifugaoense</i>	<i>Morops</i>
<i>S. ignescens</i>	<i>Ectemnaspi</i>
<i>S. iguazuense</i>	<i>Xenosimulium</i>
<i>S. imerinae</i>	<i>Xenosimulium</i>
<i>S. immortale</i>	<i>Simulium</i>
<i>S. impar</i>	<i>Nevermannia</i>
<i>S. impukane</i>	<i>Pomeroyellum</i>
<i>S. inaequale</i>	<i>Inaequalium</i>
<i>S. incanum</i>	<i>Unassigned</i>
<i>S. incertum</i>	<i>Xenosimulium</i>
<i>S. incognitum</i>	<i>Simulium</i>
<i>S. incrustatum</i>	<i>Pomeroyellum</i>
<i>S. indicum</i>	<i>Himalayum</i>
<i>S. indicum</i>	<i>Wilhelmia</i>
<i>S. inermum</i>	<i>Gomphostilbia</i>
<i>S. infenestrum</i>	<i>Simulium</i>
<i>S. infernale</i>	<i>Psilozia</i>
<i>S. inflatum</i>	<i>Montisimulium</i>
<i>S. innocens</i>	<i>Hellichella</i>
<i>S. inornatum</i>	<i>Morops</i>
<i>S. intermedium</i>	<i>Simulium</i>
<i>S. inthanonense</i>	<i>Gomphostilbia</i>
<i>S. inuitkiense</i>	<i>Morops</i>
<i>S. iphias</i>	<i>Xenosimulium</i>
<i>S. iracouboense</i>	<i>Psilopelmia</i>
<i>S. irayense</i>	<i>Morops</i>
<i>S. irianense</i>	<i>Morops</i>
<i>S. iriartei</i>	<i>Aspathia</i>
<i>S. iridescens</i>	<i>Simulium</i>
<i>S. itaunense</i>	<i>Trichodagmia</i>
<i>S. itelmenica</i>	<i>Nevermannia</i>
<i>S. ituriense</i>	<i>Pomeroyellum</i>
<i>S. ivashchenkoi</i>	<i>Schoenbaueria</i>
<i>S. ivdelense</i>	<i>Schoenbaueria</i>
<i>S. iwahigense</i>	<i>Simulium</i>
<i>S. iwatense</i>	<i>Simulium</i>
<i>S. izuense</i>	<i>Nevermannia</i>
<i>S. jacobsi</i>	<i>Psilopelmia</i>
<i>S. jacumbae</i>	<i>Simulium</i>
<i>S. jacuticum</i>	<i>Simulium</i>
<i>S. jaimeramirezi</i>	<i>Ectemnaspi</i>
<i>S. jani</i>	<i>Simulium</i>
<i>S. janzeni</i>	<i>Simulium</i>
<i>S. janzi</i>	<i>Metomphalus</i>
<i>S. japonicum</i>	<i>Simulium</i>
<i>S. jasgulemum</i>	<i>Montisimulium</i>
<i>S. jayapuraense</i>	<i>Morops</i>
<i>S. jefersoni</i>	<i>Chirostilbia</i>
<i>S. jeffreyi</i>	<i>Simulium</i>
<i>S. jenningsi</i>	<i>Phosterodoros</i>

<i>S. jerezense</i>	<i>Psilopelmia</i>
<i>S. jeteri</i>	<i>Thyrsopelma</i>
<i>S. jianjinshanense</i>	<i>Montisimulium</i>
<i>S. jieyangense</i>	<i>Gnus</i>
<i>S. jilinense</i>	<i>Eusimulium</i>
<i>S. jilinense</i>	<i>Nevermannia</i>
<i>S. jimmaense</i>	<i>Metomphalus</i>
<i>S. jinbianense</i>	<i>Gomphostilbia</i>
<i>S. jnabsium</i>	<i>Inseliellum</i>
<i>S. jobbinsi</i>	<i>Simulium</i>
<i>S. jocular</i>	<i>Boreosimulium</i>
<i>S. johanna</i>	<i>Pomeroyellum</i>
<i>S. johannseni</i>	<i>Hellichiella</i>
<i>S. johnfrumi</i>	<i>Hebridosimulium</i>
<i>S. johnsoni</i>	<i>Hearlea</i>
<i>S. jolyi</i>	<i>Hebridosimulium</i>
<i>S. jomsomense</i>	<i>Eusimulium</i>
<i>S. jonesi</i>	<i>Phosterodoros</i>
<i>S. josephi</i>	<i>Morops</i>
<i>S. joyae</i>	<i>Inseliellum</i>
<i>S. juarezi</i>	<i>Hearlea</i>
<i>S. jugatum</i>	<i>Simulium</i>
<i>S. jujuyense</i>	<i>Psaroniocompsa</i>
<i>S. junkumae</i>	<i>Gomphostilbia</i>
<i>S. juxtacrenobium</i>	<i>Nevermannia</i>
<i>S. juxtadamnosum</i>	<i>Edwardsellum</i>
<i>S. kabanayense</i>	<i>Psilopelmia</i>
<i>S. kachvorjanae</i>	<i>Simulium</i>
<i>S. kaffaense</i>	Unassigned
<i>S. kainantuense</i>	<i>Morops</i>
<i>S. kaiti</i>	<i>Morops</i>
<i>S. kalimerahense</i>	<i>Gomphostilbia</i>
<i>S. kambaitense</i>	<i>Nevermannia</i>
<i>S. kamimurai</i>	<i>Gomphostilbia</i>
<i>S. kamtshadalicum</i>	Unassigned
<i>S. kamtshaticum</i>	<i>Simulium</i>
<i>S. kanchaveli</i>	<i>Simulium</i>
<i>S. kapuri</i>	<i>Simulium</i>
<i>S. karasuae</i>	<i>Obuchovia</i>
<i>S. karenkoense</i>	<i>Simulium</i>
<i>S. kariyai</i>	<i>Hellichiella</i>
<i>S. karzhantavicum</i>	<i>Nevermannia</i>
<i>S. kaszabi</i>	<i>Eusimulium</i>
<i>S. katangae</i>	<i>Nevermannia</i>
<i>S. katoi</i>	<i>Simulium</i>
<i>S. kauntzeum</i>	<i>Anasolen</i>
<i>S. kawagishii</i>	<i>Morops</i>
<i>S. kawamurae</i>	<i>Simulium</i>
<i>S. kazahstanicum</i>	<i>Eusimulium</i>
<i>S. keenani</i>	<i>Hemicnetha</i>
<i>S. keiseri</i>	<i>Nevermannia</i>
<i>S. keningauense</i>	<i>Simulium</i>
<i>S. kenya</i>	<i>Pomeroyellum</i>
<i>S. keravatense</i>	<i>Gomphostilbia</i>
<i>S. kerei</i>	<i>Morops</i>
<i>S. kerisorum</i>	<i>Simulium</i>
<i>S. kerzhneri</i>	<i>Montisimulium</i>
<i>S. kiangaraense</i>	Unassigned
<i>S. kietaense</i>	<i>Morops</i>
<i>S. kiewfinense</i>	<i>Gomphostilbia</i>
<i>S. kilibanum</i>	<i>Edwardsellum</i>

<i>S. kinabaluense</i>	<i>Simulium</i>
<i>S. kingundense</i>	<i>Metomphalus</i>
<i>S. kipengere</i>	<i>Edwardsellum</i>
<i>S. kirgisorum</i>	<i>Montisimulium</i>
<i>S. kiritshenkoi</i>	<i>Simulium</i>
<i>S. kisoense</i>	<i>Simulium</i>
<i>S. kitetense</i>	<i>Edwardsellum</i>
<i>S. kivuense</i>	<i>Lewisellum</i>
<i>S. klonganense</i>	<i>Gomphostilbia</i>
<i>S. knidirii</i>	<i>Rubzovia</i>
<i>S. kobayashii</i>	<i>Montisimulium</i>
<i>S. koidzumii</i>	<i>Byssodon</i>
<i>S. kokodae</i>	<i>Morops</i>
<i>S. kolakaense</i>	<i>Gomphostilbia</i>
<i>S. kompi</i>	<i>Simulium</i>
<i>S. konakovi</i>	<i>Simulium</i>
<i>S. konkourense</i>	<i>Edwardsellum</i>
<i>S. konoi</i>	<i>Nevermannia</i>
<i>S. kozlovi</i>	<i>Simulium</i>
<i>S. krebsorum</i>	<i>Simulium</i>
<i>S. krombeini</i>	<i>Gomphostilbia</i>
<i>S. krymense</i>	<i>Eusimulium</i>
<i>S. kuandianense</i>	<i>Eusimulium</i>
<i>S. kugartsuense</i>	<i>Nevermannia</i>
<i>S. kugitangi</i>	<i>Nevermannia</i>
<i>S. kuingingiense</i>	<i>Gomphostilbia</i>
<i>S. kumboense</i>	<i>Phoretomyia</i>
<i>S. kurense</i>	<i>Simulium</i>
<i>S. kurganense</i>	<i>Montisimulium</i>
<i>S. kurilense</i>	<i>Simulium</i>
<i>S. kurtaki</i>	<i>Nevermannia</i>
<i>S. kuznetzovi</i>	<i>Nevermannia</i>
<i>S. kwangoense</i>	<i>Metomphalus</i>
<i>S. kyushuense</i>	<i>Simulium</i>
<i>S. labellei</i>	<i>Psilopelmia</i>
<i>S. laciniatum</i>	<i>Hebridosimulium</i>
<i>S. lagunaense</i>	<i>Gomphostilbia</i>
<i>S. lahillei</i>	<i>Trichodagmia</i>
<i>S. lakei</i>	<i>Phosterodoros</i>
<i>S. lalokiense</i>	<i>Morops</i>
<i>S. lama</i>	<i>Wilhelmia</i>
<i>S. lamachi</i>	<i>Rubzovia</i>
<i>S. lampangense</i>	<i>Simulium</i>
<i>S. landonoense</i>	<i>Simulium</i>
<i>S. laneportoi</i>	<i>Chirostilbia</i>
<i>S. langtangense</i>	<i>Simulium</i>
<i>S. languidum</i>	<i>Byssodon</i>
<i>S. laoshanstum</i>	<i>Gomphostilbia</i>
<i>S. laplandica</i>	<i>Odagmia</i>
<i>S. larvipilosum</i>	<i>Nevermannia</i>
<i>S. larvispinosum</i>	<i>Hearlea</i>
<i>S. lassmanni</i>	<i>Simulium</i>
<i>S. laterale</i>	<i>Simulium</i>
<i>S. latifile</i>	<i>Nevermannia</i>
<i>S. latigonium</i>	<i>Nevermannia</i>
<i>S. latilobus</i>	<i>Simulium</i>
<i>S. latimentum</i>	<i>Simulium</i>
<i>S. latipes</i>	<i>Hellichiella</i>
<i>S. latipollex</i>	<i>Edwardsellum</i>
<i>S. latistylum</i>	<i>Simulium</i>
<i>S. latitarsus</i>	<i>Simulium</i>

