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Photomicrographs of the male terminalia of Scandinavian Drosophilidae (Diptera)

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Black and white photomicrographs of the internal male terminalia of 77 species of Scandinavian Drosophilidae, which were redescribed and illustrated in a book in the series «Fauna Entomologica Scandinavica», are presented. A list of corrections to mistakes in the same book is also included.

Keywords: Internal male genitalia, aedeagus, hypandrium, Fennoscandia, pictures

INTRODUCTION

While preparing illustrations of the male terminalia used in the redescriptions of Scandinavian Drosophilidae (Bächli *et al.* 2004), photomicrographs of all microscope slide mounts were taken as well. Usually, the modern descriptions of drosophilid species are accompanied by line drawings which are two-dimensional interpretations of the three-dimensional terminalia, giving some hints about the connections and potential articulations among its different sclerites, their relative position and detailed structure. For the majority of species, however, the overall shape of the internal terminalia allows their prompt identification. Such standardized views can also be obtained by photomicrographs, which must always be regarded as complementary sources to the published line drawings. We are convinced that the pictures presented below, most of them combined in plates according to genus or species group and enlarged to the same magnification, will be helpful in this regard.

In addition, we take the occasion to present a list of corrections, and clarifications of ambiguities, to the data in the same book.

MATERIAL AND METHODS

Refer to Bächli *et al.* (2004) for details regarding terminalia preparations. The terminalia mounted on microscope slides were photomicrographed in left lateral views using Agfa PAN 25 ASA negative film and a Zeiss Photomicroscope with an 6.3x objective. Unless otherwise stated in the figure captions, all the photomicrographs were taken from the same specimens used for preparing the line drawings. Additional specimens are deposited in the collections of the Zoologisches Museum der Universität Zürich. Detailed label were listed in Tab. 1 of Bächli *et al.* (2004: 332–336), and in the present paper only approximate collection sites, followed by the respective countries, are cited in the captions, except for the additional speci-

mens where detailed data are provided here. Whenever in the same plate, all illustrations were obtained from negatives scanned and enlarged to the same magnification.

RESULTS

An alphabetical list of species epithets dealt with here is presented in Tab. 1, containing references to the figure and page numbers of their respective line drawings published by Bächli *et al.* (2004). For some species, additional pictures of the aedeagus and associated sclerites only, i.e. not including the hypandrium, are included aiming to add clearer views which may be helpful.

Three species were intentionally excluded here, because their respective photomicrographs have already been published: *Drosophila subarctica* Hackman, 1969 and *Drosophila vireni* Bächli, Vilela and Haring, 2002 (see Bächli *et al.* 2002: 319), and *Scaptodrosophila rufifrons* (Loew, 1873) (see Bächli *et al.* 2005: 360).

CORRECTIONS TO BÄCHLI *ET AL.* (2004)

1) In the key to *Drosophila* species, four awkward errors have occurred:
– p. 129 left-hand column, couplet 37, line 14: 42 should be 50
– p. 129, left-hand column, couplet 38,line 22: 50 should be 42
– p. 129, right-hand column, couplet 42, line 31: 42(37) should be 42(38)
– p. 130, right-hand column, couplet 50, line 12: 50(38) should be 50(37)

2) Minor corrections:
– p. 1, right-hand column, line 15: read http://www.faunaeur.org
– p. 15, left-hand column, line 10: read ... and is ... instead of ... which are ...
– p. 17, right-hand column, line 12: read ... and therefore could not be ...
– p. 17, right-hand column, lines 46-47: read ... an exact ... instead of ... axed ...
– p. 19, left-hand column, line 36: read *Cacoxenus perspicax* (Knab, 1914)
– p. 19, right-hand column, line 14: read *Phortica semivirgo* (Máca, 1977)
– p. 27, right-hand column, line 14: read ... weakly sclerotized... instead of ... hardly sclerotised ...
– p. 30, right-hand column, lines 20–21: delete (microtrichose in some Oriental species)
– p. 48, right-hand column, line 13: read (Figs 61, 65, 66, 106–109)
– p. 68, Figs 150 and 151: refer to the Figs 146 and 147 (p. 65) for labelling of the sclerites which are from top to bottom in the same sequence; additionally read 'posterior ejaculatory duct' instead of 'ejaculatory'
– p. 71, left-hand column, line 33: read *P. semivirgo* (Máca)
– p. 71, left-hand column, line 43: read *P. variegata* (Fallén)
– p. 115, right-hand column, line 43: read (Figs 236–238, 262–266)
– p. 146, left-hand column, line 18: read ... high ... instead of ... long ...
– p. 151, left-hand column, line 23: read ... 1996). instead of ... 1992).
– p. 151, left-hand column, line 41: read (Figs 334, 413–417, 463)
– p. 159, left-hand column, line 42: read (Figs 366–369, 426–430)
– p. 162, right-hand column, line 40: read (Figs 370–373, 431, 434–438)
– p. 166, left-hand column, line 16: read ... forwards.
– p. 166, left-hand column, line 17: read Aedeagus has ... instead of and has ....
– p. 169, left-hand column, line 37: read (Figs 374–377, 433, 444–447)
– p. 178, left-hand column, line 16: read ... medially interrupted dark ... instead of ... dark ...
– p. 178, right-hand column, line 45: read (Figs 457–460)
– p. 182, right-hand column, line 6: read (Figs 341, 342, 465–469)
– p. 185, right-hand column, line 3: read (Figs 349, 350, 462, 470–474)
– p. 188, right-hand column, line 16: read (Figs 345, 346, 475–479)
– p. 191, right-hand column, line 14: read (Figs 347, 348, 480–484)
– p. 195, left-hand column, line 35: (Figs 286, 287, 289, 291, 485–489)
– p. 199, left-hand column, line 7: read (Figs 290, 292, 490, 493–496)
– p. 202, left-hand column, line 30: read (Figs 299, 316, 491, 497–501)
– p. 205, right-hand column, line 15: read (Figs 324, 492, 502–506)

– p. 208, right-hand column, line 39: read (Figs 309, 322, 507–511, 515)
– p. 213, left-hand column, line 16: read (Figs 308, 323, 512, 516–520)
– p. 216, left-hand column, line 41: read (Figs 304, 305, 315, 513, 521–524)
– p. 218, right-hand column, line 47: read (Figs 300, 310, 317, 321, 514, 525–529)
– p. 222, left-hand column, line 22: read (Figs 295, 301, 302, 312, 530–534, 538)
– p. 226, right-hand column, line 6: read (Figs 306, 307, 314, 319, 535, 539–543)
– p. 230, left-hand column, line 5: read (Figs 293, 294, 296, 313, 320, 536, 544–548)
– p. 252, right-hand column, line 37: read (Figs 586–588, 595–599)
– p. 256, left-hand column, line 39: read (Figs 592–594, 600, 604–607)
– p. 259, left-hand column, line 8, read: (Figs 589–591, 601, 608–611)
– p. 261, right-hand column, line 42: read (Figs 583–585, 602, 612–615)
– p. 264, right-hand column, line 10: read (Figs 578, 581, 603, 616–619)
– p. 275, left-hand column, line 10: read (Figs 56, 625, 630, 633–635, 638–641)
– p. 286, left-hand column, line 37: read (Figs 652, 656–658, 686–690)
– p. 289, right-hand column, line 37: read (Figs 651, 653–655, 691, 694–697)
– p. 292, right-hand column, line 43: read (Figs 50, 51, 648–650, 692, 698–701)
– p. 288, Fig. 693: this illustration may refer to a different species (Máca, pers. comm.)
– p. 284, Fig. 673: this illustration may refer to a different species (Máca, pers. comm.)
– p. 298, left-hand column, lines 17-52: this description may refer to a different species (Máca, pers. comm.)
– p. 296, left-hand column, line 12: read (Figs 693, 671, 672, 702–705); see comment above
– p. 298, right-hand column, line 31: read (Figs 662, 663, 666–668, 706–710)
– p. 301, left-hand column, line 39: read (Figs 52, 664, 665, 677–679, 711, 714–717)
– p. 305, left-hand column, line 8: read (Figs 680–682, 712, 718–721)
– p. 307, right-hand column, line 16: read (Figs 669, 670, 722–725)
– p. 310, left-hand column, line 6: read (Figs 674–676, 713, 726–729)

3) For some taxa names mentioned, the respective references are missing. Instead of including them in this publication, we suggest to refer to the online database TAXODROS (Bächli 2007).

