

บรรณานุกรม

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ภาคผนวก

KEY TO THE SPECIES OF CULICOIDES OF SOUHEAST ASIA

- | | | |
|------|---|-----|
| 1. | Wing without distinct pale or dark area | 2 |
| | Wing with more or less distinct pale or dark areas..... | 9 |
| 2. | Male only; dististyle elongate, 1.5 times as long as basistyle, abruptly bent at base, slender and straight to slightly sinuate distally; apicolateral processes of ninth tergum fingerlike..... <i>uncistylus</i> n. sp. | |
| | Female; if males, dististyle gradually tapering and curving from base to tip..... | 3 |
| 3. | Spermathecae 2 | 4 |
| | Spermathecae 3 <i>kamrupi</i> Sen and Das Gupta | |
| 4. | Mandibular teeth vestigial; (antennal sensory pattern 3, 13-14).
..... <i>corti</i> Causey | |
| | Mandibular teeth strong and numerous | 5 |
| 5. | Antenal sensory pattern 3,5,7-12 <i>agas</i> n. sp. | |
| | Antenal sensory pattern otherwise | 6 |
| 6. | Antenal sensory pattern 3,7-10; wing with indistinct pattern | |
| | <i>coronalis</i> Lee and Reye | |
| | Antenal sensory pattern otherwise | 7 |
| 7. | Antenal sensory pattern 3, 10,12-14 <i>murrayi</i> n. sp. | |
| | Antenal sensory pattern 5, 7,9,11-14 or 3-7,9,11-14 | 8 |
| 8. | Antenal sensory pattern 3,5,7,9, 11-14; male antenna with short verticils, as in female <i>kusaiensis</i> Tokunaga | |
| | Antenal sensory pattern 3,7,9, 11-14; male antenna with plume.....
..... <i>garciai</i> n. sp. | |
| 9(1) | Second radial cell at least partially included in a pale spot | 10 |
| | Second radial cell wholly included in a dark spot | 117 |
| 10. | Three functional spermathecae present; second radial cell very long and broad; wing without distinct subapical palespot in cell R5 (except in <i>tenuipalpis</i>), although a pale mark involving all of wing tip may extend across extreme apex | |

of cell R5; thorax usually bright yellow in large part (Subgenus <i>Trithecoides</i>)....	11
Two functional spermathecae present; second radial cell, if very long, is narrow; cell R5 nearly always with a separate subapical or apical pale spot in addition to poststigmatic pale area at tip of second radial cell; thorax usually brown with paler marking	50

Subgenus *Trithecoides*

11. Mesonotum entirely dark brown, or yellow with dark brown area on anterior margin	12
Mesonotum uniformly yellow or pale brown, or brownish only in front of scutellum	27
12. Mesonotum predominantly dark brown, sometimes with paler markings	13
Mesonotum predominantly yellow or light brown with darker areas on anterior and humeral margins	20
13. Mandible with 6-8 curved teeth, distal ones largest; ducts of all three spermathecae joined at one point	14
Mandible with 10-15 small subequal triangular teeth; ducts of the two small spermathecae joined before duct of large one.....	16
14. Spermathecae unequal, with large, unsclerotized entrances to the ducts; palpal ratio less than 3.0; hindtibial comb with 4 spines; small species, wing 1.0 mm long	15
Spermathecae subequal, pyriform, with slender sclerotized necks; third palpal segment slender, palpal ratio 4.4; large species, large species, wing 1.5 mm long; hindtibial comb with 5 spines..... <i>tenuipalpis</i> Wirth and Hubert	
15. Wing tip broadly pale, with extensive pale areas between veins; mesonotum dark brown with small contrasting yellow areas near lateral margin and on disc <i>nanpui</i> Howarth	
Wing darker, with indistinct narrow pale apex; mesonotum brown.....	
..... <i>macfieii</i> Causey	
16(13) Halter pale; forefemur with subapical pale band.....	17

	Halter dark; forefemure dark distally or with rather indistinct pale band.....	19
17	Dark brown of mesonotum and light brown of upper pleuron abruptly meeting in a straight line laterally; antennal sensory pattern 3,11-15; (male parameres slender)	<i>elbeli</i> Wirth and Hubert
	Brown marking on mesonotum fading into light brown pleuron laterally; usually with darker brown margins on humeral angles	18
18	Female antennal sensory pattern 3, 13-15; male parameres slender	<i>tamada</i> Howarth
	Female antennal sensory pattern 3,11-15; male parameres massive tips recurved	<i>hinnoi</i> Howarth
19 (16)	Forefemur dark distally; antennal ratio 1.02-1.09 ; sensory pattern 3, 11-15; 12-15 mandibular teeth; palpal ratio 2.5-3.0; pale spot over second radial cell poorly contrasting	<i>sarawakensis</i> Wirth and Hubert
	Forefemur with indistinct subapical pale band; antennal ratio 1.11 – 1.19; sensory pattern 3, (12), 13-15; 11-12 mandibular teeth; palpal ratio 2.1-2.2 ; pale spot over second radial cell poorly contrasting	<i>raripalpis</i> Smith
20 (12)	Three subequal pyriform spermathecae with narrow sclerotized entrances to ducts	21
	One large and 2 small spermathecae with wide entrances to ducts	23
21	Mandible with 8-9 large recurved teeth; palpal ratio greater than 4; epi- and hypopharynx normal	<i>paksongi</i> Howarth
	Mandible with 12-23 teeth palpal ratio 3.0 or less; epi- and hypopharynx greatly expanded	22
22	Mandible with 12-15 large teeth, proximal ones largest; palpus very short, palpal ratio about 2; female tarsal claws bifid; parasitic on mosquitoes	<i>anophelis</i> Edwards
	Mandible with 19-23 large teeth, apical tooth large and separated from series of small triangular teeth, 4-5 proximal teeth very short, spinelike and directed distad; palpal ratio about 3 ; female tarsal claws simple	<i>paraflavescens</i> Wirth and Hubert