<i>S. lawnhillense</i>	<i>Morops</i>
<i>S. laxum</i>	<i>Simulium</i>
<i>S. leberrei</i>	<i>Pomeroyellum</i>
<i>S. ledongense</i>	<i>Simulium</i>
<i>S. lehi</i>	<i>Gomphostilbia</i>
<i>S. leigongshanense</i>	<i>Eusimulium</i>
<i>S. lekhaniense</i>	<i>Nevermannia</i>
<i>S. leonense</i>	<i>Edwardsellum</i>
<i>S. leopoldense</i>	<i>Inaequalium</i>
<i>S. lepnevae</i>	<i>Gomphostilbia</i>
<i>S. letabum</i>	<i>Metomphalus</i>
<i>S. letense</i>	<i>Nevermannia</i>
<i>S. letrāsense</i>	<i>Psilopelmia</i>
<i>S. lewisi</i>	<i>Psilopelmia</i>
<i>S. leytense</i>	<i>Simulium</i>
<i>S. liberiense</i>	<i>Pomeroyellum</i>
<i>S. lidiae</i>	<i>Nevermannia</i>
<i>S. lididae</i>	<i>Cnetha</i>
<i>S. lilianaē</i>	<i>Morops</i>
<i>S. liliwense</i>	<i>Morops</i>
<i>S. lilotense</i>	<i>Nevermannia</i>
<i>S. limay</i>	<i>Pternaspatha</i>
<i>S. limbatum</i>	<i>Psaroniocompsa</i>
<i>S. linduense</i>	<i>Simulium</i>
<i>S. lineatum</i>	<i>Wilhelmia</i>
<i>S. lineothorax</i>	<i>Simulium</i>
<i>S. lingziense</i>	<i>Eusimulium</i>
<i>S. liriense</i>	<i>Simulium</i>
<i>S. litoreum</i>	<i>Gomphostilbia</i>
<i>S. litshkense</i>	<i>Montisimulium</i>
<i>S. littopyga</i>	<i>Inseliellum</i>
<i>S. lividum</i>	Unassigned
<i>S. llutense</i>	<i>Pternaspatha</i>
<i>S. lobatoi</i>	Unassigned
<i>S. loeiense</i>	<i>Gomphostilbia</i>
<i>S. loerchae</i>	Unassigned
<i>S. lonchatum</i>	<i>Simulium</i>
<i>S. lonckei</i>	<i>Inseliellum</i>
<i>S. longifiliatum</i>	<i>Montisimulium</i>
<i>S. longipalpe</i>	<i>Simulium</i>
<i>S. longipes</i>	<i>Nevermannia</i>
<i>S. longirostre</i>	<i>Morops</i>
<i>S. longistylatum</i>	<i>Shewellomyia</i>
<i>S. longitarse</i>	<i>Eusimulium</i>
<i>S. longithallum</i>	<i>Psilopelmia</i>
<i>S. longitruncum</i>	<i>Gomphostilbia</i>
<i>S. longitruncum</i>	<i>Gomphostilbia</i>
<i>S. longplatum</i>	<i>Simulium</i>
<i>S. longshengense</i>	<i>Gomphostilbia</i>
<i>S. longtanstum</i>	<i>Nevermannia</i>
<i>S. loreense</i>	<i>Simulium</i>
<i>S. lotii</i>	<i>Inseliellum</i>
<i>S. lourencoi</i>	<i>Psaroniocompsa</i>
<i>S. loutetense</i>	<i>Nevermannia</i>
<i>S. loveridgei</i>	<i>Nevermannia</i>
<i>S. luadiense</i>	<i>Edwardsellum</i>
<i>S. luchoi</i>	<i>Pternaspatha</i>
<i>S. lucyae</i>	<i>Hebriidosimulium</i>
<i>S. ludingens</i>	<i>Nevermannia</i>
<i>S. lugense</i>	Unassigned
<i>S. luggeri</i>	<i>Phosterodoros</i>

<i>S. luliangense</i>	<i>Montisimulium</i>
<i>S. lumbwanum</i>	<i>Phoretomyia</i>
<i>S. lundstromi</i>	<i>Nevermannia</i>
<i>S. lunduense</i>	<i>Simulium</i>
<i>S. luppovae</i>	<i>Nevermannia</i>
<i>S. lurauense</i>	<i>Gomphostilbia</i>
<i>S. luridum</i>	<i>Simulium</i>
<i>S. lurybayae</i>	<i>Xenosimulium</i>
<i>S. lushanense</i>	<i>Simulium</i>
<i>S. lushanense</i>	Unassigned
<i>S. luzzi</i>	<i>Xenosimulium</i>
<i>S. lutzianum</i>	<i>Ectemnaspi</i>
<i>S. luzonicum</i>	<i>Gomphostilbia</i>
<i>S. machadoi</i>	<i>Edwardsellum</i>
<i>S. mackerratorum</i>	<i>Morops</i>
<i>S. maculatum</i>	<i>Byssodon</i>
<i>S. maehongsonense</i>	<i>Gomphostilbia</i>
<i>S. maelanoiense</i>	<i>Gomphostilbia</i>
<i>S. maenoi</i>	<i>Simulium</i>
<i>S. maertensi</i>	<i>Edwardsellum</i>
<i>S. maewongense</i>	<i>Gomphostilbia</i>
<i>S. mafuluense</i>	<i>Morops</i>
<i>S. magnum</i>	<i>Xenosimulium</i>
<i>S. makartshenkovi</i>	<i>Gomphostilbia</i>
<i>S. makilingense</i>	<i>Wallacellum</i>
<i>S. maklarini</i>	<i>Simulium</i>
<i>S. malaibaense</i>	<i>Simulium</i>
<i>S. malardei</i>	<i>Inseliellum</i>
<i>S. malayense</i>	<i>Simulium</i>
<i>S. malinoense</i>	<i>Simulium</i>
<i>S. malukuense</i>	<i>Morops</i>
<i>S. malyschevi</i>	<i>Gnus</i>
<i>S. mamasaense</i>	<i>Gomphostilbia</i>
<i>S. manadoense</i>	<i>Gomphostilbia</i>
<i>S. manbucalense</i>	<i>Morops</i>
<i>S. manense</i>	<i>Freemanellum</i>
<i>S. mangabeirai</i>	<i>Psilopelmia</i>
<i>S. mangasepi</i>	<i>Gomphostilbia</i>
<i>S. manokwariense</i>	<i>Morops</i>
<i>S. manooni</i>	<i>Simulium</i>
<i>S. manuselaense</i>	<i>Morops</i>
<i>S. maraense</i>	<i>Inseliellum</i>
<i>S. maranguapense</i>	<i>Inaequalium</i>
<i>S. marathrumi</i>	<i>Psaroniocompsa</i>
<i>S. margaritae</i>	<i>Obuchovia</i>
<i>S. margaritatum</i>	<i>Inaequalium</i>
<i>S. mariavulcanoae</i>	<i>Inaequalium</i>
<i>S. maritimum</i>	<i>Eusimulium</i>
<i>S. marlieri</i>	<i>Phoretomyia</i>
<i>S. marocanum</i>	<i>Obuchovia</i>
<i>S. marquezi</i>	<i>Simulium</i>
<i>S. marsicanum</i>	<i>Nevermannia</i>
<i>S. masabae</i>	<i>Anasolen</i>
<i>S. masilauense</i>	<i>Simulium</i>
<i>S. maskeyae</i>	<i>Simulium</i>
<i>S. mataverense</i>	<i>Inseliellum</i>
<i>S. matokoense</i>	<i>Morops</i>
<i>S. matteabanchium</i>	<i>Simulium</i>
<i>S. mauense</i>	<i>Psilopelmia</i>
<i>S. maximum</i>	<i>Simulium</i>
<i>S. mayuchuspi</i>	<i>Ectemnaspi</i>

<i>S. mayumbense</i>	<i>Pomeroyellum</i>
<i>S. mazzottii</i>	<i>Psilopelmia</i>
<i>S. mcmahoni</i>	<i>Pomeroyellum</i>
<i>S. meadowi</i>	<i>Gomphostilbia</i>
<i>S. mediaxisus</i>	<i>Simulium</i>
<i>S. mediocoloratum</i>	<i>Simulium</i>
<i>S. mediodentatum</i>	<i>Simulium</i>
<i>S. mediovittatum</i>	<i>Psilopelmia</i>
<i>S. medusaeforme</i>	<i>Metomphalus</i>
<i>S. meigeni</i>	<i>Nevermannia</i>
<i>S. melanocephalum</i>	<i>Phoretomyia</i>
<i>S. melanopus</i>	<i>Simulium</i>
<i>S. melatum</i>	<i>Morops</i>
<i>S. mellah</i>	Unassigned
<i>S. menchacai</i>	<i>Hearlea</i>
<i>S. mendiense</i>	<i>Morops</i>
<i>S. mengense</i>	<i>Edwardsellum</i>
<i>S. mengi</i>	<i>Gomphostilbia</i>
<i>S. menglaense</i>	<i>Simulium</i>
<i>S. merga</i>	<i>Montisimulium</i>
<i>S. meridionale</i>	<i>Byssodon</i>
<i>S. merops</i>	<i>Pomeroyellum</i>
<i>S. merritti</i>	<i>Nevermannia</i>
<i>S. mesasiaticum</i>	<i>Simulium</i>
<i>S. mesodontium</i>	<i>Inseliellum</i>
<i>S. metallicum</i>	<i>Simulium</i>
<i>S. metatrsale</i>	<i>Gomphostilbia</i>
<i>S. metecontae</i>	Unassigned
<i>S. meyeræ</i>	<i>Psilopelmia</i>
<i>S. miblosi</i>	<i>Gomphostilbia</i>
<i>S. microbranchium</i>	<i>Hearlea</i>
<i>S. microlepidum</i>	<i>Edwardsellum</i>
<i>S. middlemissæ</i>	<i>Inseliellum</i>
<i>S. mie</i>	<i>Nevermannia</i>
<i>S. milloti</i>	<i>Nevermannia</i>
<i>S. minahasaense</i>	<i>Nevermannia</i>
<i>S. minangkabau</i>	<i>Simulium</i>
<i>S. mindanaoense</i>	<i>Gomphostilbia</i>
<i>S. mindoroense</i>	<i>Gomphostilbia</i>
<i>S. mindoroense</i>	<i>Simulium</i>
<i>S. minji</i>	<i>Morops</i>
<i>S. minuanum</i>	<i>Psaroniocompsa</i>
<i>S. minus</i>	<i>Hellichella</i>
<i>S. minusculum</i>	<i>Cerqueirellum</i>
<i>S. minuticorpus</i>	<i>Cnetha</i>
<i>S. minutum</i>	<i>Nevermannia</i>
<i>S. miyagii</i>	<i>Gomphostilbia</i>
<i>S. modicum</i>	<i>Nevermannia</i>
<i>S. mogii</i>	<i>Gomphostilbia</i>
<i>S. molliculum</i>	<i>Simulium</i>
<i>S. mongolense</i>	Unassigned
<i>S. mongolicum</i>	<i>Simulium</i>
<i>S. montiblense</i>	<i>Gomphostilbia</i>
<i>S. monticola</i>	<i>Simulium</i>
<i>S. monticoloides</i>	<i>Simulium</i>
<i>S. montium</i>	<i>Montisimulium</i>
<i>S. montshadskii</i>	<i>Nevermannia</i>
<i>S. morae</i>	<i>Simulium</i>
<i>S. morisonoi</i>	<i>Nevermannia</i>
<i>S. morsitans</i>	<i>Simulium</i>
<i>S. motoyukii</i>	<i>Morops</i>