ACKNOWLEDGEMENTS

Pierre Brauchli helped with preparing the photomicrographs for publication; Elsa Obrecht (Bern), Milan Chvála (Praha) and in particular Jan Máca (České Budějovice) informed us about some errors in Bächli *et al.* (2004) to be corrected.

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Bächli, G., Haring, E. & Vilela, C.R. 2005. On the phylogenetic relationships of *Scaptodrosophila rufifrons* and *S. lebanonensis* (Diptera, Drosophilidae). Mitteilungen der Schweizerischen Entomologischen Gesellschaft 78: 349–364.

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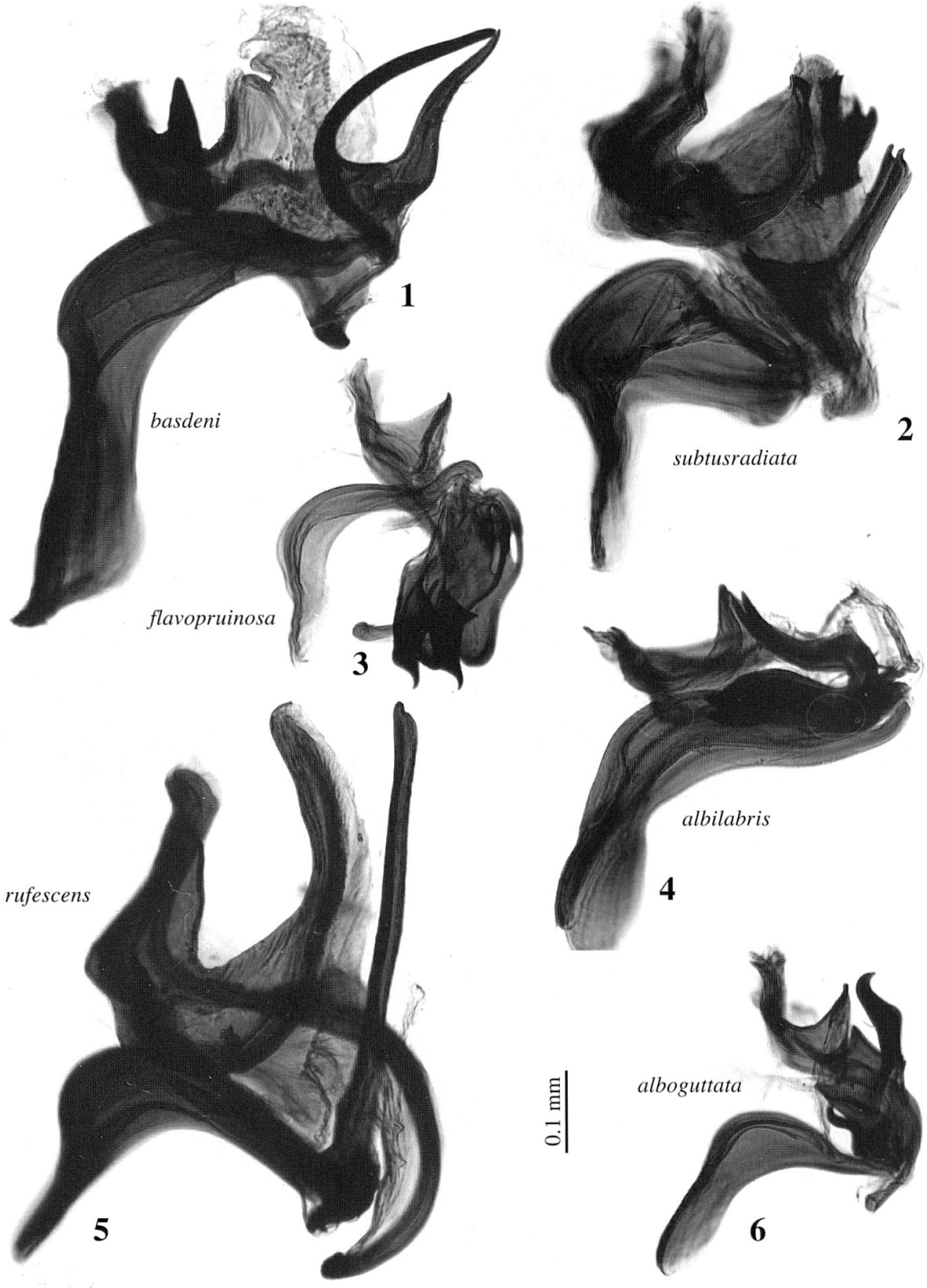
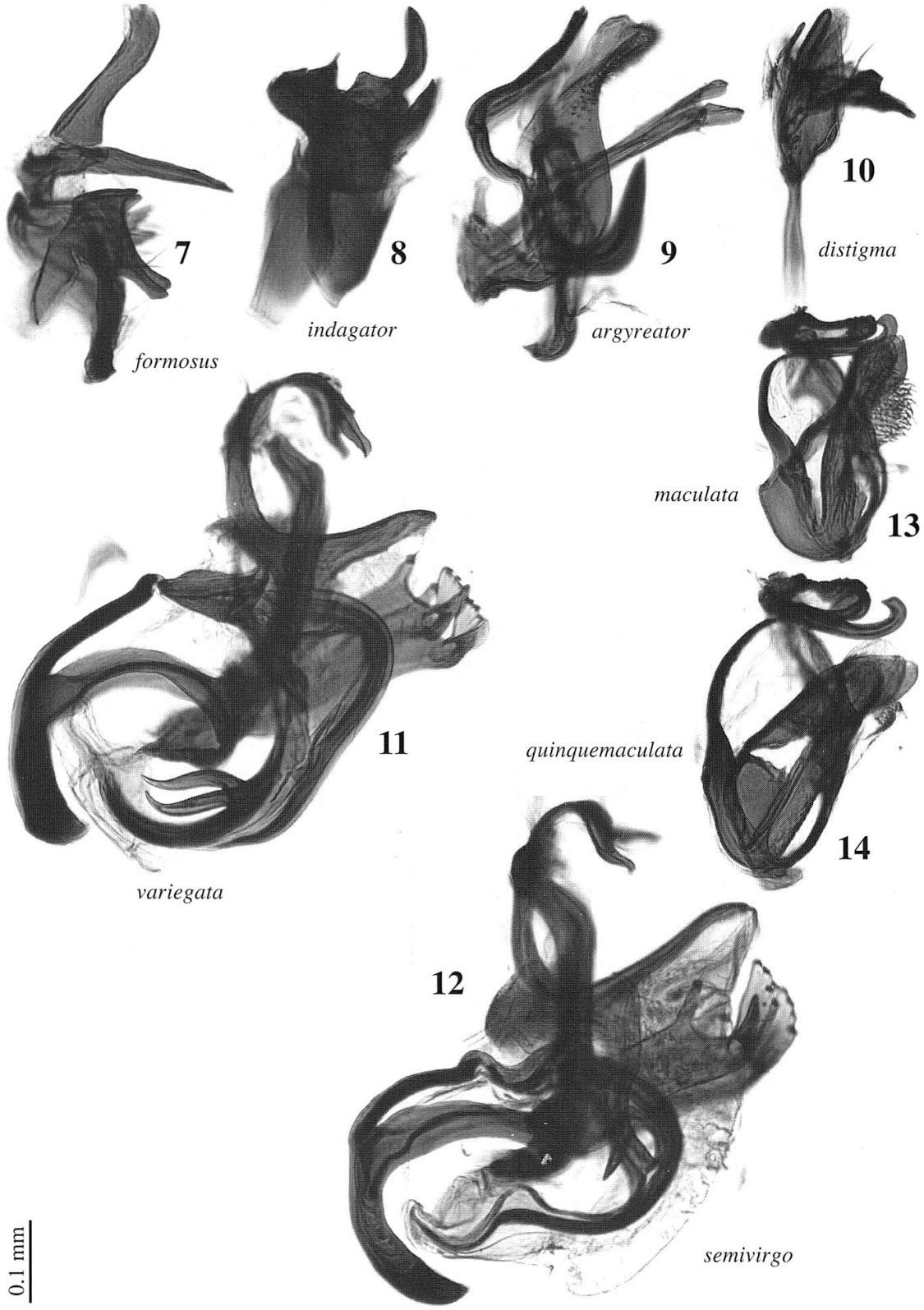
Table 1. List of the specific epithets of Scandinavian drosophilids, their respective male internal terminalia photomicrographs, and previously published line drawings.