23	Mandible with 7 strong teeth, distal ones largest; hindfemur entirely dark <i>parahumeralis</i> n. sp.	
	Mandible with 10-17 small, subequal, triangular teeth	24
24	Hind femur with apical third pale; tip of wing broadly pale; spermathecae sausage-shaped, almost twice as long as wide; (halter pale; antennal sensory pattern 3,11-15) <i>allantothecus</i> n. sp.	
	Hindfemur dark or with indistinct subapical pale band; tip of wing narrowly pale; spermathecae not sausage-shaped	25
25	Halter infuscated; (hindfemur entirely dark; antennal sensory pattern 3, 11- 15)..... <i>qwqertzi</i> Causey	
	Halter pale	26
26	Antennal sensory pattern 3, 13-15; male parameres slender <i>tamada</i> Howarth	
	Antennal sensory pattern 3, 11-15; male parameres massive, tips recurved <i>hinnoi</i> Howarth	
27	Mandible with 8 large curving teeth, proximal ones slightly larger; (parasitic on mosquitoes; femora banded; wing with pale spot covering second radial cell nearly to base..... <i>baisasi</i> Wirth and Hubert	
	Mandible with teeth small and uniform or distal ones larger	28
28	Thorax and legs entirely yellow or pale brown	29
	Thorax or legs marked with brown	30
29	Thorax and legs entirely yellow; mandible with 9 very large, rakelike teeth, lacinia also strongly developed and rakelike; spermathecae ovoid with slender necks <i>acanthostomus</i> n. sp.	
	Thorax pale brown, legs with narrow apices of femora and tibiae pale brown; mandible with 7 short, broad, recurved teeth lacinia normal; spermathecae elongate with globular spices without slender necks <i>pendleburyi</i> n. sp.	
30 (28)	Mandible with vestigial teeth; proboscis and palpus very short <i>manikumari</i> n. sp.	

	Mandible with well-developed teeth; proboscis and palpus normal	31
31	Mandible with 21-24 teeth; spermathecae subequal and pyriform with short sclerotized necks and small openings to the ducts; hindfemur with broad pale band, apex narrowly infuscated ; wing pale –streaked, the apex not pale ; scutellum pale brown	<i>flavescens</i> Mafie
	Mandible with 7-16 teeth; spermathecae unequal, the opening to the ducts large (except in <i>nyungnoi</i> Howarth)	32
32	Mandible with 7-8 large curved teeth, distal ones usually largest	33
	Mandible with 10-16 small, subequal, triangular teeth	39
33	Three subequal pyriformspermathecae with short, narrow, sclerotized neck	<i>nyungnoi</i> Howarth
	Spermathecae with wide opening to duct	34
34	Postscutellum dark brown; halter pale or dark	35
	Postscutellum yellowish, rarely tinged with pale brown; halter dark; hindfemur with broad apical or subapical pale band	37
35	All knees broadly pale	<i>tomai</i> Howarth
	Hindfemur with distinct dark apex	36
36	Hindfemur dark to apex or rarely with narrow pale subapical band; halter usually dark; wing mostly dark, second radial cell only partly in a pale spot, which barely reaches media narrowly	<i>palpifer</i> Das Gupta and Ghosh
	Hindfemur with broad subapical pale band; halter pale; wing mostly pale, second radial cell almost completely in a pale spot, which crosses media broadly	<i>ruqulithecus</i> n. sp.
37 (34)	Third palpal segment long, cylindrical, palpal ratio 3.4-4.2	<i>cylndripalpis</i> n. sp.
	Third palpal segment shorter, and at least slightly broadened toward distal third	38
38	Foreknee pale; hindfemur pale to knee; larger species, wing 1.08 mm long; antennal ratio 1.16; large spermatheca shorter, rugulose	<i>luteolus</i> n. sp.

	Fore-and hindfemora usually with knees darked; smaller species, wing 0.94 m long; antennal ratio 0.99; large spermatheca longer, not rugulose	
	.....<i>subpalpifer</i> n. sp.	
39 (32)	Hindfemur with apical or subapical pale band	40
	Hindfemur dark to apex	46
40	Halter dark	41
	Halter pale or slightly infuscated	42
41	Wing largely pale on proximal half, apex dark; mesonotum brownish on posterior portion next to scutellum <i>albibasis</i> Wirth and Hubert	
	Wing not paler on proximal half, apex narrowly pale; mesonotum uniformly yellowish <i>gouldi</i> n. sp.	
42	Scutellum yellow	43
	Scutellum dark brown	44
43	Spermathecae subequal, elongate, usually sausage-shaped; wing extensively pale <i>triallantionis</i> Howarth	
	Spermathecae unequal, large one broader than long, conoidal, smaller ones subspherical; wing not extensively pale <i>flavisutellaris</i> n. sp.	
44	Hindfemur with subapical pale band covering almost half of femur wing tip indistinctly pale; antennal sensory pattern 3, 13-15 <i>parabarnetti</i> n. sp.	
	Hindfemur with narrow subapical pale band; pale area at wing tip broad and distinct; antennal sensory pattern 3, 11-5	45
45	Postigmatic pale spot in cell R5 covering distal 2/3 of second radial cell; subapical pale band on hindfemur prominent <i>barnetti</i> Wirth and Hubert	
	Postigmatic pale spot in cell R5 covering less than distal half of second radial cell; pale band on hindfemur less distinct <i>huberti</i> Howarth	
46 (39)	Antennal sensory pattern 3, 13-15	47
	Antennal sensory pattern 3, 11-15	48
47	Wing tip broadly pale <i>fordae</i> n. sp.	
	Wing tip slightly pale only in apices of cells R5 and M1 <i>tamada</i> Howarth	
48	Spermathecae saclike, broadest at apical third; wing tip dark; (midknee pale)	

	.....<i>dungnensis</i> n. sp.	
	Spermathecae not saclike; largest one broadest at basal third; wing tip usually narrowly to broadly pale	49
49	Disc of wing without pale spots behind medial fork; antenna and proboscis shorter, antennal ratio 0.93; palpal ratio 2.5; P/H ratio 0.64; male parameres and apicolateral processes on ninth tergum shorter	
	.....<i>flaviscutatus</i> Wirth and Hubert	
	Disc of wing with large pale spot in cell M2 behind medial fork; antenna and proboscis longer, antennal ratio 1.03; palpal ratio 3.0; P/H ratio 0.68; male parameres and apicolateral processes on ninth tergum longer	
	.....<i>laoensis</i> Howarth	
50	Distal pale spot (or second, if 3 are present) in cell R5 usually transverse, sometimes round, but never extending to near apex of cell R5; pale marking distinct	51
	Distal pale spot in cell R5 extending to apex of cell and usually longitudinally elongated, or pale spots very indistinct	93
51	Three distinct pale spots in each of cells R5 and M1; second radial cell short	
	.....<i>hui</i> Wirth and Hubert	
	Not more than 2 pale spots in each of cells R5 and M1 (not counting any division of the poststigmatic pale spot in cell R5 into 2 separate pale spots)	52
52	Wing with a separate pale spot overlapping midportion of vein M1, no pale spot straddling midportion of vein M1; 1 radial cell present, pale only at extreme apex (Group uncertain)	53
	Wing without a separate pale spot overlapping or lying just in front of midportion of vein M1; with or without a large pale spot straddling midportion of vein M2; 1 or 2 radial cells.....	54
53	Pale spot straddling midportion of vein M1; third palpal segment with sensilla scattered on entire length ; palpal ratio 3.2	
	.....<i>logipalpis</i> Delfinado	