<i>S. moucheti</i>	<i>Phoretomyia</i>
<i>S. moultoni</i>	<i>Nevermannia</i>
<i>S. moxiense</i>	<i>Montisimulium</i>
<i>S. muangpanense</i>	<i>Gomphostilbia</i>
<i>S. multiclavulatum</i>	<i>Pomeroyellum</i>
<i>S. multidentatum</i>	<i>Cnetha</i>
<i>S. multifurcatum</i>	<i>Simulium</i>
<i>S. multistriatum</i>	<i>Simulium</i>
<i>S. mumfordi</i>	<i>Inseliellum</i>
<i>S. munumense</i>	<i>Gomphostilbia</i>
<i>S. murmanum</i>	<i>Simulium</i>
<i>S. murvanidzei</i>	<i>Nevermannia</i>
<i>S. mussauense</i>	<i>Morops</i>
<i>S. mutucuna</i>	<i>Xenosimulium</i>
<i>S. mysterium</i>	<i>Hellichella</i>
<i>S. nacojapi</i>	<i>Simulium</i>
<i>S. nahimi</i>	<i>Cerqueirellum</i>
<i>S. nakanoi</i>	<i>Simulium</i>
<i>S. nakhonense</i>	<i>Simulium</i>
<i>S. namdanense</i>	<i>Gomphostilbia</i>
<i>S. namense</i>	<i>Gomphostilbia</i>
<i>S. nami</i>	<i>Gomphostilbia</i>
<i>S. nanoiense</i>	<i>Gomphostilbia</i>
<i>S. nanthaburiense</i>	<i>Gomphostilbia</i>
<i>S. nanum</i>	<i>Simulium</i>
<i>S. napuense</i>	<i>Gomphostilbia</i>
<i>S. narcaeum</i>	<i>Nevermannia</i>
<i>S. natalense</i>	<i>Metomphalus</i>
<i>S. naturale</i>	<i>Nevermannia</i>
<i>S. neavei</i>	<i>Lewisellum</i>
<i>S. nebulicola</i>	<i>Simulium</i>
<i>S. nebulosum</i>	<i>Hellichella</i>
<i>S. negativum</i>	<i>Simulium</i>
<i>S. neireti</i>	<i>Xenosimulium</i>
<i>S. nemorale</i>	<i>Pternaspatha</i>
<i>S. nemorivagum</i>	<i>Montisimulium</i>
<i>S. nemuroense</i>	<i>Simulium</i>
<i>S. neornatipes</i>	<i>Nevermannia</i>
<i>S. neoviceps</i>	<i>Inseliellum</i>
<i>S. nepalense</i>	<i>Gomphostilbia</i>
<i>S. netteli</i>	<i>Psilopelmia</i>
<i>S. ngabogei</i>	<i>Anasolen</i>
<i>S. nganganum</i>	<i>Edwardsellum</i>
<i>S. ngouense</i>	<i>Metomphalus</i>
<i>S. nicholsoni</i>	<i>Morops</i>
<i>S. nigricorne</i>	<i>Hearlea</i>
<i>S. nigricoxum</i>	<i>Simulium</i>
<i>S. nigrifacies</i>	<i>Simulium</i>
<i>S. nigrifemur</i>	<i>Xenosimulium</i>
<i>S. nigrimana</i>	<i>Trichodagmia</i>
<i>S. nigripilosum</i>	<i>Simulium</i>
<i>S. nigristrigatum</i>	<i>Pternaspatha</i>
<i>S. nigritarse</i>	<i>Nevermannia</i>
<i>S. nigrofemoralum</i>	<i>Gomphostilbia</i>
<i>S. nigrofuscipes</i>	<i>Eusimulium</i>
<i>S. nigrogilvum</i>	<i>Himalayum</i>
<i>S. nigrum</i>	<i>Schoenbaueria</i>
<i>S. niha</i>	<i>Simulium</i>
<i>S. nikkoense</i>	<i>Simulium</i>
<i>S. nilési</i>	<i>Psilopelmia</i>
<i>S. nilgircum</i>	<i>Simulium</i>

<i>S. nili</i>	<i>Anasolen</i>
<i>S. nishijimai</i>	<i>Simulium</i>
<i>S. nitidithorax</i>	<i>Simulium</i>
<i>S. nobile</i>	<i>Simulium</i>
<i>S. nodosum</i>	<i>Simulium</i>
<i>S. noelleri</i>	<i>Simulium</i>
<i>S. norfolkense</i>	<i>Nevermannia</i>
<i>S. norforense</i>	<i>Morops</i>
<i>S. noroense</i>	<i>Morops</i>
<i>S. notatum</i>	<i>Psilopelmia</i>
<i>S. notiale</i>	<i>Phosterodoros</i>
<i>S. notoense</i>	<i>Hellichella</i>
<i>S. novemarticulatum</i>	<i>Gomphostilbia</i>
<i>S. novigracile</i>	<i>Eusimulium</i>
<i>S. novolineatum</i>	<i>Simulium</i>
<i>S. nubis</i>	<i>Simulium</i>
<i>S. nudifrons</i>	<i>Simulium</i>
<i>S. nudipes</i>	<i>Morops</i>
<i>S. nujiangense</i>	<i>Simulium</i>
<i>S. nunesdemelloi</i>	Unassigned
<i>S. nuneztovari</i>	<i>Psilopelmia</i>
<i>S. nuneztovari</i>	<i>Psilopelmia</i>
<i>S. nuwakotense</i>	<i>Gomphostilbia</i>
<i>S. nyaense</i>	<i>Pomeroyellum</i>
<i>S. nyanzense</i>	<i>Nevermannia</i>
<i>S. nyasalandicum</i>	<i>Lewisellum</i>
<i>S. nyssa</i>	<i>Phosterodoros</i>
<i>S. obesum</i>	<i>Xenosimulium</i>
<i>S. obichingoum</i>	<i>Montisimulium</i>
<i>S. obikumbense</i>	<i>Simulium</i>
<i>S. oblongum</i>	<i>Asiosimulium</i>
<i>S. ochoai</i>	<i>Psilopelmia</i>
<i>S. ochraceum</i>	<i>Psilopelmia</i>
<i>S. ochrescentipes</i>	Unassigned
<i>S. ocreastylum</i>	<i>Montisimulium</i>
<i>S. octofiliatum</i>	<i>Montisimulium</i>
<i>S. octospicæ</i>	<i>Anasolen</i>
<i>S. oculatum</i>	<i>Morops</i>
<i>S. odontostylum</i>	<i>Montisimulium</i>
<i>S. ogatai</i>	<i>Gomphostilbia</i>
<i>S. ogonukii</i>	<i>Wallacellum</i>
<i>S. oguamai</i>	<i>Pomeroyellum</i>
<i>S. oitanum</i>	<i>Simulium</i>
<i>S. okinawaense</i>	<i>Gomphostilbia</i>
<i>S. oligocenicum</i> (fossil)	<i>Hellichella</i>
<i>S. oligotuberculatum</i>	<i>Nevermannia</i>
<i>S. olympicum</i>	<i>Psilopelmia</i>
<i>S. olonicum</i>	<i>Hellichella</i>
<i>S. omorii</i>	<i>Simulium</i>
<i>S. omutaense</i>	<i>Gomphostilbia</i>
<i>S. onoi</i>	Unassigned
<i>S. onum</i>	<i>Montisimulium</i>
<i>S. opunohuense</i>	<i>Inseliellum</i>
<i>S. orbitale</i>	<i>Trichodagmia</i>
<i>S. oresti</i>	<i>Chelocnetha</i>
<i>S. ornatipes</i>	<i>Nevermannia</i>
<i>S. ornatum</i>	<i>Simulium</i>
<i>S. orsovae</i>	<i>Nevermannia</i>
<i>S. oshimaense</i>	Unassigned
<i>S. oshimanum</i>	<i>Simulium</i>
<i>S. ovazzae</i>	<i>Lewisellum</i>