Specific epithet	this publication		Bächli *et al.* 2004	
acuminata	Fig.	70	p. 253	Fig. 597
albilabris	Fig.	4	p. 35	Fig. 85
alboguttata	Fig.	6	p. 37	Fig. 89
alpina	Fig.	56	p. 203	Fig. 499
ambigua	Fig.	57	p. 206	Fig. 504
amoena	Fig.	25	p. 110	Fig. 255
andalusiaca	Fig.	73	p. 257	Fig. 606
argyreator	Fig.	9	p. 56	Fig. 125
baechlii	Fig.	16	p. 85	Fig. 196
basdeni	Fig.	1	p. 46	Fig. 104
bifasciata	Fig.	58	p. 209	Fig. 509
busckii	Fig.	29	p. 136	Fig. 388
cameraria	Fig.	69	p. 243	Fig. 568
caudatula	Fig.	24	p. 103	Fig. 242
coleoptrata	Fig.	17	p. 86	Fig. 200
confusa	Fig.	67	p. 246	Fig. 572
congesta	Fig.	76	p. 268	Fig. 620
consimilis	Fig.	81	p. 297	Fig. 704
costata	Fig.	26	p. 107	Fig. 250
deflexa	Fig.	75	p. 278	Fig. 644
distigma	Fig.	10	p. 61	Fig. 137
distincta	Fig.	27	p. 113	Fig. 259
eskoi	Fig.	59	p. 214	Fig. 518
ezoana	Fig.	46	p. 183	Fig. 467
fenestrarum	Fig.	74	p. 260	Fig. 610
flava	Fig.	82	p. 299	Fig. 708
flavopruinosa	Fig.	3	p. 42	Fig. 96
formosus	Fig.	7	p. 29	Fig. 59
funebris	Fig.	30	p. 140	Fig. 396
furta	Fig.	15	p. 81	Fig. 190
fuscimana	Fig.	28	p. 116	Fig. 264
graminum	Fig.	83	p. 304	Fig. 716
griseola	Fig.	84	p. 306	Fig. 720
helvetica	Fig.	60	p. 217	Fig. 523
hexasticha	Fig.	71	p. 262	Fig. 614
histrio	Fig.	31	p. 144	Fig. 401
hydei	Fig.	42	p. 173	Fig. 450
hypoleuca	Fig.	18	p. 89	Fig. 204
immigrans	Fig.	32	p. 147	Fig. 406
indagator	Fig.	8	p. 54	Fig. 121
ingrica	Fig.	55	p. 234	Fig. 551
kuntzei	Figs	34, 35	p. 160	Fig. 428
limbata	Figs	36, 37	p. 163	Fig. 436
littoralis	Fig.	47	p. 186	Fig. 472
longifibula	Fig.	19	p. 91	Fig. 209
lummei	Fig.	48	p. 189	Fig. 477
lundstroemi	Fig.	65	p. 237	Fig. 555
maculata	Fig.	13	p. 65	Fig. 146
mehadiae	Fig.	20	p. 93	Fig. 213
melanogaster	Figs	50, 51, 52	p. 196	Figs 487, 488
montana (*Drosophila*)	Fig.	49	p. 192	Fig. 482
montana (*Scaptomyza*)	Fig.	85	p. 308	Fig. 724
nigricolor	Fig.	72	p. 265	Fig. 618
nigrithorax	Fig.	21	p. 96	Fig. 218
obscura	Fig.	61	p. 219	Fig. 527
oldenbergi	Fig.	66	p. 241	Fig. 564

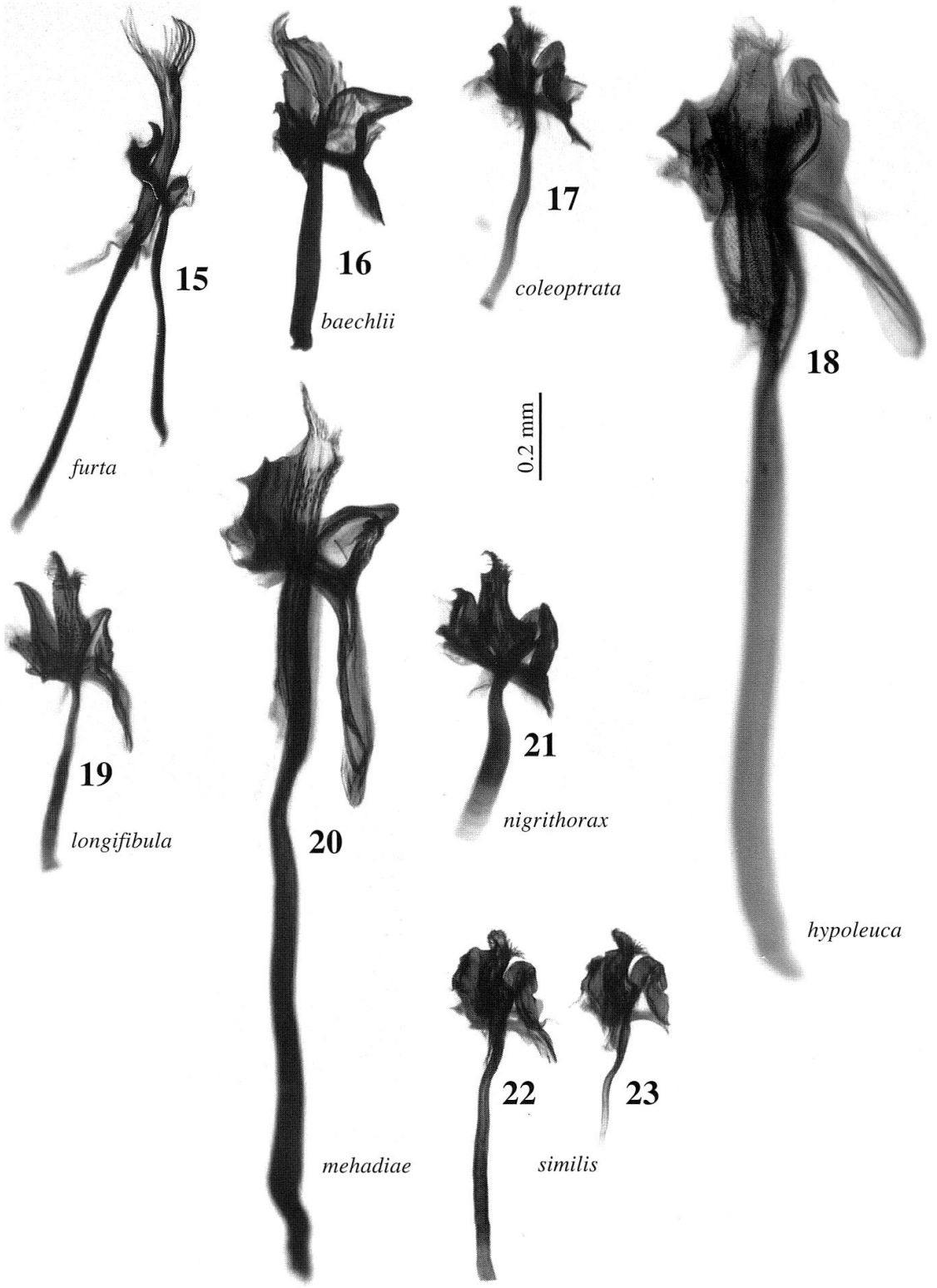
pallida	Fig.	80	p. 293	Fig.	700
phalerata	Figs	38, 39	p. 167	Fig.	441
picta	Fig.	33	p. 157	Fig.	424
quinquemaculata	Fig.	14	p. 68	Fig.	150
repleta	Figs	43, 44	p. 176	Fig.	455
rufescens	Fig.	5	p. 49	Fig.	108
semivirgo	Fig.	12	p. 73	Fig.	162
similis	Figs	22, 23	p. 98	Fig.	222
simulans	Figs	53, 54	p. 200	Figs	495, 496
subobscura	Fig.	62	p. 223	Fig.	532
subsilvestis	Fig.	63	p. 227	Fig.	541
subtusradiata	Fig.	2	p. 44	Fig.	100
teinoptera	Fig.	86	p. 311	Fig.	728
testacea	Fig.	45	p. 179	Fig.	459
transversa	Figs	40, 41	p. 170	Fig.	446
tristis	Fig.	64	p. 231	Fig.	546
trivittata	Fig.	68	p. 249	Fig.	576
trochanterata	Fig.	78	p. 287	Fig.	688
unipunctum	Fig.	79	p. 290	Fig.	696
variegata	Fig.	11	p. 75	Fig.	166
zetterstedti	Fig.	77	p. 271	Fig.	626