	Pale spot lies on anterior side of midportion of vein M1; third palpal segment with sensilla scattered on distal half, palpal ratio 5.0	
	..... <i>perakensis</i> Kitaoka	
54	Wing with a large pale spot straddling midportion of vein M2.	55
	Wing without pale spot straddling midportion of vein M2; (second radial cell short and broad; anal cell with longitudinal pale streak and pale spots or <i>Orientalis</i> Group pattern, antennal segment cylindrical as in <i>Orientalis</i> Group) (Subgenus <i>Avaritia</i>)	
	..... <i>jacobsoni</i> Macfie	
55	Wing with 2 radial cells in female	56
	Wing with 1 radial cell in female (Subgenus <i>Haemophoructus</i>)	80
56	Wing with proximal part of vein Cu1 pale-margined on both side; second radial cell very short (Subgenus <i>Avaritia</i>)	
	..... <i>boophagus</i> Macfie	
	Wing with vein Cu1 never pale-margined on anal cell side (Subgenus <i>Hoffmania</i>)	57

Subgenus *Hoffmania*

57	Wing with proximal pale spot in cell M4 at or near mediocubital fork and with marginal pale spot in cell M4 not touching vein M3+4	58
	Wing not with above combination of character	61
58	Wing with r-m crossvein infuscated; proximal pale spot in cell M4 border vein M3+4 only, not reaching mediocubital fork	
	..... <i>insignipennis</i> Macfie	
59	Wing with a dark line in cell R5 extending from vein R4+5 across poststigmatic pale spot to distal dark area	
	..... <i>divisus</i> n.sp.	
	Wing without a dark line extending beyond vein R4+5 across post stigmatic pale spot	60
60	Wing with infuscation on vein R4+5 extending into poststigmatic pale spot to point where vein bends toward costa; pale spot over r-m crossvein narrow, sometime divided transversely at radius into 2 spots; halter pale	
	..... <i>peregrinus</i> Kiffer	
	Wing with infuscation on vein R4+5 not extending into poststigmatic pale spot;	

	pale spot over r-m crossvein broad; halter dark	<i>effusus</i> Delfinado	
61	Eyes separated		62
	Eyes contiguous		63
62	Anal cell with pale spot at base; dark area along vein R4+5 penetrating into poststigmatic pale spot; apex of vein M1 pale	<i>recurvus</i> Delfinado	
	Anal cell without pale spot at base; dark area along vein R4+5 not penetrating into poststigmatic pale spot; apex of vein M1 dark	<i>hirtipennis</i> Delfinado	
63	Third palpal segment without trace of pit		64
	Third palpal segment with definite round or irregular, sometimes subdivided pit		68
64	Hindfemur dark to tip		65
	Hindfemur broadly pale on distal portion		67
65	Halter dark; forefemur dark to tip; small species, wing 1.05 mm long	<i>indianus</i> Macfie	
	Halter pale; forefemur broadly pale apical; wing 1.11-1.21 mm long		66
66	Poststigmatic pale spot in cell R5 divided into 2 separate pale spots; vein M1, M2 and M3+4 with small pale spots at wing margin; sensilla scattered entire length of third palpal segment	<i>cheahi</i> Kitaoka	
	Poststigmatic pale spot in cell R5 not divided into 2 separate pale spots; vein M1, M2 and M3+4 without pale spots at wing margin; sensilla scattered on distal half of third palpal segment	<i>pikongkoi</i> Howarth	
67 (64)	Forefemur broadly pale apically; wing with dark spot in anal angle; cibarium without patch of spicules	<i>klossi</i> Edward	
	Forefemur dark to tip; wing without dark spot in anal angle; cibarium with patch of about 50 spiculate teeth	<i>spiculae</i> Howarth	
68(63)	Anal angle of wing broadly pale; pale spot present about midway along anterior margin of vein M1, sometime fused with poststigmatic pale spot in cell R5; (halter pale; mesonotum pale brown)	<i>parabubalus</i> n. sp.	
	Anal angle of wing with at least a dark spot (ordinarily without additional pale spot along anterior margin of vein M1)		69

69	Cell M4 with a small central dark spot enclosed by a C-shaped pale ring open to posterior wing margin	<i>orestes</i> n. sp.	
	Cell M4 without central dark spot enclosed by a C-shaped pale mark		70
70	Very large species, wing length 1.63 mm; wing dark with small, faint, pale marking, without pale spot at tip of vein M1; cell M4 and anal cell often entirely dark; anal cell dark at base	<i>brinchangensis</i> n.sp.	
	Small to large species, wing length less than 1.45 mm; base of anal cell with pale marking		71
71	Tibial comb with 6 spines (rarely 5); halter pale or dark		72
	Tibial comb with 4-5 spines; halter pale		75
72	Pale spot in cell M4 at most narrowly touching vein M3+4 anteriorly; poststigmatic pale spot in cell R5 not reaching vein M1		73
	Pale spot in cell M4 large and often connected anteriorly along vein M3+4 with a small proximal pale spot in mediocubital fork; poststigmatic pale spot in cell R5 broadly reaching and sometime crossing vein M1	<i>bubalus</i> Delfinado	
73	Hindtibial with tip broadly and distinctly pale; wing with more extensive pale spots		74
	Hindtibial with apex dark or narrowly and indistinctly pale; wing dark with small distinct pale spots	<i>lansangensis</i> Howarth	
74	Third palpal segment with round sensory pit, palpal ratio 2.9; halter dark	<i>innoxius</i> Sen and Das Gupta	
	Third palpal segment with irregular subdivided pit; palpal ratio 4.2; halter pale	<i>cameronensis</i> Kitaoka	
75	Tibial comb with 4 spines; male aedeagus with prominent subapical sclerotized spurs	<i>andrewsi</i> Causey	
	Tibial comb with 5 spines; aedeagus not as above		76
76	Third palpal segment not constricted beyond the pit; mandible with vestigial teeth	<i>carophilus</i> n. sp.	
	Third palpal segment slender beyond the pit; mandible with or without well		