<i>S. oviceps</i>	<i>Inseliellum</i>
<i>S. oviedoï</i>	<i>Xenosimulium</i>
<i>S. oyapockense</i>	<i>Cerqueirellum</i>
<i>S. ozarkense</i>	<i>Simulium</i>
<i>S. padangense</i>	<i>Gomphostilbia</i>
<i>S. pahangense</i>	<i>Daviesellum</i>
<i>S. palauense</i>	<i>Inseliellum</i>
<i>S. palawanense</i>	<i>Simulium</i>
<i>S. pallidicranium</i>	<i>Inseliellum</i>
<i>S. pallidofemur</i>	<i>Simulium</i>
<i>S. pallidum</i>	<i>Simulium</i>
<i>S. palmatum</i>	<i>Simulium</i>
<i>S. palmeri</i>	<i>Pomeroyellum</i>
<i>S. palniense</i>	<i>Simulium</i>
<i>S. palopoense</i>	<i>Simulium</i>
<i>S. palustre</i>	<i>Simulium</i>
<i>S. pamahaense</i>	<i>Morops</i>
<i>S. panamense</i>	<i>Psilopelmia</i>
<i>S. pandanophilum</i>	<i>Edwardsellum</i>
<i>S. pangunaense</i>	<i>Morops</i>
<i>S. pankumuense</i>	<i>Hebridosimulium</i>
<i>S. papaveroi</i>	<i>Xenosimulium</i>
<i>S. papuense</i>	<i>Morops</i>
<i>S. paracarolinae</i>	<i>Hearlea</i>
<i>S. paracorniferum</i>	<i>Nevermannia</i>
<i>S. paradisiium</i>	<i>Hebridosimulium</i>
<i>S. paraequinum</i>	<i>Wilhelmia</i>
<i>S. paraguayense</i>	<i>Notolepria</i>
<i>S. parahiyangum</i>	<i>Gomphostilbia</i>
<i>S. parahiyangum</i>	<i>Gomphostilbia</i>
<i>S. paralongipalpe</i>	Unassigned
<i>S. paraloutetense</i>	<i>Nevermannia</i>
<i>S. paramorsitans</i>	<i>Simulium</i>
<i>S. paranense</i>	<i>Xenosimulium</i>
<i>S. paranubis</i>	<i>Simulium</i>
<i>S. parapusillum</i>	<i>Schoenbaueria</i>
<i>S. parargreatum</i>	<i>Simulium</i>
<i>S. parawaterfallum</i>	<i>Simulium</i>
<i>S. parimaense</i>	Unassigned
<i>S. parmatum</i>	<i>Boreosimulium</i>
<i>S. parnassum</i>	<i>Simulium</i>
<i>S. parrai</i>	<i>Simulium</i>
<i>S. parvulum</i>	<i>Simulium</i>
<i>S. parvum</i>	<i>Simulium</i>
<i>S. pathrushevae</i>	<i>Nevermannia</i>
<i>S. patrushevae</i>	<i>Schoenbaueria</i>
<i>S. pattoni</i>	<i>Gomphostilbia</i>
<i>S. patzicianense</i>	<i>Simulium</i>
<i>S. paucicuspis</i>	<i>Eusimulium</i>
<i>S. pauliani</i>	<i>Pomeroyellum</i>
<i>S. pautense</i>	<i>Ectemnaspi</i>
<i>S. pavlovskii</i>	<i>Simulium</i>
<i>S. paynei</i>	<i>Hemicnetha</i>
<i>S. pegalanense</i>	<i>Gomphostilbia</i>
<i>S. peggyae</i>	<i>Morops</i>
<i>S. pekingense</i>	<i>Wilhelmia</i>
<i>S. penai</i>	<i>Eremulium</i>
<i>S. penobscotense</i>	<i>Phosterodoros</i>
<i>S. pentaceros</i>	<i>Metomphalus</i>
<i>S. peregrinum</i>	<i>Gomphostilbia</i>
<i>S. perflavum</i>	<i>Psilopelmia</i>

<i>S. perforatum</i>	<i>Nevermannia</i>
<i>S. perlucidulum</i>	<i>Nevermannia</i>
<i>S. perplexum</i>	<i>Trichodagmia</i>
<i>S. pertinax</i>	<i>Chirostilbia</i>
<i>S. peskovi</i>	<i>Montisimulium</i>
<i>S. petersoni</i>	<i>Simulium</i>
<i>S. petropoliense</i>	<i>Xenosimulium</i>
<i>S. phapeungense</i>	<i>Gomphostilbia</i>
<i>S. phayaoense</i>	<i>Simulium</i>
<i>S. philippianum</i>	<i>Xenosimulium</i>
<i>S. philippii</i>	<i>Pternaspatha</i>
<i>S. philipponi</i>	Unassigned
<i>S. phluktainae</i>	Unassigned
<i>S. pichi</i>	<i>Pternaspatha</i>
<i>S. pichoni</i>	<i>Inseliellum</i>
<i>S. pictipes</i>	<i>Shewellomyia</i>
<i>S. pifanoi</i>	<i>Ectemnaspi</i>
<i>S. pilosum</i>	<i>Eusimulium</i>
<i>S. pindiense</i>	<i>Wilhelmia</i>
<i>S. pingxianensis</i>	<i>Gomphostilbia</i>
<i>S. pintoii</i>	<i>Trichodagmia</i>
<i>S. piperi</i>	<i>Simulium</i>
<i>S. piscicidium</i>	<i>Simulium</i>
<i>S. pitasawatae</i>	<i>Gomphostilbia</i>
<i>S. pitense</i>	<i>Simulium</i>
<i>S. planipuparium</i>	<i>Nevermannia</i>
<i>S. platytarse</i>	<i>Simulium</i>
<i>S. plumbeum</i>	<i>Edwardsellum</i>
<i>S. podostemi</i>	<i>Phosterodoros</i>
<i>S. pohaense</i>	<i>Morops</i>
<i>S. polare</i>	<i>Simulium</i>
<i>S. politum</i>	<i>Nevermannia</i>
<i>S. polyprominulum</i>	<i>Montisimulium</i>
<i>S. pontinum</i>	<i>Simulium</i>
<i>S. popowae</i>	<i>Obuchovia</i>
<i>S. posticatum</i>	<i>Simulium</i>
<i>S. pothigaiense</i>	<i>Simulium</i>
<i>S. praelargum</i>	<i>Nevermannia</i>
<i>S. prafiense</i>	<i>Morops</i>
<i>S. prayongi</i>	<i>Gomphostilbia</i>
<i>S. proctorae</i>	<i>Inseliellum</i>
<i>S. prodexargenteum</i>	<i>Pternaspatha</i>
<i>S. prominentum</i>	<i>Simulium</i>
<i>S. promorsitans</i>	<i>Simulium</i>
<i>S. pseudequinum</i>	<i>Wilhelmia</i>
<i>S. pseudoamazonicum</i>	<i>Cerqueirellum</i>
<i>S. pseudoantillarum</i>	<i>Psilopelmia</i>
<i>S. pseudocallidum</i>	<i>Psilopelmia</i>
<i>S. pseudocallidum</i>	<i>Psilopelmia</i>
<i>S. pseudocorium</i>	<i>Inseliellum</i>
<i>S. pseudoexiguum</i>	<i>Inaequalium</i>
<i>S. pseudonearticum</i>	<i>Byssodon</i>
<i>S. pseudopusillum</i>	<i>Schoenbaueria</i>
<i>S. puaense</i>	<i>Gomphostilbia</i>
<i>S. pufauense</i>	<i>Inseliellum</i>
<i>S. pugetense</i>	<i>Nevermannia</i>
<i>S. puigi</i>	<i>Simulium</i>
<i>S. pukaengense</i>	<i>Simulium</i>
<i>S. pulanotum</i>	<i>Simulium</i>
<i>S. pulchripes</i>	<i>Simulium</i>
<i>S. pulchrum</i>	<i>Pternaspatha</i>

<i>S. puliense</i>	<i>Simulium</i>
<i>S. pullus</i>	<i>Simulium</i>
<i>S. pulverulentum</i>	<i>Hemicnetha</i>
<i>S. purii</i>	<i>Nevermannia</i>
<i>S. purosae</i>	<i>Morops</i>
<i>S. pusillum</i>	<i>Schoenbaueria</i>
<i>S. putre</i>	<i>Xenosimulium</i>
<i>S. qianense</i>	<i>Simulium</i>
<i>S. qiaolaoense</i>	<i>Nevermannia</i>
<i>S. qinghaiense</i>	<i>Wilhelmia</i>
<i>S. qingshuiense</i>	<i>Nevermannia</i>
<i>S. qingxilingense</i>	<i>Wilhelmia</i>
<i>S. qini</i>	Unassigned
<i>S. qinlingense</i>	<i>Nevermannia</i>
<i>S. qiongzhouense</i>	<i>Nevermannia</i>
<i>S. quadratum</i>	<i>Boreosimulium</i>
<i>S. quadrifidum</i>	<i>Coscaroniellum</i>
<i>S. quadrifila</i>	<i>Wilhelmia</i>
<i>S. quadristrigatum</i>	<i>Psaroniocompsa</i>
<i>S. quadrivittatum</i>	<i>Psilopelmia</i>
<i>S. quasidocolletum</i>	<i>Nevermannia</i>
<i>S. quasifrenum</i>	<i>Simulium</i>
<i>S. quattuordecimfilium</i>	<i>Montisimulium</i>
<i>S. quattuordecimfilum</i>	<i>Montisimulium</i>
<i>S. quebecense</i>	<i>Nevermannia</i>
<i>S. quechuanum</i>	<i>Pternaspatha</i>
<i>S. quilleverei</i>	Unassigned
<i>S. quinquefilium</i>	<i>Simulium</i>
<i>S. quinquestriatum</i>	<i>Simulium</i>
<i>S. racenisi</i>	<i>Simulium</i>
<i>S. ramosum</i>	<i>Simulium</i>
<i>S. ramulosum</i>	<i>Simulium</i>
<i>S. ranauense</i>	<i>Simulium</i>
<i>S. rangeli</i>	<i>Notolepria</i>
<i>S. rangiferinum</i>	<i>Schoenbaueria</i>
<i>S. ransikiense</i>	<i>Morops</i>
<i>S. raohense</i>	<i>Nevermannia</i>
<i>S. rappae</i>	<i>Xenosimulium</i>
<i>S. rappae</i>	<i>Xenosimulium</i>
<i>S. rashidi</i>	<i>Simulium</i>
<i>S. rasyani</i>	<i>Edwardsellum</i>
<i>S. ratekholaense</i>	<i>Simulium</i>
<i>S. raunsimnae</i>	<i>Morops</i>
<i>S. raybouldi</i>	<i>Nevermannia</i>
<i>S. rayohense</i>	<i>Gomphostilbia</i>
<i>S. rebunense</i>	<i>Nevermannia</i>
<i>S. recurvum</i>	<i>Wallacellum</i>
<i>S. reginae</i>	<i>Eusimulium</i>
<i>S. remissum</i>	<i>Simulium</i>
<i>S. remotum</i>	<i>Simulium</i>
<i>S. rendalense</i>	<i>Hellichella</i>
<i>S. repertum</i>	<i>Edwardsellum</i>
<i>S. reptans</i>	<i>Simulium</i>
<i>S. resimum</i>	<i>Wallacellum</i>
<i>S. retusum</i>	<i>Simulium</i>
<i>S. rezvoi</i>	<i>Simulium</i>
<i>S. rheophilum</i>	<i>Simulium</i>
<i>S. rhodesinense</i>	<i>Anasolen</i>
<i>S. rhopaloides</i>	<i>Gomphostilbia</i>
<i>S. rickenbachi</i>	<i>Phoretomyia</i>
<i>S. riograndense</i>	<i>Chirostilbia</i>