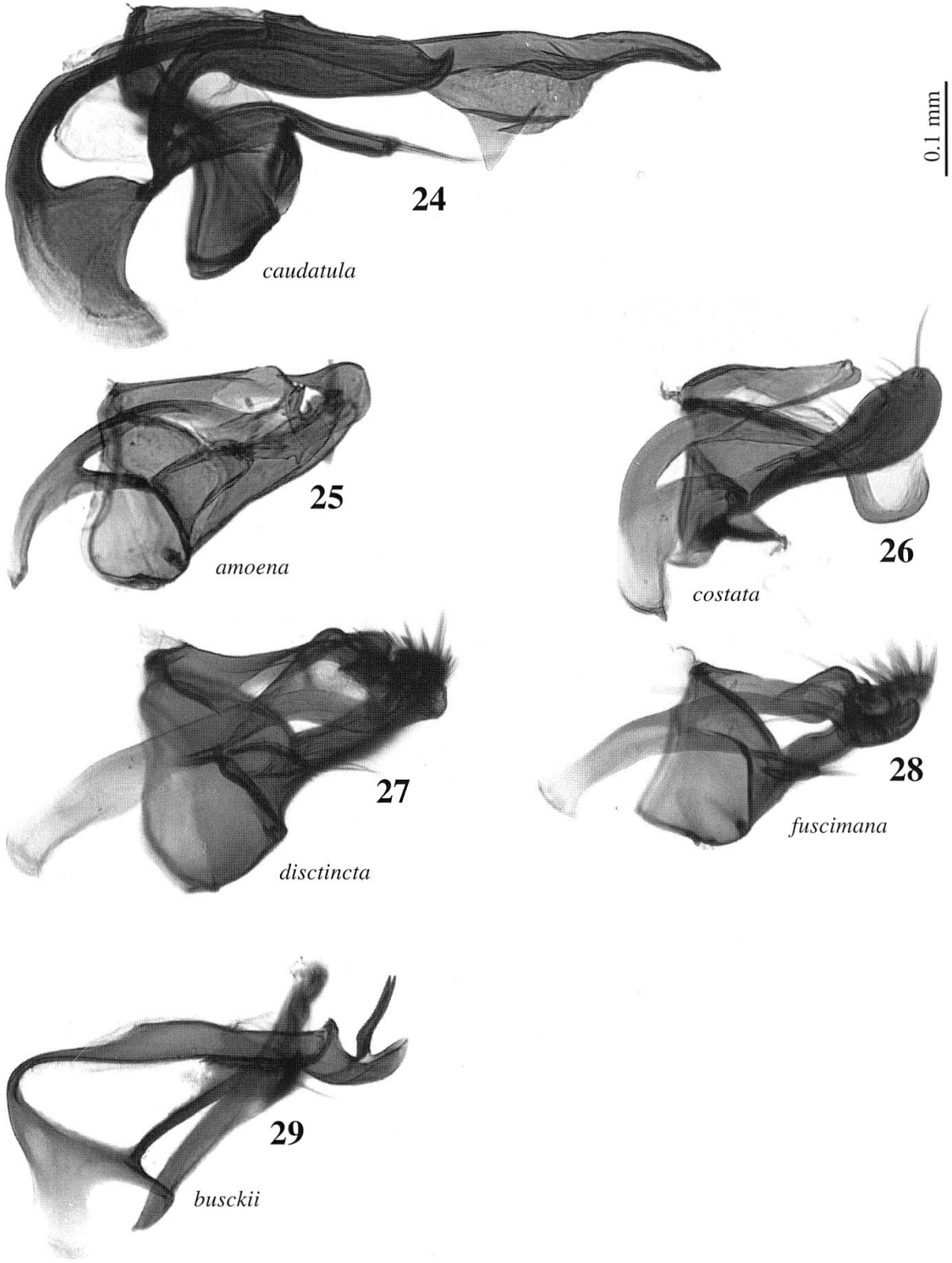
Figs 1–6. Photomicrographs of internal male terminalia of species of *Amiota*, left lateral view. 1: *A. basdeni*, Biel, Switzerland; 2: *A. subtusradiata*, Tvärminne, Finland; 3: *A. flavopruinosa*, Finges, Switzerland; 4: *A. albilabris*, Tjentište, Serbia; 5: *A. rufescens*, Parc National Suisse, Switzerland; 6: *A. alboguttata*, Aucelon, France.