	developed teeth	77
77	Poststigmatic pale spot in cell R5 not reaching vein M1; pale spot over r-m crossvein not produced angularly into base of cell R5	78
	Poststigmatic pale spot in cell R5 reaching and sometime crossing vein M1; pale spot over r-m crossing projecting angularly distad incell R5 and usually extending into cell M1	<i>malayae</i> Macfie
78	Pale spot over r-m crossvein narrow, usually interrupted by a dark line bordering radius; (small species, wing 1.06 mm long; mandibular teeth normal ; pale wing spots small)	<i>sumatrae</i> Macfie
	Pale spot over r-m crossvein broad, not interrupted along radius	79
79	Large species, wing length 1.43 mm, mandibular teeth vestigial; pale wing spots small	<i>kinabaluensis</i> n. sp.
	Smaller species, wing length 1.19 mm; mandibular teeth normal ; pale wing spots extensive	<i>paramalayae</i> n. sp.
80 (55)	Base of wing including anal angle dark; halter dark; legs dark brown with narrow pale bands	81
	Base of wing including anal angle pale; halter pale; legs usually broadly pale at fore-and midknees or entirely pale	83
81	Wing with pale spots well defined; al cell with 2 distal pale spots; hindtibial spur elongate	<i>calcaratus</i> n. sp.
	Wing with pale spots indistinct; anal cell with 1 distal pale spot; hindtibial spur elongate or normal	82
82	Radial cell with broad tip, costa displaced at this point; hindtibial spur elongate	<i>maculipennis</i> (Macfie)
	Radial cell with narrow tip, costa straight; hindtibial spur normal	<i>tawauensis</i> n. sp.
83 (80)	Hindfemur entirely yellow; mesonotum with disc yellowish; pale wing marking extensive; third palpal segment slender, palpal ratio 4.6	<i>mellipes</i> n. sp.
	Hindfemur dark on at least proximal half; wing marking and palpus various	84

84	Cell M4 with distinct pale spot at base of mediocubital fork	85
	Cell M4 without pale spot at base of mediocubital fork	86
85	Femora with broad distal pale bands; wing length 1.26 mm <i>boormani</i> Giles and Wirth Femora dark to apices; wing length 1.06 mm <i>hoffmanioides</i> n. sp.	
86	Large species, wing length 1.68- 1.80 mm; third palpal segment slender, palpal ratio 5.0-5.4	87
87	Mesonotum shining brownish black; distal pale spot in cell M1 small and located more than its own length from wing margin <i>nitens</i> Edwards Mesonotum with yellowish brown pattern; distal pale spot in cell M1 larger and usually almost meeting wing margin <i>gentilis</i> Macfie	
88	Hindfemur with distal third distinctly pale including knee; (mesonotum with disc yellowish) <i>unicus</i> Delfinado Hindfemur dark to tip or with faint subapical pale band, knee dark	89
89	Hindtibial comb with 4 spines; cell M2 without pale spot lying in front of mediocubital fork; legs pale with faint brown marking <i>kisangkini</i> Howarth Hindtibial comb with 5-6 spines; cell M2 with pale spot lying in front of mediocubital fork fused with pale streak at base of	
90	Distal pale spot in cell M2 not attaining wing margin; mesonotum uniformly dark brown, without yellowish markings	91
	Distal pale spot in cell M2 meets wing margin, at least narrowly; mesonotum with yellowish brown markings	92
91	Midknees narrowly, narrow bases of fore- and hindtibiae, and narrow apex of hindtibia distinctly banded with yellow antennal sensory pattern 3, (7,9), 11-15, sensilla usually present on 7 and 9 ; male ninth tergum with a single median lobe on caudal margin; thorax and legs with weak setae	
	.....<i>kinari</i> Howarth Pale leg marking indistinct, but more extensive than above; antennal sensory pattern 3, 11-15; male ninth tergum with a pair of distinct submedian lobes on	

	caudal margin; thorax and legs with strong bristly setae <i>gemellus</i> Macfie	
92	Distal pale spot in cell M1 at most narrowly meeting wing margin; second dark band at costal margin usually as broad or broader than pale band on each side; pale mesonotal marking limited; male ninth tergum with single median lobe on caudal margin <i>nyakini</i> Howarth	
	Distal pale spot in cell M1 broadly meeting wing margin; second dark band at costa margin distinctly narrower than adjacent pale bands; pale areas on disc of mesonotum extensive; male ninth tergum with broad median notch and prominent low sublateral lobes <i>gymnopterus</i> Edward	
93 (50)	Third palpal segment large and greatly swollen apically or spindle-shaped, tapering beyond the pit, which if round is never small and deep; wing macrotrichia usully numerous 94	94
	Third palpal segment small and not narrowed beyond the small round pit; wing macrotrichia sparse (Subgenus Avaritia) 105	105
94	Second radial cell at least twice as long as first, pale nearly to base, not narrowed distad; (large yellowish species) 95	95
	Second radial cell not more than twice as long as first 96	96
95	Small round palpal pit present; pale wing marking more extensive, confluent, apex of wing including tip of vein M1 pale; pale spot in cell M4 extending proximad along vein M3+4 to base of mediocubital fork <i>liui</i> Wirth and Hubert	
	Palpal pit absent, sensilla scattered on surface of third segment; pale wing marking not confluent, tip of vein M1 dark at wing margin; pale spot in cell M4 not produced proximad along vein M3+4 <i>tenuifasciatus</i> n. sp.	
96	Cell R5 distally without pale spot or with only a small round pale spot at tip of cell 97	97
	Cell R5 with a large pale area more or less filling distal half of cell, pale wing markings usually extensive 98	98
97	Cell R5 without pale spot in distal portion ; pale spot present in cell M2 just in front of mediocubital fork; antennal sensory pattern 3-14 (ornatus group, part)..... <i>pampangensis</i> Delfinado (part)	