<i>S. rithrogenophila</i>	<i>Phoretodagmia</i>
<i>S. rithrogenophilum</i>	<i>Simulium</i>
<i>S. rivasi</i>	<i>Xenosimulium</i>
<i>S. riverai</i>	<i>Morops</i>
<i>S. rivierei</i>	<i>Inseliellum</i>
<i>S. rivosecchii</i>	<i>Nevermannia</i>
<i>S. rivosecchii</i>	<i>Simulium</i>
<i>S. robynae</i>	<i>Psilopelmia</i>
<i>S. rodhaini</i>	<i>Pomeroyellum</i>
<i>S. romanai</i>	<i>Ectemnaspi</i>
<i>S. roquemayu</i>	<i>Ectemnaspi</i>
<i>S. roraimense</i>	<i>Cerqueirellum</i>
<i>S. rorotaense</i>	<i>Psilopelmia</i>
<i>S. rosemaryae</i>	<i>Gomphostilbia</i>
<i>S. roslihashimi</i>	<i>Gomphostilbia</i>
<i>S. rothfelsi</i>	Unassigned
<i>S. rotifilis</i>	<i>Simulium</i>
<i>S. rotundatum</i>	<i>Simulium</i>
<i>S. rotundum</i>	<i>Pomeroyellum</i>
<i>S. rounae</i>	<i>Morops</i>
<i>S. ruandae</i>	<i>Metomphalus</i>
<i>S. rubescens</i>	<i>Nevermannia</i>
<i>S. rubicundulum</i>	<i>Hemicnetha</i>
<i>S. rubiginosum</i>	<i>Psilopelima</i>
<i>S. rubrithorax</i>	<i>Hemicnetha</i>
<i>S. rubroflavifemur</i>	<i>Simulium</i>
<i>S. rubtzovi</i>	<i>Simulium</i>
<i>S. rubzovium</i>	<i>Schoenbaueria</i>
<i>S. rudnicki</i>	<i>Simulium</i>
<i>S. rufibasis</i>	<i>Simulium</i>
<i>S. ruficorne</i>	<i>Nevermannia</i>
<i>S. rufithorax</i>	<i>Nevermannia</i>
<i>S. rugglesi</i>	<i>Simulium</i>
<i>S. ruizi</i>	<i>Simulium</i>
<i>S. rurutuense</i>	<i>Inseliellum</i>
<i>S. rutherfordi</i>	<i>Nevermannia</i>
<i>S. sabahense</i>	<i>Simulium</i>
<i>S. saccai</i>	<i>Hellichella</i>
<i>S. saccatum</i>	<i>Simulium</i>
<i>S. sacculiferum</i>	<i>Nevermannia</i>
<i>S. saihoense</i>	<i>Morops</i>
<i>S. sakhalinum</i>	<i>Montisimulium</i>
<i>S. sakishimaense</i>	<i>Simulium</i>
<i>S. salazarae</i>	<i>Morops</i>
<i>S. salebrosus</i>	<i>Simulium</i>
<i>S. saliceti</i>	<i>Nevermannia</i>
<i>S. salinum</i>	<i>Eusimulium</i>
<i>S. samarkandica</i>	<i>Schoenbaueria</i>
<i>S. samboni</i>	<i>Psilopelmia</i>
<i>S. sanctipauli</i>	<i>Edwardsellum</i>
<i>S. sandyi</i>	<i>Simulium</i>
<i>S. sangrense</i>	<i>Wilhelmia</i>
<i>S. sanguineum</i>	<i>Cerqueirellum</i>
<i>S. santomi</i>	<i>Pomeroyellum</i>
<i>S. saradzoense</i>	<i>Montisimulium</i>
<i>S. sarawakense</i>	<i>Gomphostilbia</i>
<i>S. sasai</i>	<i>Nevermannia</i>
<i>S. sastscheri</i>	<i>Simulium</i>
<i>S. satsumense</i>	<i>Eusimulium</i>
<i>S. savici</i>	<i>Simulium</i>
<i>S. saxosum</i>	<i>Simulium</i>

<i>S. schamili</i>	<i>Simulium</i>
<i>S. schevyakovi</i>	<i>Montisimulium</i>
<i>S. schizolomum</i>	<i>Eusimulium</i>
<i>S. schizostylum</i>	<i>Montisimulium</i>
<i>S. schmidtmummi</i>	<i>Psaroniocompsa</i>
<i>S. schoenemanni</i>	<i>Pternaspatha</i>
<i>S. schoutedeni</i>	<i>Pomeroyellum</i>
<i>S. schwetzi</i>	<i>Pomeroyellum</i>
<i>S. scutellatum</i>	<i>Xenosimulium</i>
<i>S. scutistriatum</i>	<i>Hemicnetha</i>
<i>S. sechani</i>	<i>Inseliellum</i>
<i>S. segusina</i>	<i>Obuchovia</i>
<i>S. selwynense</i>	<i>Morops</i>
<i>S. semushini</i>	<i>Simulium</i>
<i>S. senile</i>	<i>Nevermannia</i>
<i>S. septentrionale</i>	<i>Simulium</i>
<i>S. seramense</i>	<i>Simulium</i>
<i>S. sergenti</i>	<i>Wilhelmia</i>
<i>S. serranum</i>	<i>Chirostilbia</i>
<i>S. serratum</i>	<i>Gomphostilbia</i>
<i>S. setsukoeae</i>	<i>Simulium</i>
<i>S. sexafila</i>	<i>Simulium</i>
<i>S. sexiense</i>	<i>Meilloniellum</i>
<i>S. sextuplum</i>	<i>Gomphostilbia</i>
<i>S. shadini</i>	<i>Montisimulium</i>
<i>S. shandongense</i>	<i>Nevermannia</i>
<i>S. shangchuanense</i>	<i>Simulium</i>
<i>S. shannonae</i>	<i>Inseliellum</i>
<i>S. shanxiense</i>	<i>Simulium</i>
<i>S. sheilae</i>	<i>Gomphostilbia</i>
<i>S. shennongjiaense</i>	<i>Simulium</i>
<i>S. sherwoodi</i>	<i>Gomphostilbia</i>
<i>S. sheveligiense</i>	<i>Montisimulium</i>
<i>S. shevtshenkovae</i>	<i>Simulium</i>
<i>S. shewellianum</i>	<i>Ectemnaspi</i>
<i>S. shiraki</i>	<i>Simulium</i>
<i>S. shoae</i>	<i>Anasolen</i>
<i>S. shogakii</i>	<i>Gomphostilbia</i>
<i>S. siamense</i>	<i>Gomphostilbia</i>
<i>S. sicuani</i>	<i>Ectemnaspi</i>
<i>S. silvaticum</i>	<i>Eusimulium</i>
<i>S. silvestre</i>	<i>Nevermannia</i>
<i>S. simianshanense</i>	<i>Eusimulium</i>
<i>S. simile</i>	<i>Pternaspatha</i>
<i>S. simoffi</i>	<i>Simulium</i>
<i>S. simplex</i>	<i>Nevermannia</i>
<i>S. simulacrum</i>	<i>Simulium</i>
<i>S. simulans</i>	<i>Simulium</i>
<i>S. singgihi</i>	<i>Gomphostilbia</i>
<i>S. singtamense</i>	<i>Simulium</i>
<i>S. siolii</i>	<i>Psaroniocompsa</i>
<i>S. sirbanum</i>	<i>Edwardsellum</i>
<i>S. sirimonense</i>	<i>Nevermannia</i>
<i>S. slossonae</i>	<i>Simulium</i>
<i>S. smarti</i>	<i>Hemicnetha</i>
<i>S. snowi</i>	<i>Phosterodoros</i>
<i>S. sofiani</i>	<i>Gomphostilbia</i>
<i>S. solarii</i>	<i>Hemicnetha</i>
<i>S. solomonense</i>	<i>Morops</i>
<i>S. songense</i>	<i>Gomphostilbia</i>
<i>S. sonkulense</i>	<i>Montisimulium</i>

<i>S. sorongense</i>	<i>Morops</i>
<i>S. soubrense</i>	<i>Edwardsellum</i>
<i>S. souzalopesi</i>	<i>Xenosimulium</i>
<i>S. speculiventre</i>	<i>Nevermannia</i>
<i>S. spilmani</i>	<i>Simulium</i>
<i>S. spinibranchium</i>	<i>Chirostilbia</i>
<i>S. spinifer</i>	<i>Psilopelmia</i>
<i>S. spinosibranchium</i>	<i>Wallacellum</i>
<i>S. spinulicorne</i>	<i>Freemanellum</i>
<i>S. spiroi</i>	<i>Hebridosisimulium</i>
<i>S. splendidum</i>	<i>Simulium</i>
<i>S. spoonatum</i>	<i>Simulium</i>
<i>S. squamosum</i>	<i>Edwardsellum</i>
<i>S. stackelbergi</i>	<i>Montisimulium</i>
<i>S. standfasti</i>	<i>Morops</i>
<i>S. starmuhlneri</i>	<i>Nevermannia</i>
<i>S. steatopygium</i>	<i>Hebridosisimulium</i>
<i>S. stellatum</i>	Unassigned
<i>S. stelliferum</i>	<i>Pternaspatha</i>
<i>S. stenophallum</i>	<i>Simulium</i>
<i>S. stevensoni</i>	<i>Tetisimulium</i>
<i>S. strelkovi</i>	<i>Nevermannia</i>
<i>S. striatum</i>	<i>Simulium</i>
<i>S. strigidorsum</i>	<i>Pternaspatha</i>
<i>S. striginotum</i>	<i>Chirostilbia</i>
<i>S. suarezi</i>	<i>Psilopelmia</i>
<i>S. suarezi</i>	<i>Psilopelmia</i>
<i>S. subatrum</i>	<i>Simulium</i>
<i>S. subclavibranchium</i>	<i>Inaequalium</i>
<i>S. subcostatum</i>	<i>Nevermannia</i>
<i>S. subexiguum</i>	<i>Notolepria</i>
<i>S. subgriseum</i>	<i>Nevermannia</i>
<i>S. sublonckeii</i>	<i>Inseliellum</i>
<i>S. subnigrum</i>	<i>Inaequalium</i>
<i>S. subornatoides</i>	<i>Simulium</i>
<i>S. subpallidum</i>	<i>Xenosimulium</i>
<i>S. subpalmatum</i>	<i>Simulium</i>
<i>S. subparadisium</i>	<i>Hebridosisimulium</i>
<i>S. subpusillum</i>	<i>Schoenbaueria</i>
<i>S. subratai</i>	<i>Nevermannia</i>
<i>S. subtile</i>	<i>Simulium</i>
<i>S. subvariegatum</i>	<i>Simulium</i>
<i>S. suchariti</i>	<i>Simulium</i>
<i>S. suchitrae</i>	<i>Asiosimulium</i>
<i>S. sulawesiense</i>	<i>Gomphostilbia</i>
<i>S. sumapazense</i>	<i>Grenieriella</i>
<i>S. sumatraense</i>	<i>Gomphostilbia</i>
<i>S. sumatraense</i>	<i>Simulium</i>
<i>S. sundaicum</i>	<i>Gomphostilbia</i>
<i>S. supercilium</i>	<i>Hebridosisimulium</i>
<i>S. suplidoi</i>	<i>Simulium</i>
<i>S. surachaii</i>	<i>Montisimulium</i>
<i>S. sutebense</i>	<i>Morops</i>
<i>S. suthheppuiense</i>	<i>Gomphostilbia</i>
<i>S. suzuki</i>	<i>Simulium</i>
<i>S. syafruddini</i>	<i>Gomphostilbia</i>
<i>S. synanceium</i>	<i>Eusimulium</i>
<i>S. synanceium</i>	<i>Gomphostilbia</i>
<i>S. syriacum</i>	<i>Obuchovia</i>
<i>S. sytshevskiae</i>	<i>Montisimulium</i>
<i>S. taalense</i>	<i>Simulium</i>