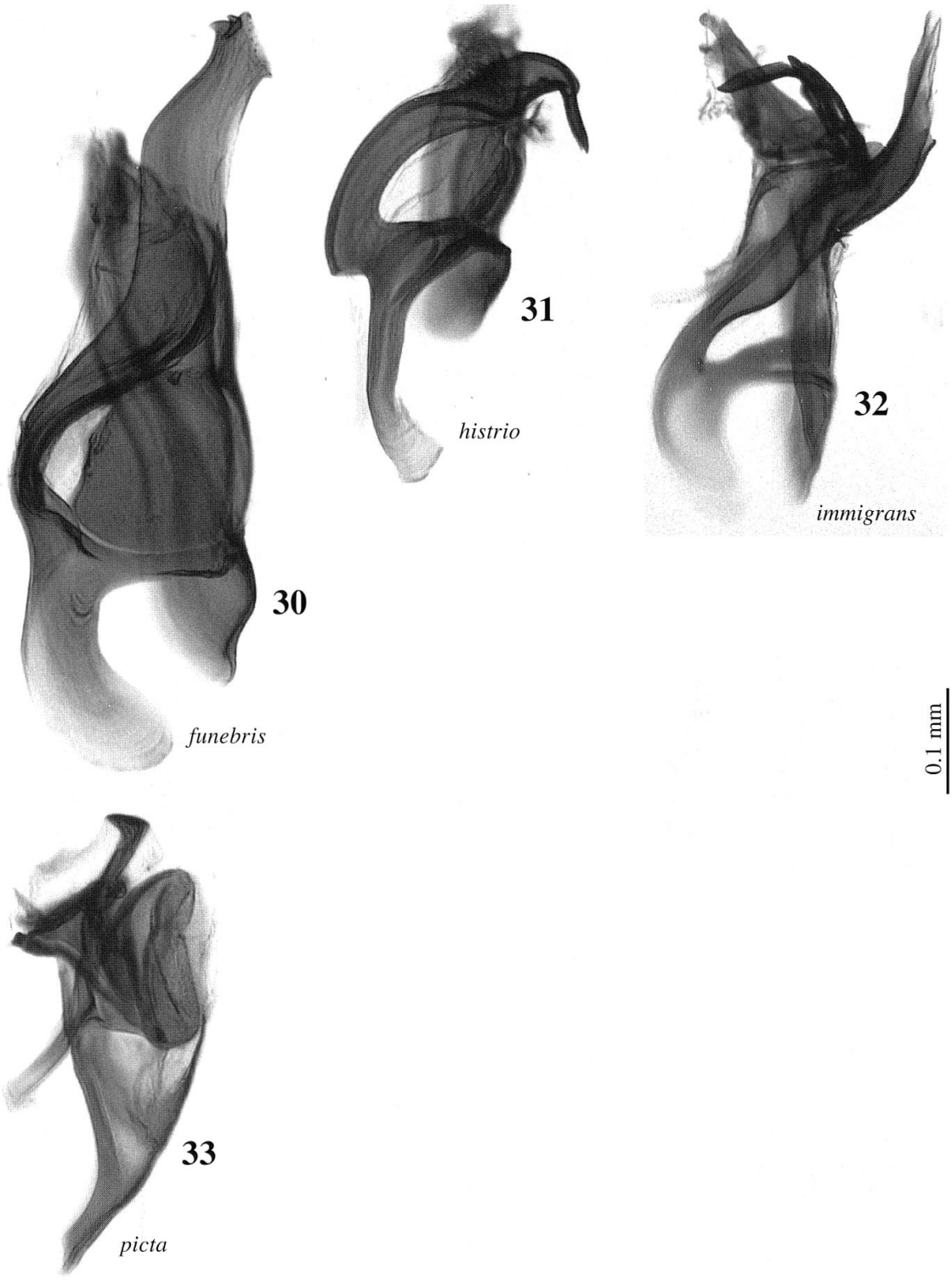
Figs 7–14. Photomicrographs of internal male terminalia of species of Steganinae, left lateral view. 7: *Acletoxenus formosus*, K. Meiron, Israel; 8: *Cacoxenus indagator*, Fazael, Israel; 9: *Cacoxenus argyreator*, Pfynwald, Switzerland; 10: *Gitona distigma*, Gyón, Hungary; 11: *Phortica variegata*, Popovica, Serbia; 12: *Phortica semivirgo*, Arcegno, Switzerland; 13: *Leucophenga maculata*, Seelisberg, Switzerland; 14: *Leucophenga quinquemaculata*, Someo, Switzerland.



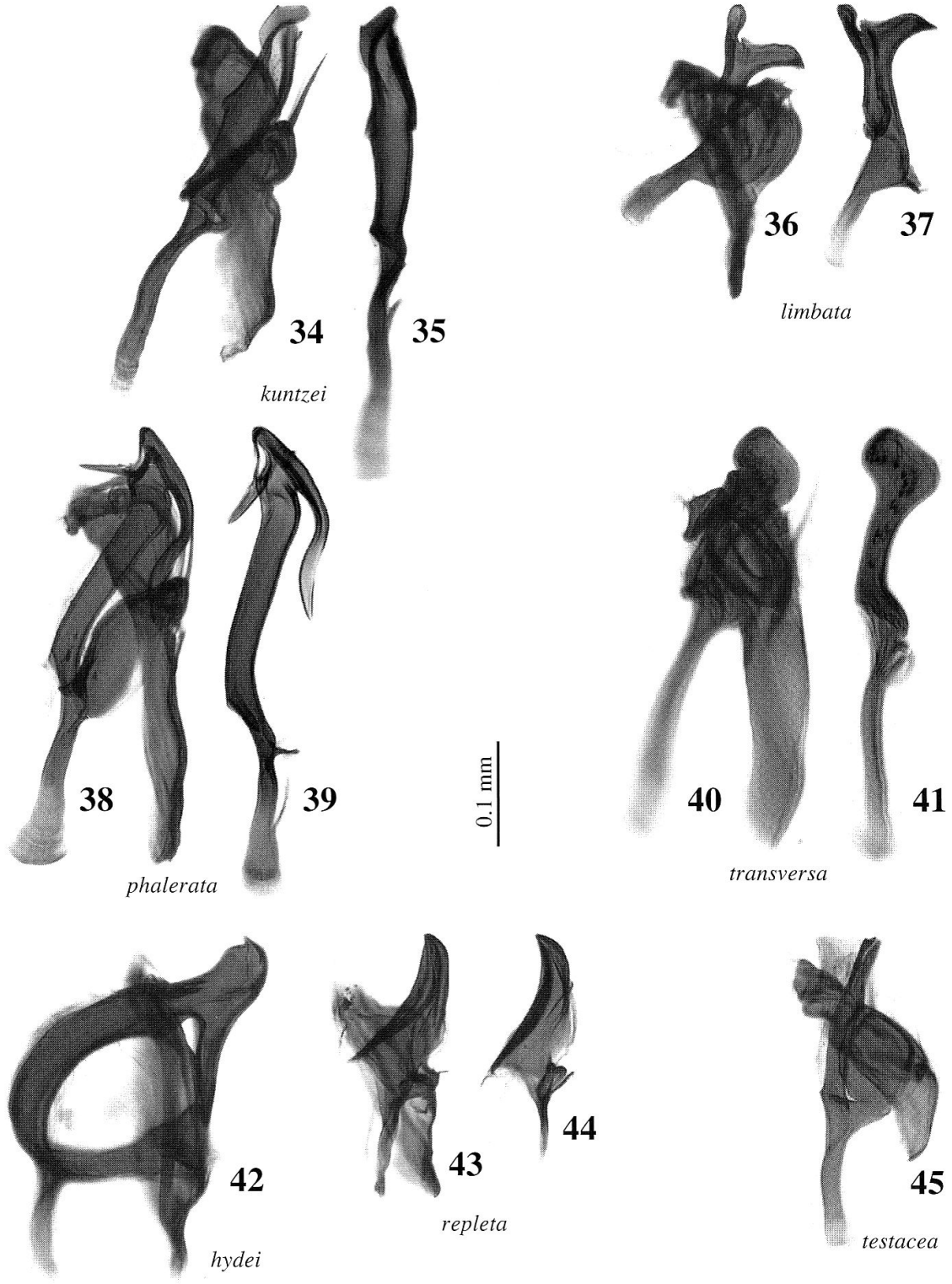
Figs 15–23. Photomicrographs of internal male terminalia of species of *Stegana*, left lateral view. 15: *S. furta*, Finges, Switzerland; 16: *S. baechlii*, Aarau, Switzerland; 17: *S. coleoptrata*, Karislojo, Finland; 18: *S. hypoleuca*, Dyrehaven, Denmark; 19: *S. longifibula*, Biasca, Switzerland; 20: *S. mehadiae*, Beeram, Denmark; 21: *S. nigrithorax*, Dietikon, Switzerland, 22: *S. similis*, Hönggerberg, Switzerland; 23: *S. similis*, Hönggerberg, Switzerland.