	Cell R5 with a definite small round pale spot at tip of cell; pale spot absent in cell M2 just in front of mediocubital fork; antennal sensory pattern 3, 13-15 (<i>neavei</i> group, part)	<i>kepongensis</i> n. sp.	
98 (96)	Antennal sensory pattern 3, 7-10; r-m crossvein dark; wing pattern inconspicuous; macrotrichia sparse, short and spinelike	<i>coronalis</i> Lee and Reye	
	Antennal sensory pattern 3-14, 3-9, 11-14,3,10,12-14,3-15 or 3, 11-15; r-m crossvein in a pale spot		99
99	Antennal sensory pattern 3, 11-15		100
	Antennal sensory pattern 3-14, 3-9, 11-14, 3, 10, 12-14 or 3-15		101
100	Wing pale yellowish with 3 conspicuous dark brown spots on anterior margin, faintly continued transversely to hind wing margin; halter pale	<i>trimaculipennis</i> n. sp.	
	Wing grayish with faint streaklike markings, mainly along veins; halter dark	<i>novairelandi</i> Tokunaga	
101	Antennal sensory pattern 3, 10, 12-14 or 3-14, sensilla absent on 15; halter dark		102
	Antennal sensory pattern 3-15; halter pale		103
102	Two large pale areas in cell R5, distal on filling apex of cell; base of mediocubital fork dark; antennal sensory pattern usually 3-14, sensilla sometimes absent on some of proximal series; third palpal segment with sensilla borne on surface of segment or in subdivided open pits or irregular concave area	(<i>peliliouensis</i> Tokunaga)	
		<i>Pongsomiensis</i> Chu	
	At least three irregular pale areas in cell R5, distal one arcuate and not filling apex of cell; base of mediocubital fork with pale margin; antennal sensory pattern 3,10, 12-14; third palpal segment with shallow round pit	<i>pictilis</i> n. sp.	
103	Spermathecae small; legs brownish; eyes nearly contiguous; third palpal		

segment with small round pit; wing marking extensive ;

.....*papuensis* Tokunaga

Spermathecae large; legs yellow 104

104 Third palpal segment with small round pit; eyes moderately separated; wing marking distinct; male parameres slender distally*pangkorensis* n. sp.

Third palpal segment with larger pit; eyes nearly contiguous; wing marking indistinct; male parameres massive distally*maai* n. sp.

Subgenus *Avaritia*

105(93) Eyes hairy; second radial cell pale only on extreme tip, on distal side of vein R4+5; legs pale yellowish*actoni* Smith (part)

Eye bare; second radial cell pale on distal fourth to half; leg brownish in part 106

106 Wing with pale spots very indistinct, only pale spots over r-m crossvein and second radial cell prominent, remainder grayish darker along veins, sometimes faint spots present; halter dark brown; leg dark, pale only at base of hindtibia*pungens* Meijere

Wing with large, distinct pale spots at least in apex of cell R5; legs pale or dark with prominent bands 107

107 Anal cell with basal portion entirely pale; cell M2 with area in front of mediocubital fork pale 108

Anal cell with basal portion dark or at least with dark streak cell M2 with area in front of mediocubital fork dark 113

108 Antennal sensory pattern 3, 12-15 ; halter pale 109

Antennal sensory pattern 3, 12-15 ; halter infuscated 110

109 Wing with dark mark on vein M2 narrowed subapically by a posterior broadening of pale spot in cell M1 distinctly before wing margin; third palpal segment with sensory pit shallow 111

Wing with dark mark on vein M2 uniformly broad subapically, narrowed distally at wing margin; third palpal segment with sensory pit distinct*brevitarsis* Kieffer

- 110 Third palpal segment with indistinct pit, the margins not definite
.....*nudipalpis* Delfinado
Third palpal segment with indistinct pit with well –defined sunken
.....*imicola* Kieffer
- 111 Legs pale yellowish with indistinct markings, knees yellow; thorax yellowish
brown; wing with indistinct markings, pale areas large and diffuse between the
veins*brevipalpis* Delfinado
Legs dark with distinct pale bands, knee spots blackish, at least on one pair of
legs; thorax dark brown ; wing marking distinct 112
- 112 Wing vein M2 with isolated dark spot at base cut off from dark area over base
of vein M1 and from distal dark area on vein M2 by pale areas encroaching
from cells M1 and M2; dark mark on vein M2 ends distally in a point at wing
margin; male ninth tergum with prominent submedian lobes
.....*flavipunctatus* Kitaoka
Wing vein M2 with dark area continuous from base to tip, pale spots in cells M1
and M2 not quite meeting on vein; male ninth tergum with broadly rounded
sublateral lobes*fulvus* Sen and Das Gupta
- 113 Large species, wing length 0.85-1.20 mm, third palpal segment long and
slender with small round pit, palpal ratio 2.9-3.1; sensilla chaetica (verticils) on
segments 11-15 usually reduced 114
Smaller species, wing length 0.82 mm; third palpal segment shorter and stouter,
palpal ratio 1.9 sensilla chaetica well developed on segments 11-15
.....*dumdum* Sen and Das Gupta
- 114 Cell M2 with pale area absent or indistinct immediately distad of level of
mediocubital fork; pale markings in anal cell faint, veins forming radial cell
especially strong 115
Cell M2 with distinct pale spot or streak present just distad of level of
mediocubital fork; pale marking in anal cell distinct; veins forming radial cells
not unusually strong 116
- 115 Large blackish species, wing length 1.43 mm; wing marking more contrasting;
spermathecae large, darker, without necks (0.071 by 0.054 mm)

-*pastus* Kitaoka
- Smaller brownish species, wing length 1.00-1.20 mm; wing markings more diffuse; spermathecae small (0.047 by 0.038 mm); paler with slender necks
-*maculatus* (Shiraki)
- 116 A quadrate dark spot present at tip of vein M2 entirely cut off from proximal dark portion of vein by pale area crossing from cell M1 to cell M2; third palpal segment short and stout; male aedeagus short with convex sides and bifid tip, basal arch low; (first dark costal marking as in *orientalis*; male ninth tergum bilobate)*wadai* Kitaoka
- Distal portion of vein M2 not separated from dark midportion of vein by a pale area crossing vein from cell M1 to cell M2; third palpal segment longer and more slender; male aedeagus longer with straight sides and simple tip
-*orientalis* Macfie