<i>S. tachengense</i>	<i>Tetisimulium</i>
<i>S. tafae</i>	<i>Morops</i>
<i>S. tafulaense</i>	<i>Morops</i>
<i>S. tahanense</i>	<i>Gomphostilbia</i>
<i>S. tahitiense</i>	<i>Inseliellum</i>
<i>S. taipei</i>	<i>Eusimulium</i>
<i>S. taipokauense</i>	<i>Simulium</i>
<i>S. taishanense</i>	<i>Montisimulium</i>
<i>S. taiwanicum</i>	<i>Simulium</i>
<i>S. takae</i>	<i>Morops</i>
<i>S. takahasii</i>	<i>Wilhelmia</i>
<i>S. takense</i>	<i>Simulium</i>
<i>S. talassicum</i>	<i>Wilhelmia</i>
<i>S. tallafarroae</i>	<i>Xenosimulium</i>
<i>S. tamorense</i>	<i>Simulium</i>
<i>S. tanae</i>	<i>Titanopteryx</i>
<i>S. tanae</i>	Unassigned
<i>S. tandrokum</i>	Unassigned
<i>S. tanetchowi</i>	Unassigned
<i>S. tani</i>	<i>Simulium</i>
<i>S. tarbagataicum</i>	<i>Simulium</i>
<i>S. tarnogradskii</i>	<i>Simulium</i>
<i>S. tarsale</i>	<i>Hemicnetha</i>
<i>S. tarsatum</i>	<i>Hemicnetha</i>
<i>S. tashikulganense</i>	<i>Gomphostilbia</i>
<i>S. tatarica</i>	<i>Montisimulium</i>
<i>S. tatapaniense</i>	<i>Simulium</i>
<i>S. taulingense</i>	<i>Nevermannia</i>
<i>S. tauricum</i>	<i>Nevermannia</i>
<i>S. taxodium</i>	<i>Phosterodoros</i>
<i>S. taylori</i>	<i>Metomphalus</i>
<i>S. teerachanense</i>	<i>Gomphostilbia</i>
<i>S. temascalense</i>	<i>Hearlea</i>
<i>S. tenerificum</i>	<i>Eusimulium</i>
<i>S. tentaculum</i>	<i>Pomeroyellum</i>
<i>S. tenuatum</i>	<i>Simulium</i>
<i>S. tenuipes</i>	<i>Eremulium</i>
<i>S. tenuistylum</i>	<i>Gomphostilbia</i>
<i>S. tenuitarse</i>	<i>Nevermannia</i>
<i>S. tenuitarse</i>	<i>Simulium</i>
<i>S. tergo-spinosum</i>	<i>Psaroniocompsa</i>
<i>S. teruamanga</i>	<i>Inseliellum</i>
<i>S. tesorum</i>	<i>Simulium</i>
<i>S. thailandicum</i>	<i>Simulium</i>
<i>S. thienemanni</i>	<i>Simulium</i>
<i>S. thungchangense</i>	<i>Gomphostilbia</i>
<i>S. thyolense</i>	<i>Edwardsellum</i>
<i>S. tianchi</i>	<i>Nevermannia</i>
<i>S. timondavidi</i>	<i>Nevermannia</i>
<i>S. timoreense</i>	<i>Simulium</i>
<i>S. titareense</i>	<i>Simulium</i>
<i>S. tjanschanicum</i>	<i>Simulium</i>
<i>S. tjidodense</i>	<i>Nevermannia</i>
<i>S. tobetsuense</i>	<i>Simulium</i>
<i>S. tokachiense</i>	<i>Boreosimulium</i>
<i>S. tokareense</i>	<i>Gomphostilbia</i>
<i>S. tolimaense</i>	<i>Ectemnaspi</i>
<i>S. tolongoinae</i>	<i>Nevermannia</i>
<i>S. tomiae</i>	<i>Gomphostilbia</i>
<i>S. tomentosum</i>	<i>Simulium</i>
<i>S. tomohonense</i>	<i>Simulium</i>

<i>S. tondewandouense</i>	<i>Metomphalus</i>
<i>S. tongbaishanense</i>	<i>Wilhelmia</i>
<i>S. torautense</i>	<i>Gomphostilbia</i>
<i>S. tormentor</i>	<i>Simulium</i>
<i>S. torresianum</i>	<i>Morops</i>
<i>S. tosariense</i>	<i>Nevermannia</i>
<i>S. toubkal</i>	<i>Nevermannia</i>
<i>S. touffeum</i>	<i>Metomphalus</i>
<i>S. townsendi</i>	<i>Trichodagmia</i>
<i>S. transbaikalicum</i>	<i>Schoenbaueria</i>
<i>S. transcaspicum</i>	<i>Obuchovia</i>
<i>S. transiens</i>	<i>Parabyssodon</i>
<i>S. travassosi</i>	<i>Inaequalium</i>
<i>S. travisi</i>	<i>Psilopelmia</i>
<i>S. triangustum</i>	<i>Simulium</i>
<i>S. tricorne</i>	<i>Simulium</i>
<i>S. tricrenum</i>	<i>Nevermannia</i>
<i>S. tridens</i>	<i>Byssodon</i>
<i>S. trifasciatum</i>	<i>Simulium</i>
<i>S. triglobus</i>	<i>Simulium</i>
<i>S. trilineatum</i>	<i>Simulium</i>
<i>S. trirugosum</i>	<i>Gomphostilbia</i>
<i>S. trisphaerae</i>	<i>Byssodon</i>
<i>S. trivittatum</i>	<i>Psilopelmia</i>
<i>S. trombetense</i>	Unassigned
<i>S. trukense</i>	<i>Inseliellum</i>
<i>S. truncatum</i>	<i>Simulium</i>
<i>S. truncatum</i>	<i>Simulium</i>
<i>S. tsharae</i>	<i>Hemicnetha</i>
<i>S. tsheburovae</i>	<i>Hellichella</i>
<i>S. tshernovskii</i>	<i>Schoenbaueria</i>
<i>S. tshuni</i>	<i>Argentisimulium</i>
<i>S. tuberculum</i>	<i>Hebridosisimulium</i>
<i>S. tuberosum</i>	<i>Simulium</i>
<i>S. tuenense</i>	<i>Gomphostilbia</i>
<i>S. tulshii</i>	<i>Simulium</i>
<i>S. tumidum</i>	<i>Gomphostilbia</i>
<i>S. tumninum</i>	<i>Gnus</i>
<i>S. tumpaense</i>	<i>Simulium</i>
<i>S. tumulosum</i>	<i>Simulium</i>
<i>S. tumum</i>	<i>Gomphostilbia</i>
<i>S. tunja</i>	<i>Ectemnaspi</i>
<i>S. turgaicum</i>	<i>Wilhelmia</i>
<i>S. tuyense</i>	<i>Wallacellum</i>
<i>S. uaense</i>	<i>Inseliellum</i>
<i>S. ubiquitousum</i>	<i>Simulium</i>
<i>S. uchidai</i>	<i>Nevermannia</i>
<i>S. uemotoi</i>	<i>Nevermannia</i>
<i>S. ufengense</i>	<i>Simulium</i>
<i>S. ulyssesi</i>	<i>Coscaroniellum</i>
<i>S. uncum</i>	<i>Simulium</i>
<i>S. underhilli</i>	<i>Phosterodoros</i>
<i>S. undulatum</i>	<i>Hebridosisimulium</i>
<i>S. unicornutum</i>	<i>Pomeroyellum</i>
<i>S. unum</i>	<i>Gomphostilbia</i>
<i>S. upikae</i>	<i>Simulium</i>
<i>S. urbanum</i>	<i>Nevermannia</i>
<i>S. urubambanum</i>	<i>Xenosimulium</i>
<i>S. urundiense</i>	<i>Meilloniellum</i>
<i>S. usovae</i>	<i>Hellichella</i>
<i>S. ussovae</i>	<i>Hemicnetha</i>