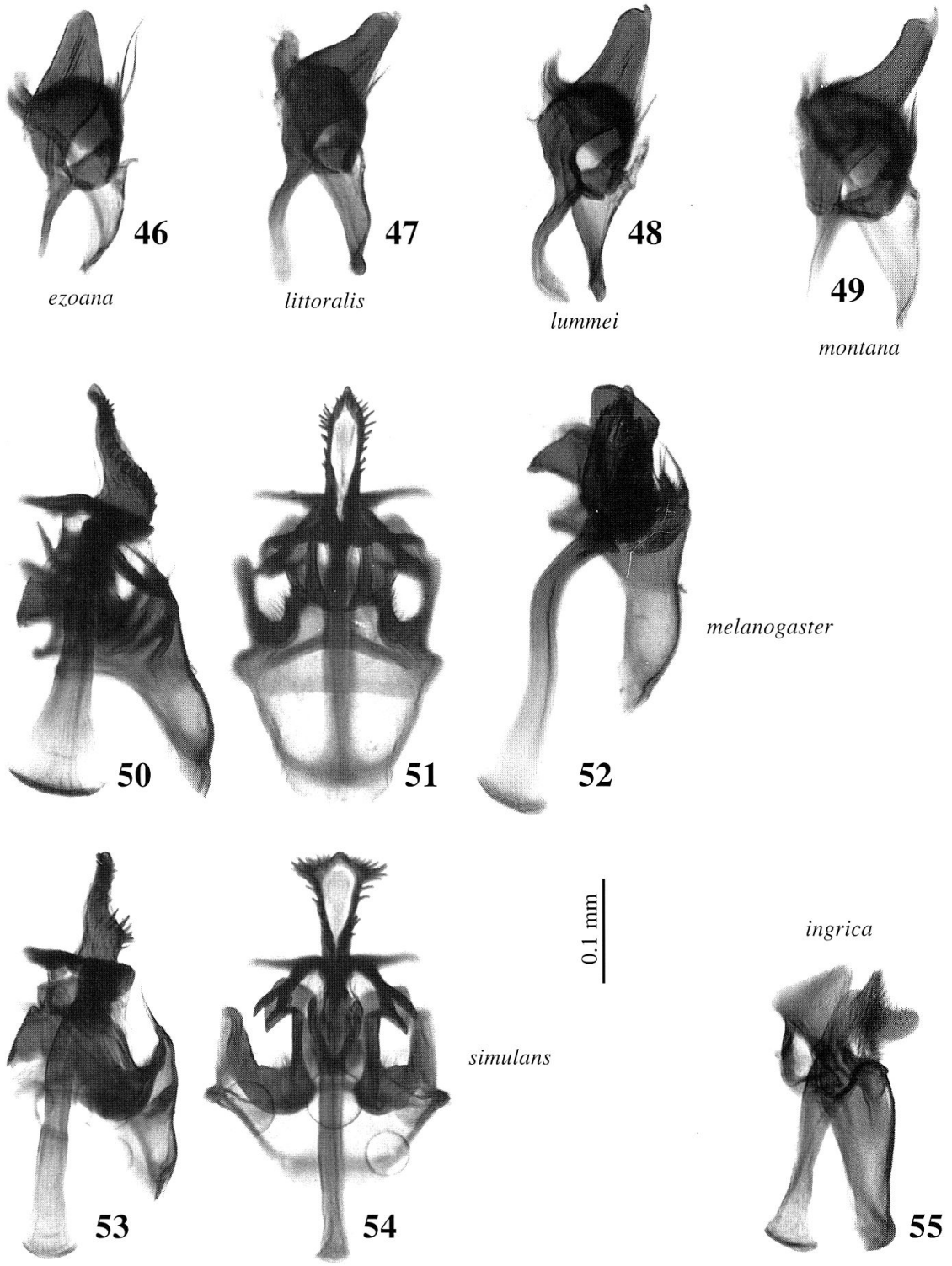
Figs 24–29. Photomicrographs of internal male terminalia of species of Drosophilidae, left lateral view, all collected in Swizerland. 24: *Chymomyza caudatula*, Someo; 25: *Chymomyza amoena*, Dietikon; 26: *Chymomyza costata*, Il Fuorn; 27: *Chymomyza distincta*, Faido; 28: *Chymomyza fuscimana*, Faido; 29: *Drosophila busckii*, Rheineck.



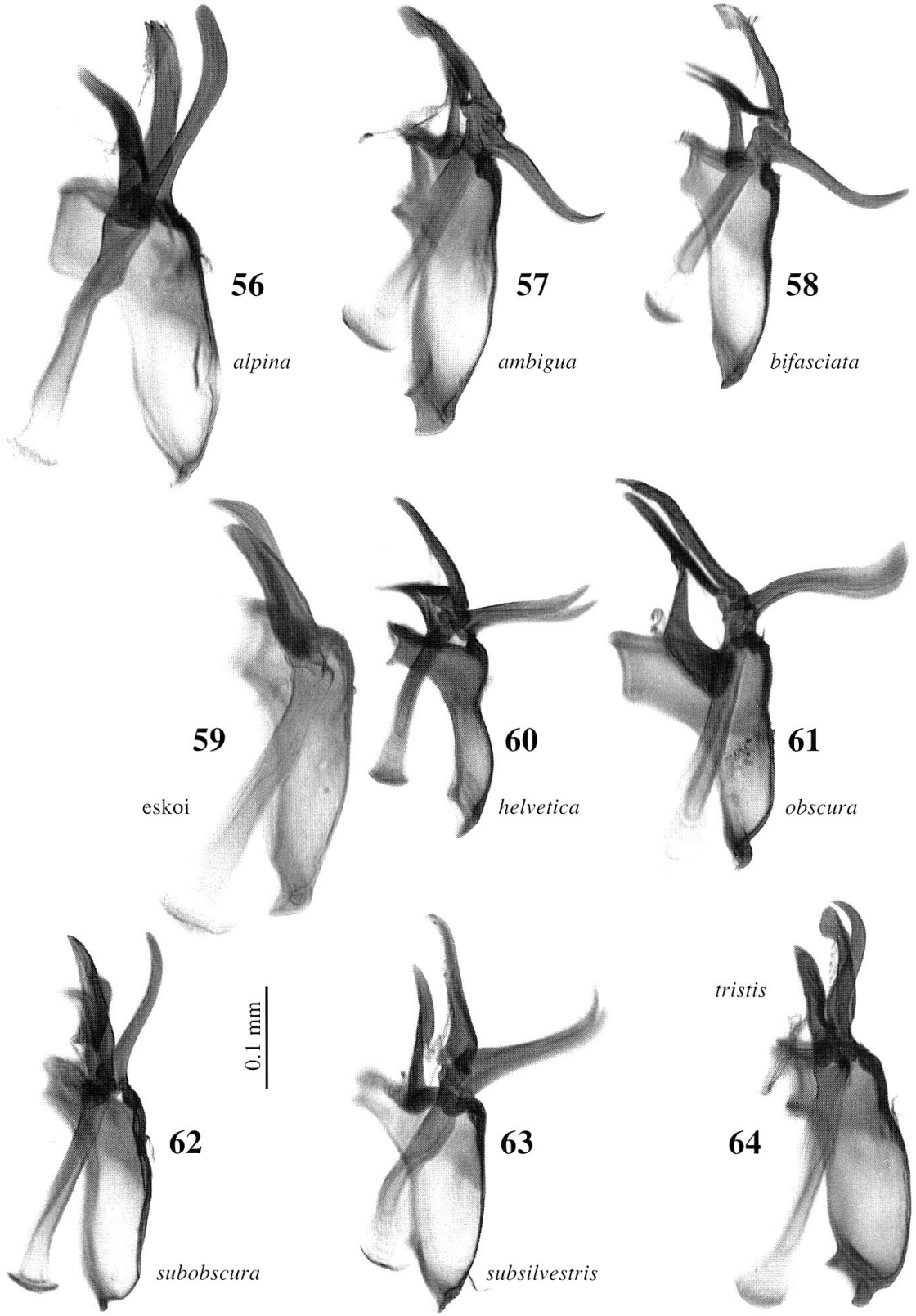
Figs 30–33. Photomicrographs of internal male terminalia of *Drosophila* species, left lateral view. 30: *D. funebris*, Seelisberg, Switzerland; 31: *D. histrio*, Rheineck, Switzerland; 32: *D. immigrans*, Gomel, Belarus; 33: *D. picta*, Bordils, Spain.