Second radial cell dark at apex

- 117 (9) Wing with only 1 distinct pale spot, at end of costa on anterior margin; crossvein r-m dark; large species with dark stigma*majorinus* Chu
- Wing with 2 or more pale spots 118
- 118 Wing with only 2 pale spots, one over r-m crossvein and other at end of costa, both on anterior margin of wing
- Wing with more than 2 pale spots, sometimes posterior one very faint 121
- 119 Third palpal segment with sensory pit opening by broad pore antennal ratio 1.25; legs without pale rings*flumineus* Macfie
- Third palpal segment with sensory pit opening by much smaller pore 120
- 120 Antennal sensory pattern 3-15, sensilla usually small and one to a segment; antennal ratio 1.12; fore- and midfemora with subapical, and all tibiae with subbasal, narrow pale rings*wenzeli* Delfinado
- Antennal sensory pattern 3-14, sensilla prominent and usually at least two to a segment; antennal ratio 1.40; legs without pale*okinawensis* Arnaud
- 121 Wing without pale spot in cell M1 122
- Wing with 1 to 3 pale spots in cell M1 125

- 122 Wing without macrotrichia; small species, wing length 0.57 mm; costa short, costal ratio 0.53; second radial cell vestigial (actoni Group)
.....*minimus* n. sp.
- Wing with dense long macrotrichia to base; large species, wing 1.0-1.4 mm long ; costa long costal ratio 0.58; second radial cell large, open 123
- 123 Base of mediocubitus without pale spots; cells M2 and M4 with indistinct pale spots; third palpal segment broad and swollen to base with deep pit opening by smaller pore 124
- Base of mediocubitus with a small distinct pale spot; cells M2 and M4 without pale spots; third palpal segment elongate with shallow round pit
.....*dryadeus* Wirth and Hubert
- 124 Palpal pore round; spermathecae oval, slightly unequal; mandible with 12 teeth
.....*siamensis* n. sp.
- Palpal pore elongate; spermathecae subequal, with tapering necks; mandible with 16 teeth*nigripes* n. sp.
- 125 (121) Wing with definite pale spots straddling vein M1 and M2 at about midlength
..... 125
- Wing with distal pale spots located mainly between veins, none straddling vein M1 (basal pale spot in cell M1 extending over vein M2 in *simillis* and *selangorensis*) 128
- 126 Distal pale spot in cell R5 small, round, and well separated from wing margin; third palpal segment with deep pit 127
- Distal pale spot in cell R5 elongate and broadly meeting wing margin; third palpal segment with scattered sensilla*pseudocordiger* n. sp.
- 127 Blackish species; halter and legs dark; wing dark gray with discrete small pale spot, those in cells M1, M2 and M4 lying far from wing margin
.....*bigeminus* n. sp.
- Brownish species with pale halter and legs; wing paler with larger, less definite pale spots, those in cells M1, M2 and M4 lying near or touching wing margin
.....*keantanensis* n. sp.
- 128(125) Cell M1 with 3 pale spots; cell R5 with 2 pale spots in distal half 129

	Cell M1 with 1 or 2 pale spots, the proximal one sometimes extending over vein M2	130
129	Third palpal segment with a small deep pit; antennal sensory pattern 3-14	
	.....<i>circumbasalis</i> Tokunaga	
	Third palpal segment with irregular open sensory area; antennal sensory pattern 3, 8-10	
	.....<i>shorti</i> Smith and Swaminath	
130	Cell M1 with only 1 pale spot	131
	Cell M1 with 2 pale spots	136
131	Pale spot present immediately anterior to mediocubital fork	132
	Pale spot absent anterior to mediocubital fork (third palpal) segment slender, with small round pit; fourth tarsomere cylindrical; antenna slender, proximal segment elongate	135
132	Fourth tarsomere cordiform; vein M1 pale bordered; pale spot present straddling base of vein M2; (third palpal segment very short and swollen, with sensilla borne on surface; antenna stout, proximal segments transverse to moniliform, sensilla coeloconica present on segments 3-14)	
	.....<i>pseudocordiger</i> n. sp.	
	Fourth tarsomere cylindrical; vein M1 not pale bordered; no pale spot straddling base of vein M2	133
133	Pale spot in cell M1 located near wing margin; radial cells narrow; pale spot over r-m crossvein located just distad of vein	134
	Pale spot in cell M1 located at midlength of cell; radial cells unusually broad; pale spot over r-m crossvein centered on vein third palpal segment with shallow irregular pit	
	.....<i>yoshimurai</i> Tokunaga	
134	Third palpal segment with deep round pit opening by a small pore; halter pale; male aedeagus with caudolateral spurs	
	.....<i>distinctus</i> Sen and Das Gupta	
	Third palpal segment with a large round shallow sensory pit; halter dark; male aedeagus without caudolateral spurs	
	.....<i>arenicola</i> Howarth	
136(131)	Small species, wing length 0.74 mm; macrotrichia very sparse; costa short, costal ratio 0.56; antennal sensory pattern 3,12-15	
	.....<i>actoni</i> Smith	
	Large species, wing length 1.08 mm; macrotrichia long and numerous; costal	

	ratio 0.66; antennal sensory pattern 3, 11-15	<i>macclurei</i> n. sp.	
136(130)	Pale spot present in distal portion of cell R5		137
	No pale spot present in cell R5 distal to level of poststigmatic pale spots		
	(<i>ornatus</i> Grop, part)	<i>pampangensis</i> Delfinado	
137	Cell R5 with small, usually more or less round, pale spot at extreme apex and with no pale spot lying between this spot and poststigmatic pale spot		138
	Cell R5 with distal pale spot located subapically and usually longitudinally elongate or irregular, if small and apical there is also a pale spot between it and poststigmatic pale spot (s); distal pale spot sometime large, apical and irregular		154
138	One saclike spermatheca present (Subgenus Meijerehelea)		139
	Two spermathecae present		144