<i>S. valparaiense</i>	<i>Simulium</i>
<i>S. vampirum</i>	<i>Simulium</i>
<i>S. vamprium</i>	<i>Simulium</i>
<i>S. vangilsi</i>	<i>Pomeroyellum</i>
<i>S. vantshi</i>	<i>Rubzovia</i>
<i>S. vantshum</i>	<i>Montisimulium</i>
<i>S. varians</i>	<i>Xenosimulium</i>
<i>S. varicorne</i>	<i>Gomphostilbia</i>
<i>S. variegatum</i>	<i>Simulium</i>
<i>S. veltistshevi</i>	<i>Wilhelmia</i>
<i>S. velutinum</i>	<i>Eusimulium</i>
<i>S. venator</i>	<i>Psilopelmia</i>
<i>S. venezuelense</i>	<i>Cerqueirellum</i>
<i>S. ventricum (fossil)</i>	Unassigned
<i>S. venustum</i>	<i>Simulium</i>
<i>S. veracruzianum</i>	<i>Psilopelmia</i>
<i>S. verecundum</i>	<i>Simulium</i>
<i>S. vernum</i>	<i>Nevermannia</i>
<i>S. vershininae</i>	<i>Simulium</i>
<i>S. versicolor</i>	<i>Obuchovia</i>
<i>S. versicolor</i>	<i>Xenosimulium</i>
<i>S. vidanoi</i>	<i>Nevermannia</i>
<i>S. vigintifile</i>	<i>Simulium</i>
<i>S. vilhenai</i>	<i>Edwardsellum</i>
<i>S. violator</i>	<i>Eusimulium</i>
<i>S. violovitshi</i>	<i>Montisimulium</i>
<i>S. virgatum</i>	<i>Hemicnetha</i>
<i>S. visayaense</i>	<i>Gomphostilbia</i>
<i>S. vischarvi</i>	<i>Gomphostilbia</i>
<i>S. visuti</i>	<i>Simulium</i>
<i>S. vitile</i>	<i>Nevermannia</i>
<i>S. vittatum</i>	<i>Psilozia</i>
<i>S. voilense</i>	<i>Simulium</i>
<i>S. voltae</i>	<i>Anasolen</i>
<i>S. vorax</i>	<i>Metomphalus</i>
<i>S. vulcanoae</i>	<i>Psilopelmia</i>
<i>S. vulgare</i>	<i>Simulium</i>
<i>S. wakrisense</i>	<i>Morops</i>
<i>S. walterwittmeri</i>	<i>Pternaspatha</i>
<i>S. wambanum</i>	<i>Edwardsellum</i>
<i>S. wamena</i>	<i>Morops</i>
<i>S. wanchaii</i>	<i>Asiosimulium</i>
<i>S. wangxianense</i>	<i>Nevermannia</i>
<i>S. wantoatense</i>	<i>Morops</i>
<i>S. watanabei</i>	<i>Simulium</i>
<i>S. waterfallum</i>	<i>Simulium</i>
<i>S. watetoense</i>	<i>Morops</i>
<i>S. weiningense</i>	<i>Eusimulium</i>
<i>S. weisiense</i>	<i>Montisimulium</i>
<i>S. weji</i>	<i>Simulium</i>
<i>S. wellmanni</i>	<i>Metomphalus</i>
<i>S. weyeri</i>	<i>Pomeroyellum</i>
<i>S. whartoni</i>	<i>Gomphostilbia</i>
<i>S. wilhelmlandae</i>	<i>Morops</i>
<i>S. wirthi</i>	<i>Hemicnetha</i>
<i>S. wolffhuegeli</i>	<i>Psilopelmia</i>
<i>S. woodi</i>	<i>Lewisellum</i>
<i>S. wulaofengense</i>	<i>Montisimulium</i>
<i>S. wulindongense</i>	<i>Nevermannia</i>
<i>S. wutaishanense</i>	<i>Tetisimulium</i>
<i>S. wuzhishanense</i>	<i>Simulium</i>

<i>S. wygodzinskyorum</i>	<i>Grenieriella</i>
<i>S. wygoi</i>	<i>Simulium</i>
<i>S. wyomingense</i>	<i>Nevermannia</i>
<i>S. xanthinum</i>	<i>Simulium</i>
<i>S. xanthogastrum</i>	<i>Simulium</i>
<i>S. xiaodaoense</i>	<i>Tetisimulium</i>
<i>S. xiaolongtanense</i>	<i>Simulium</i>
<i>S. xinbinense</i>	<i>Nevermannia</i>
<i>S. xingyiense</i>	<i>Wilhelmia</i>
<i>S. xinzhouense</i>	<i>Montisimulium</i>
<i>S. yacuchuspi</i>	<i>Pternaspatha</i>
<i>S. yadongense</i>	<i>Simulium</i>
<i>S. yaeyamaense</i>	<i>Gomphostilbia</i>
<i>S. yahense</i>	<i>Edwardsellum</i>
<i>S. yamayaense</i>	<i>Nevermannia</i>
<i>S. yemenense</i>	<i>Meilloniellum</i>
<i>S. yepocapense</i>	<i>Hemicnetha</i>
<i>S. yokotense</i>	<i>Simulium</i>
<i>S. yonagoense</i>	<i>Boophthora</i>

<i>S. yonakuniense</i>	<i>Wallacellum</i>
<i>S. yongi</i>	<i>Simulium</i>
<i>S. yuanbaoshanense</i>	<i>Gomphostilbia</i>
<i>S. yuleae</i>	<i>Morops</i>
<i>S. yunnanense</i>	<i>Gomphostilbia</i>
<i>S. yuntaiense</i>	<i>Montisimulium</i>
<i>S. yuphae</i>	<i>Simulium</i>
<i>S. yushangense</i>	<i>Nevermannia</i>
<i>S. zairense</i>	<i>Phoretomyia</i>
<i>S. zakhariense</i>	<i>Nevermannia</i>
<i>S. zaporojae</i>	<i>Chelocnetha</i>
<i>S. zempoalense</i>	<i>Psilopelmia</i>
<i>S. zephyrus</i>	<i>Boreosimulium</i>
<i>S. zetterstedti</i>	<i>Simulium</i>
<i>S. zhangjiajiense</i>	<i>Nevermannia</i>
<i>S. zhiltzovae</i>	<i>Nevermannia</i>
<i>S. zombaense</i>	<i>Metomphalus</i>
<i>S. zonatum</i>	<i>Gomphostilbia</i>

**Parasite morphology:** Like all dipteran insects, *Simulium* spp. form 4 different types of morphological stages during their life-cycle: eggs; larvae; pupae; and adults. Eggs measure from 100-500  $\mu\text{m}$  in length and are oval to triangular in shape with rounded edges. They are creamy-white in colour when deposited but darken to brown within 24 hours. They have a glutinous outer layer and a smooth inner shell, sometimes containing a subapical micropyle. Larvae develop through 5-11 instars which gradually increase in size up to 5-15 mm long. They have elongated cylindrical creamy-brown bodies with 2 distinctive stubby prolegs (one thoracic and one terminal abdominal) facilitating attachment to underwater substrates using rows of tiny hooks that enmesh with silk spun from adjacent glands. They have hardened head capsules with a small dorsal tubercle (egg burster), lateral eyespots, a pair of 4-segmented antennae and anterior mouths with opposable toothed mandibles that move pincer-like in a horizontal plane. Most species possess a prominent pair of anterior labral fans used for filter feeding, although some species lack these fans and use their mouthparts to scrape food from substrates. Early instars usually rely on cuticular respiration, but later instars develop posterior gills and mature larvae are distinguished by the presence of black gill spots on the thorax. Pupae are enclosed in dark-coloured conical silken cocoons 2-4 mm long which are attached to substrates by their pointed posterior ends. Simuliid pupae are readily identifiable by the presence of long branched or filamentous respiratory gills protruding from their blunted anterior ends. The pupae resemble adult stages with all appendages held close to the body. Adult black flies have small squat bodies 1-5 mm long (a few species up to 10 mm) with a characteristically humped thorax and broad wings. Despite their name, they are not always black with colouration but may range to grey, brown and even yellow-orange. They have small rounded heads with large compound eyes meeting at the midline in males (holoptic) but separate in females (dichoptic). They have a single pair of short bead-like antennae, each comprising a basal scape, pedicel and then 7-9 rounded flagellomeres lacking setae. The head has a short thick downward-directed proboscis flanked by a longer pair of maxillary palps (5-segmented) present in both sexes. The mouthparts (pair of mandibles, pair of maxillae, labrum and hypopharynx) are sheathed within the labium when not in use. Most piercing stylets are serrated or toothed in blood-feeding females but not in males. The ventral hypopharynx bears a longitudinal groove along which saliva flows during feeding. The alimentary tract consists of a tubular oesophagus leading to a globular proventriculus (with saccular diverticula) ultimately routed to the digestive midgut, then the hindgut (with excretory Malpighian tubules), rectum (with expandable ampulla) and terminal anus. The thorax is generally ovoid with a characteristic dorsal convex arch or hump. The scutum usually lacks setae and bristles but many species display coloured patterns of pigmentation. The mesothorax bears one pair of short broad wings, either smoky opaque or hyaline but never patterned, hairy or scaly. The wing membranes are supported by 6 primary veins [costa (C), subcosta (Sc), radius (R), media (M), cubitus (Cu), and anal (A)] which are thickened along the anterior margin and have a large anal lobe. Like other dipteran flies, the second pair of wings are highly reduced to a pair of posterior knob-like halteres used to stabilize flight. The ventral thorax is the point of attachment for 3 pairs of short hairless legs, each composed of 5 segments (coxa, trochanter, femur, tibia, tarsus) with the latter bearing tarsal claws that are either unarmed or toothed (in species feeding on mammals) or equipped with a thumb-like lobe (in species feeding on birds). The abdomen is ovoid and segmented, most without setae except for the first abdominal tergite being modified to form a prominent basal scale fringed with fine hairs. The abdominal covering is membranous, notably in females to accommodate significant expansion after bloodmeals. The abdomen typically has 7 pairs of lateral spiracles for respiration and the terminal segments are highly modified by external genitalia (ventral genital ducts, male claspers, female ovipositor). Males possess 2 testes connected by vas deferens to a seminal vesicle (with lateral accessory glands) leading to a tubular ejaculatory duct with a terminal bulb near the retractable copulatory aedeagus. Females have 2 ovaries (with polytrophic ovarioles) joined by tubular oviducts to a globular uterus (with associated spermatheca and accessory glands) leading to the vulva.

**Site of infection:** Black flies are free-living insects with aquatic developmental stages and free-flying adults which feed on plant sugars, although adult female flies of some species must also feed on vertebrate blood in order to produce eggs. These transient ectoparasites feed on a wide variety of mammalian and avian hosts, most species being stenoxenous and feeding on closely-related animals, both domestic and wild. Most blood-feeding black flies target bare unprotected skin with little or no hair, notably around the face, ears, neck, abdomen, legs and ankles, with some even attempting to crawl into facial orifices. Several species also exhibit some site specificity, where those that transmit *Onchocerca* to humans in Africa biting the lower limbs and trunk, while those in the Americas preferentially bite the scalp and upper body.