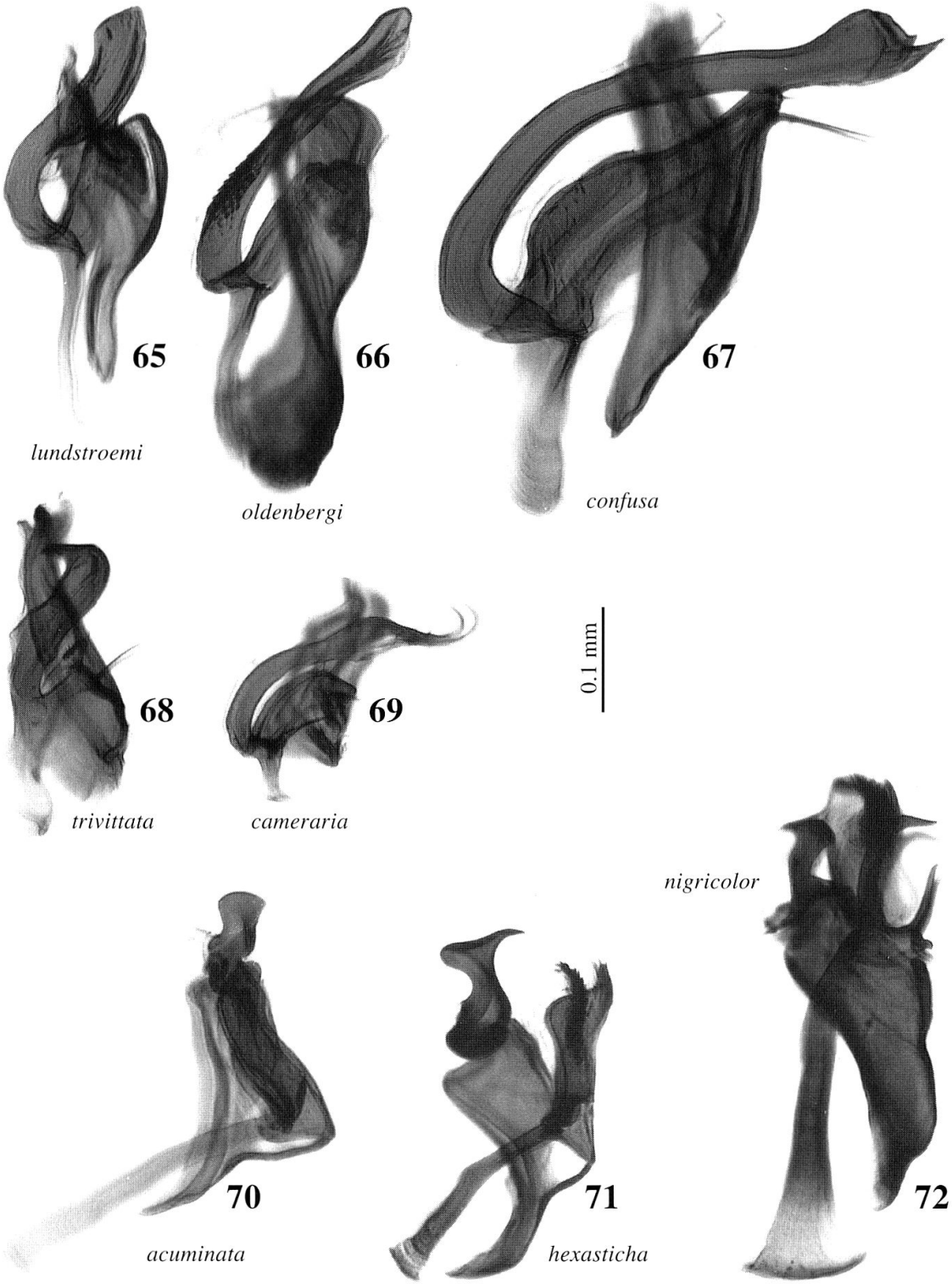
Figs 34–45. Photomicrographs of internal male terminalia (only aedeagus+aedeagal apodeme in Figs 35, 37, 39, 41, and 44) of seven species of *Drosophila*, left lateral view. 34: *D. kuntzei*, Würenlingen, Switzerland; 35: idem [Würenlingen, Switzerland, 6–11.6.73, G. Bächli coll.]; 36: *D. limbata*, Stams, Austria; 37: idem [Rheineck, Switzerland, 14–17.8.73, G. Bächli coll.]; 38: *D. phalerata*, Dietikon, Swizerland; 39: idem [Dietikon, Switzerland, Mai 1974, G. Bächli coll.]; 40: *D. transversa*, Delémont, Switzerland; 41: idem [Rheineck, Switzerland, 14–17.8.73, G. Bächli coll.]; 42: *D. hydei*, Alexandria, Egypt; 43: *D. repleta*, Bachs, Switzerland; 44: idem [Cueva Chirrepeck, Alta Verapaz, Guatemala, 6–8.4.1973, Strineti coll.]; 45: *D. testacea*, Dietikon, Switzerland.



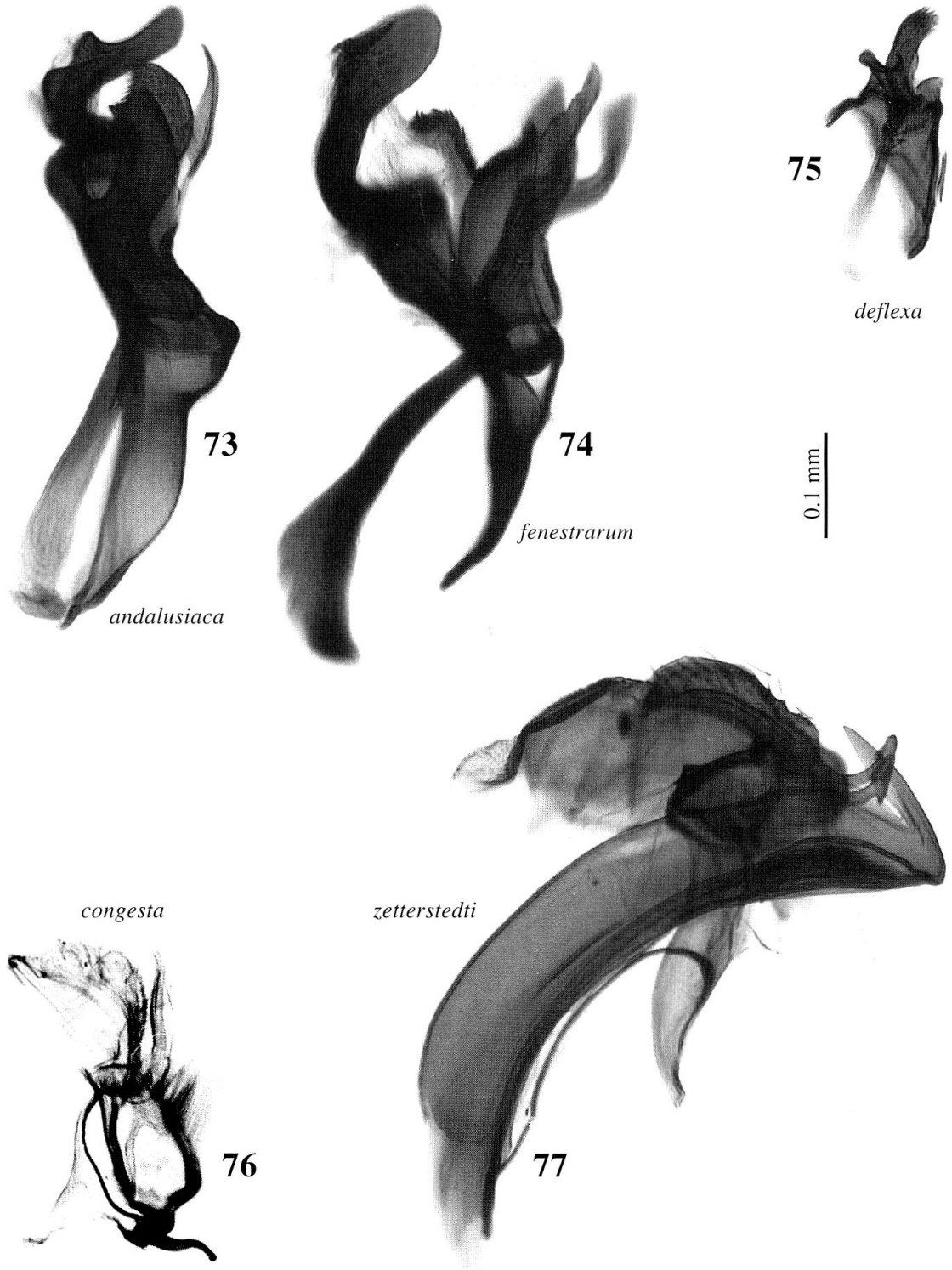
Figs 46–55. Photomicrographs of internal male terminalia of *Drosophila* species, mainly of the *virilis* and *melanogaster* groups, left lateral view (except Figs 51 and 54: posterior view). 46: *D. ezoana*, Kemi, Finland; 47: *D. littoralis*, Popovica, Serbia; 48: *D. lummei*, Hokkaido, Japan; 49: *D. montana*, Kemi, Finland; 50: *D. melanogaster*, Hönggerberg, Switzerland; 51: same specimen as 50; 52: idem, unevert aedeagus [Landquart, Switzerland, 9–12.8.74, G. Bächli coll.]; 53: *D. simulans*, Rheineck, Switzerland; 54: same specimen as 53; 55: *D. ingrica*, Suistamo, Russia.