Subgenus Meijerehelea

139	Wing without pale spot in cell R5 posterior to radial cells and midway between r-m crossvein and poststigmatic pale spot		140
	Wing with pale spot present in this location		141
140	Two separate poststigmatic pale spots in cell R5, the posterior one located slightly proximad of the one lying at end of costa; wing marking very prominent; spermathecae elongate pear- shaped		
	.....	<i>arakawae</i> (Arakawa) (part)	
	Only 1 large transverse poststigmatic pale spot in cell R5; wing marking faint; spermatheca broad and oval	<i>hegneri</i> Causey	
141	Poststigmatic pale spot with distoposterior extension toward vein M1, or with separate spot at this angle to poststigmatic pale spot; spermatheca sagittate, widest near proximal third	<i>histris</i> Johannsen	
	Poststigmatic pale spot without distoposterior extension, but with a separate posterior spot located slightly proximad		142
142	Spermatheca sagittate, widest near proximal third; palpus elongate, third segment 5 times as long as broad; proximal pale spot in cell R5 touching vein M1 but not reaching radius	<i>proxillipalis</i> n. sp.	
	Spermatheca widest toward apex; third palpal segment 1.1-2.5 times as long as		

	broad	143
143	Proximal pale spot in cell R5 touching vein M1 but not reaching radius; spermatheca widest near distal third, tapering to base of duct <i>guttifer</i> (Meijere)	
	Proximal pale spot in cell R5 lying near to or touching radius but not reaching vein M1; spermatheca saclike, widest near blunt apex <i>arakawae</i> (Arakawa) (part)	
144(138)	Cell M2 with a pale spot lying immediately in front of mediocubital fork (<i>Clavipalpis</i> Group, part)	145
	Cell M2 without pale spot lying immediately in front of mediocubital fork (<i>Shermani</i> Group)	150

Clavipalpis Group

145	Poststigmatic pale spot in cell R5 in form of a trilobed spot extending from costal margin to vein M1; antennal sensory pattern 3, 8-10	
	.....<i>clavipalpis</i> Mukerji	
	Poststigmatic pale spot in cell R5 usually divided into 2 separate pale spots	146
146	Posterior poststigmatic pale spot touching vein M1 posteriorly	147
	Posterior poststigmatic pale spot located midway between anterior poststigmatic pale spot and vein M1, not touching latter	148
147	Proximal pale spot in cell M1 laps over vein M2 into cell M2; third palpal segment slender with small deep pit; antennal sensory pattern 3,10, 12, 14 <i>palpisimilis</i> n. sp.	
	Proximal pale spot in cell M1 not lapping over vein M2 into cell M2; third palpal segment swollen with broad shallow pit ; antennal sensory pattern 3,5,7- 10	<i>huffi</i> Causey
148	Third palpal segment swollen to base, with deep pit opening by small pore <i>parviscriptus</i> Tokunaga	
	Third palpal segment swollen distally with a shallow pit	149
149	Proximal pale spot in cell M1 laps over vein M2 into cell M2; separate subapical pale spot in cell M2 absent; cibarial armature absent; male aedeagus	

without caudolateral spurs but with distal process extremely slender and pointed
*similis* Carter, Ingram and Macfie
 Proximal pale spot in cell M1 not crossing vein M1caudad; a separate round
 subapical pale spot present in cell M2 past level of mediocubital fork; male
 aedeagus with caudolateral spurs present, distal process parallel-sided and
 blunt-tipped*notatus* Delfinado

Shermani Group

150 (144)	Cell M2 with 1 pale spot present distal to level of mediocubital fork Cell M2 with 2 pale spots present distal to level of mediocubital fork	151 152
151	Third palpal segment large with deep pit opening by small pore; antennal sensory pattern 3-9, 11-14; wing macrotrichia numerous; halter dark; spermathecae without necks <i>shermani</i> Causey Third palpal segment small with shallow open sensory area; antennal sensory pattern 3, 8-10, 12; wing macrotrichia scanty; halter pale <i>minipalpis</i> n. sp.	151 152
152	Two pale spots (may be fused in a double spot) distally in anal cell; palpal pit broad and shallow; antennal sensory pattern 3, 11-14; wing markings distinct on distal and posterior wing margin One pale spots distally in anal cell; palpal pit deep and round, opening by smaller pore; antennal sensory pattern 3-11, 13-14; wing marking faint on distal and posterior part of wing <i>thurmanae</i> n. sp.	153 153
153	Wing only sparsely hairy and only on distal half; pale wing marking more extensive; sensilla borne singly on antennal segments <i>geminus</i> Macfie Wing with long hairs numerous distally and along posterior margin to base of anal cell; pale wing markings more restricted; sensilla borne several to a segment on antenna <i>marginatus</i> Delfinado	153 153
154(137)	One sclerotized functional spermatheca present Two sclerotized functional spermathecae present	155 157
155	Pale spot over r-m crossvein containing a dark central spot; eyes narrowly	155

	separated; antennal sensory pattern 3-14 (subgenus Betranmyia)	156
	Pale spot over r-m crossvein without dark central spot; cell M4 with dark central spot; eyes broadly separated; antennal sensory pattern 3, 8-10 (Subgenus Monoculicoides)	
156	Proximal pale spot in cell M1 and subapical pale spot in cell M2 each with a dark spot in center surrounded by a pale halo; halter dark; male parameres joined by a sclerotized basal bridge; aedeagus with a slender, ventrally bent, sclerotized peg at tip	<i>homotomus</i> Kieffer
	Proximal pale spot in cell M1 and subapical pale spot in cell M2 not containing dark spots in center; halter pale; male parameres not joined by a basal sclerotized bridge; aedeagus with simple, blunt tip	<i>circumscriptus</i> Kieffer
157(154)	Pale spot present lying immediately adjacent to anterior side of ediocubital fork	158
	No pale spot lying immediately adjacent to anterior side of mediocubital fork	166
158	Distal pale spot in cell R5 rounded, hourglass-shaped or double, situated in or across cell at distal 0.6; antennal sensory pattern 3, 8-10 or 3-15	159
	Distal pale spot in cell R5 very large, extending to wing tip, or divided longitudinally into 2 spots in apical half of cell; antennal sensory pattern usually 3, 10,12, 14	161
159	Cell R5 with separate small round pale spot between distal spot and poststigmatic pale spot(s); third palpal segment moderately swollen with shallow with shallow sensory pit; antennal sensory pattern 3,8-10	<i>oxystoma</i> Kieffer
	Cell R5 without pale spot lying between poststigmatic and distal pale spots; third palpal segment swollen to base with deep sensory pit; antennal sensory pattern 3-15	160
160	Vein M2 with pale spot straddling midportion; antennal ratio 1.43, distal segments; proboscis elongate, P/H Ratio 0.83	