**Pathogenesis:** Female black flies are telmophagous (pool feeders) as they use their mouthparts to cut the skin and rupture capillaries causing blood to pool in the tissues from where it is sucked up using muscular pharyngeal pumps. They are determined feeders that are not easily interrupted and typically remain feeding over several minutes until satiated, often ingesting their own weight in blood. The saliva they inject at bite sites contains powerful chemicals with anticoagulant, vasodilatory, analgesic and even anaesthetic properties. Host pathological responses may be divided into 3 stages: local trauma to bites; progressive allergic responses to salivary components; and diminished health and productivity due to cumulative host stress. Feeding flies cause structural damage to cutaneous tissues resulting in focal lesions with erythema, haematoma and wheal formation, petechial haemorrhages, ulceration, blood loss, oedematous swellings, dermatitis, and pruritus which can persist for days. Clinical consequences appear to be more severe in young ungulates and nestling birds. Mass attacks by fly swarms have also been associated with sudden death characterized by acute stress, general petechial haemorrhages, anaemia, oedema of the larynx and abdominal wall, and sometimes acute toxemia and anaphylactic shock. Bites can be painful to the host resulting in considerable fly worry and biting-stress (annoyance, irritation) precipitating unusual avoidance behaviours (recumbency, quivering, fleeing, even stampedes) and self-trauma (due to biting, scratching, and rubbing) which may predispose wounds to secondary bacterial infections. Hosts may

become distracted from feeding, grooming and mating and demonstrate reduced productivity (reduced growth, poor weight gain or even weight loss, lower milk production and decreased egg production). Individuals with prolonged exposure to biting flies may also develop allergic reactions to salivary components (both immediate and delayed hypersensitivity), sometimes causing a systemic illness known as black fly fever characterized by headaches, nausea, vomiting, fever, lethargy, adenitis, localized dermatitis and occasionally asthmatic responses. In addition to being significant biting and nuisance pests to humans and livestock, many *Simulium* spp. may act as biological vectors for infectious diseases caused by viruses (eastern equine encephalitis, vesicular stomatitis in cattle, horses and pigs), protists (leucocytozoonosis and trypanosomiasis in poultry, some waterfowl and raptors) and filarial nematodes (mansonellosis and onchocerciasis, including the species *Onchocerca volvulus* causing river blindness in humans in Africa).

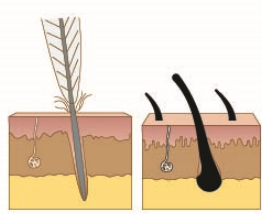
**Developmental cycle and mode of transmission:** Black flies undergo holometabolous (complete) metamorphosis whereby grub-like larvae transform in pupal cocoons to form winged adults. Egg deposition, larval development and pupation take place in aquatic environments, specifically in flowing water whether it be a trickling stream or raging river. Gravid females are oviparous and lay eggs on partially submerged substrates (stones, vegetation) or on the water surface, often in batches of 150-600 eggs although some species oviposit individual eggs. The eggs usually hatch in 2-12 days although this can be delayed for several weeks for many species due to unfavourable conditions (some species over-winter as eggs, while others may over-summer). The eggs of several species have also been shown to survive in moist sand along dried waterways for up to 2 years and then hatch *en masse* following flooding. Emergent larvae attach themselves to vegetation or rocks in flowing water using silken threads and small hooks on their prolegs. They are essentially sedentary although they can change their site of attachment to downstream locations if food becomes scarce or oxygen levels drop. Most species filter feed on detritus and micro-organisms using their labral fans, while other species living in pristine environments (such as glacial melt-waters) have lost their fans and scrape substrates for food. The larvae (and pupae) remain in flowing currents rather than stagnant waters as they require oxygenated water for respiration and survival. The kinetics of larval development depends on the species, prevailing environmental conditions (particularly temperature) and food availability. Most species moult through 5-11 larval instars (average 6-7) over a period of several weeks, but sometimes extended up to 1 year (some species over-winter as larvae). The final larval instar spins a conical cocoon with the narrow end attached to shallow submerged objects and the open end with the highly branched or filamentous respiratory gills facing downstream. Pupation generally takes 3-10 days and the immature adult emerges rising to the surface in a bubble of air. Adults emerge during the daytime, with males usually emerging first and then waiting to mate with emergent females, sometimes in swarms. Both males and females feed on plant nectar to derive energy. Not all species are blood-feeders and their females are obligatorily autogenous and may complete ovarian (gonotrophic) cycles (maturation of egg batches) using internal energy reserves. However, the females of other species are anautogenous and do require bloodmeals to produce eggs, completing each gonotrophic cycle 2-10 days after feeding. These species are therefore transient haematophagous ectoparasites on a range of vertebrate hosts. They often aggregate in trees along waterways and emerge in dense swarms when hosts become available. Females use a variety of senses to find hosts; particularly olfactory (exhaled carbon dioxide, body odours), thermal (body temperature), visual (size, shape, colour) and tactile (skin texture) cues. Black flies are moderate fliers and generally require low wind speed, although they can disperse for kilometres when wind-assisted. Most hosts that are bitten live close to running water and are attacked during the day in the outdoors (exophilic). Female flies live for 3-4 weeks and lay eggs in batches of 150-600 eggs but they usually only complete 2-4 gonotrophic cycles before dying. The duration of the entire life-cycle depends largely on the climate in which the fly species live, with many in cold regions being univoltine and only completing a single generation annually, many in temperate regions being multivoltine and completing around 7 generations annually while those in the tropics may complete up to 20 generations annually.

**Differential diagnosis:** Clinical signs exhibited by hosts (dermal lesions, inflammation and pruritus) are nonspecific and may be attributed to a range of aetiological agents (ectoparasites, microbes, allergic and other skin conditions). Nevertheless, black fly bites (and even black fly fever) may be suspected in affected hosts with relevant temporal and spatial histories (seasonal afflictions in proximity to flowing water). Diagnosis is dependent on the direct observation of biting flies but this can be difficult in nervous animals shying away from small flies. While black flies may be captured using baits or nets, their identification is difficult as many species are morphologically indistinguishable. Entomologists often resort to more holistic approaches to species identification and examine characteristics of aquatic pre-adult stages (eggs, larvae and pupae), but still refer to species 'groups' or 'complexes' in recognition of the potential existence of cryptic, sibling or cyto-species. Genetic karyotyping studies have detected unique banding patterns on polytene chromosomes from larval silk glands, and molecular biological studies on adult flies (particularly those implicated in the transmission of river blindness) are beginning to discover signature sequences in nuclear and mitochondrial genes amplified by polymerase chain reaction (PCR).

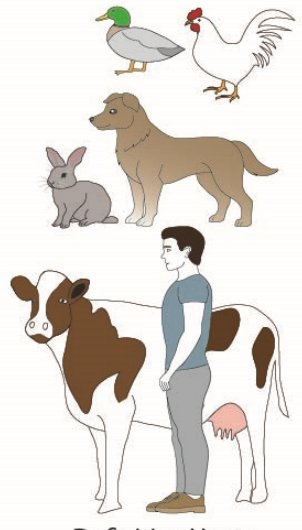
**Treatment and control:** Humans suffering from adverse reactions to black fly bites may be treated symptomatically with anti-inflammatory and antipruritic lotions or creams, as well as antibiotics for secondary infections as required. Those experiencing severe allergic reactions (including black fly fever) may require hospitalization and systemic treatment with glucocorticoids and antihistamines to alleviate hypersensitivity responses. Over the last few decades, a range of topical insecticides have been applied to animals in attempts to reduce the frequency of attack. Early studies reported good success using the organochlorine dichlorodiphenyltrichloroethane (DDT) but it has been discontinued due to rapid development of resistance as well as undesirable effects on non-target species. Subsequent studies reported successes with other organochlorides (methoxychlor), organophosphates

(temephos, malathion) and insect growth regulators (triazines), but most were not selective and had negative impacts on non-target species. Intensively-farmed livestock have responded well to treatment with macrocyclic lactones (ivermectin as pour-ons or impregnated in ear tags) and oils, greases or salves laced with repellents (permethrins, and even turpentine) applied to susceptible sites (particularly ears). Aerial and ground fogging with DDT and permethrin products have been used to kill free-flying adults in the environment, as well as larvae in aquatic habitats, but such measures have largely been abandoned due to ecological concerns and the recent development of alternative larvicidal treatments. Great success has been reported when spraying the environment with the entomopathogenic bacterium *Bacillus thuringiensis* var. *israelensis* whose endotoxins kill black fly larvae by disrupting the integrity of their midguts. Many countries have adopted control programmes involving spraying bacterial suspensions by hand or aircraft to a wide variety of waterways. Other attempts at biological control have evaluated mermithid nematodes, microsporidia, chytrid fungi and several viruses as parasites and pathogens of black flies. Some control has been achieved by reducing the suitability of potential breeding habitats by the physical removal of attachment sites in water (esp. trailing vegetation) and engineering irrigation systems to avoid fast currents (installing ponds and periodically manipulating water levels to expose larvae). Several animal management practices can also be used to reduce the incidence of fly attack, including housing animals indoors or building covered shelters as black flies do not venture inside darkened cooler areas or buildings. Insecticides and repellents can also be sprayed on surfaces or coverings around doors and windows. People may also adopt higher levels of personal protection, staying indoors during peak biting times (mornings and evenings), covering-up (wearing light-coloured clothing with gathered cuffs and collars, even wearing fine-mesh head-nets to avoid swarms when working outside) and using insect repellents (applying natural or synthetic chemicals to the skin or clothing). While many studies have shown that the repellent diethyltoluamide (DEET) may be used safely on humans, it should not be sprayed on animals as it may be toxic if ingested by licking, and several studies have suggested that it may not repel some *Simulium* species.

# Simulium

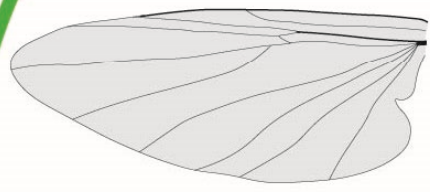


adult female (dorsal) (~ 4 mm)

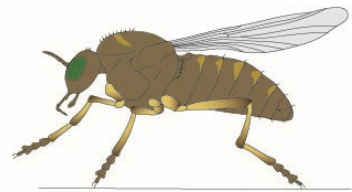


Definitive Hosts (mammals, birds)

adults free-flying, females of some species are transient ectoparasites (require bloodmeal for reproduction)



wing venation



resting posture

eclosion

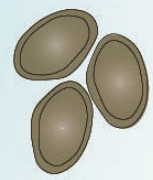
complete (holometabolous) metamorphosis



pupa (~ 4 mm)



free-living feeding larva (~ 10 mm)



eggs (~ 300 μm)

hatch

eggs laid on water or partly submerged substrates

development in aquatic habitats (flowing oxygenated waters)



*Simulium* adult



*Simulium* eggs



*Simulium* larva



*Simulium* pupa