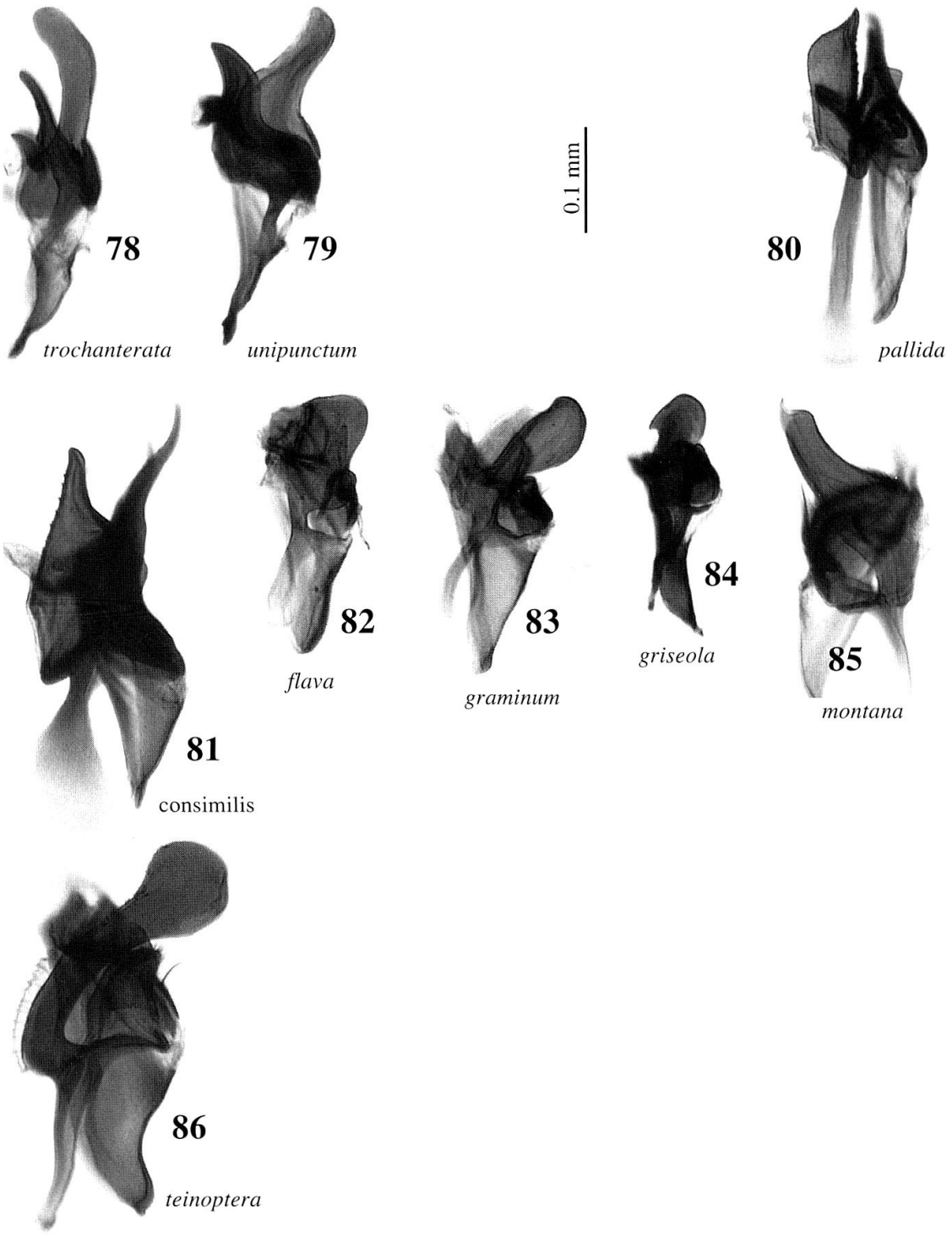
Figs 56–64. Photomicrographs of internal male terminalia of *Drosophila* species of the *obscura* group, left lateral view, all from Switzerland (except *D. eskoi*). 56: *D. alpina*, Les Reussilles; 57: *D. ambigua*, Geeren; 58: *D. bifasciata*, Arcegno; 59: *D. eskoi*, Oulu, Finland; 60: *D. helvetica*, Dietikon; 61: *D. obscura*, Würenlingen; 62: *D. subobscura*, Würenlingen; 63: *D. subsilvestris*, Niesen; 64: *D. tristis*, Dietikon.



Figs 65–72. Photomicrographs of internal male terminalia of species of the genera *Hirtodrosophila* and *Lordiphosa*, left lateral view. 65: *Hirtodrosophila lundstroemi*, Gödöllö, Hungary; 66: *Hirtodrosophila oldenbergi*, Hönggerberg, Switzerland; 67: *Hirtodrosophila confusa*, Bergdietikon, Switzerland; 68: *Hirtodrosophila trivittata*, Hluboka, Czech Republic; 69: *Hirtodrosophila cameraria*, Seelisberg, Switzerland; 70: *Lordiphosa acuminata*, Pichelsberg, Germany; 71: *Lordiphosa hexasticha*, Rappersdorf, Germany; 72: *Lordiphosa nigricolor*, Albisgütli, Switzerland.



Figs 73–77. Photomicrographs of internal male terminalia (plus external terminalia in Figs. 76 and 77) of species of Drosophilidae, left lateral view. 73: *Lordiphosa andalusiaca*, Varegös, Turkey; 74: *Lordiphosa fenestrarum*, Stams, Austria; 75: *Scaptodrosophila deflexa*, Veyrier, Switzerland; 76: *Microdrosophila congesta*, Aarau, Switzerland; 77: *Microdrosophila zetterstedti*, Smolandia, Sweden [lectotype].



Figs 78–86. Photomicrographs of internal male terminalia of species of *Scaptomyza*, left lateral view. 78: *S. trochanterata*, Urjala, Finland; 79: *S. unipunctum*, Paltamo, Finland; 80: *S. pallida*, Glockner, Austria; 81: *S. consimilis*, Joutseno, Finland; 82: *S. flava*, Bielefeld, Germany; 83: *S. graminum*, Klöntal, Switzerland; 84: *S. griseola*, Eičiai Taurage distr., Lithuania; 85: *S. montana*, Merkinė, Lithuania; 86: *S. teinoptera*, Messuby, Finland.