	.....<i>selangorensis</i> n. sp.	
	Proximal pale spot in cell M1 does not straddle vein M2; antennal ratio 1.2, distal segments not so elongate; palpal pit extends proximad to midlength of third segment; proboscis shorter, P/H Ratio 0.52	<i>jefferyi</i> Kitaoka
161(158)	Distal pale spot in cell R5 irregularly oval, not emarginated on anterior side	162
	Distal pale spot in cell R5 containing a small anteriodistal dark spot, thus appearing crescent-shaped, open anteriorly or completely divided into two separate spots	163
162	Anal cell with 1 pale spot in distal portion	<i>yasumatsui</i> Tokunaga
	Anal cell with 2 pale spot in distal portion.....	<i>cambodiensis</i> Chu
163	Cell R5 with an elongate crescent- shaped pale spot distally; antennal sensory pattern 3, 10,12,14 or 3,10,12-14; veins M1, M2, M3+4 and Cul dark at apices	164
	Cell R5 with 2 separate pale spots on distal half; veins M1, M2, M3+4 and Cul pale-borded distally; antennal sensory pattern 3,8-10	<i>perornatus</i> Delfinado
164	Pale wing spot in cell M4 not bordering vein Cul; pale wing spots extensive and less distinct; palpal pit irregular.....	<i>delfinadoae</i> n. sp
	Pale spot in cell M4 with an extension bordering vein Cul; pale wing spots less extensive but distinct; palpal pit round	165
165	Poststigmatic pale spot extends proximad to involve vein R4+5 and narrow tip of second radial cell; distal arcuate pale spot in cell R5 narrowly arcuate without proximal V-shaped expansion or isolated distal round spot	<i>pictilis</i> n. sp.
	Poststigmatic pale spot not including vein R4+5 at tip of second radial cell; distal arcuate pale spot in cell R5 divided into a V-shaped proximal portion and an isolated round distal portion	<i>perornatus</i> Delfinado (part)
166 (157)	Fourth tarsomere at most slightly broadened, not cordiform; sensilla coeloconica present on some or all of antennal segment 3-14 (except in <i>papuensis</i> with 3-5);	

	spermathecae usually with sclerotized necks	167
	Fourth tarsomere distinctly cordiform; spermathecae without sclerotized necks; antennal sensory pattern 3-15; (wing sparsely hairy at apex)	
	.....<i>cordiger</i> Macfie	

Ornatus group (part) etc.

167	Distal pale spot in cell R5 usually attaining apex of cell	168
	Distal pale spot in cell R5 round or oval, not extending to apex of cell	171
168	Halter pale or very slightly darkened; femora pale basally	169
	Halter dark; femora unbanded, entirely dark; (one oblique poststigmatic pale spot in cell R5; tibiae with sub-basal, narrow pale rings)	
	.....<i>mcdowelli</i> Delfinado	
169	Anal cell with 1 distal pale spot; 2 separate poststigmatic pale spots in cell R5; antennal sensory pattern 3, (4,5,6,8), 11-14	<i>ornatus</i> Taylor
	Anal cell with 2 distal pale spot; 1 large poststigmatic pale spot in cell R5; antennal sensory pattern 3-15	170
170	Spermathecae very large, ovoid, tapering to long stout necks; second radial cell dark to tip	<i>niphanae</i> n.sp.
	Spermathecae much smaller, neck shorter; second radial cell may be pale distally	<i>papuensis</i> Tokunaga (part)
171(167)	Anal cell with only 1 distal pale spot	172
	Anal cell with 2 distal pale spots, the posterior one sometimes indistinct in some specimens	179
172	Antennal sensory pattern 3, (11), 13-14; spermathecae large and subspherical with long slender sclerotized necks; eye hairy	173
	Antennal sensory pattern 3-9, sensilla also present on some of distal segments; eyes hairy or bare	174
173	Mandible with 5-6 rudimentary teeth; proboscis short P/H Ratio 0.52; antennal sensory pattern 3-4; antennal ratio 0.97; palpal ratio 1.5	<i>corti</i> Causey (part)
	Mandible with 10-14 teeth; proboscis of normal length; antennal sensory pattern 3, 11, 13-14; antennal ratio 1.06; palpal ratio 2.3	

	.....<i>griffithi</i> n.sp.	
174	Antennal sensory pattern 3-10, 11, 14 (palpal pit small and deep; spermathecae large and subspherical with long slender necks distal pale spot in cell M1 often extending to wing margin) <i>infulatus</i> Delfinado (part)	
	Antennal sensory pattern 3-14 (sometime absent on 10 in <i>damosus</i>)	
	.....	175
175	Eyes hairy; (hindtibia dark to base; wing marking indistinct; halter dark)	
	.....<i>palawanensis</i> Delfinado	
	Eyes bare	176
176	Hindtibia dark to base; wing marking indistinct, sometime only two anterior pale spots present; halter very dark; (eyes moderately separated; spermathecae short) <i>flumineus</i> Macfie (part)	
	Hindtibia with sub-basal pale ring; wing marking distinct; halter pale or dark	
	.....	177
177	Halter dark; (wing markings restricted but distinct; eyes narrowly to broadly separated; spermathecae much longer than broad)	
	.....<i>damosus</i> Delfinado	
	Halter pale	178
178	Two pale spots in cell M2 past mediocubital fork; poststigmatic pale spot in cell R5 distinctly oblique; wing macrotrichia dense; third palpal segment slender at base <i>quatei</i> n. sp.	
	One pale spots in cell M2 past mediocubital fork; poststigmatic pale spot in cell R5 nearly transverse; wing macrotrichia scanty; third palpal segment swollen to base <i>pseudopalpis</i> n. sp.	
179(171)	Spermathecae oval, tapering abruptly to slender necks	180
	Spermathecae slightly elongate, distinctly pyriform, tapering gradually to necks; halter dark <i>hewitti</i> Causey	
180	Antennal sensory pattern 3, 8-10 <i>fadzillii</i> Kitaoka	
	Antennal sensory pattern includes sensilla on segments 13-14	180
181	Antennal sensory pattern 3-10, 13-14 (sensilla sometimes missing on 4,6,8	

	and/or 10)	<i>infulatus</i> Delfinado	
	Antennal sensory pattern 3-14		182
182	Halter dark; indistinct pale spot anterior to midportion of medicubital stem	<i>circumbasalis</i> Tokunaga (part)	
	Halter pale; distinct pale spot staddling midportion of mediocubital stem	<i>quatei</i> n. sp. (part)	

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Publications

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Current Project

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Publications

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