

FURTHER SPECIES OF THE VICTORIAN EARTHWORM GENUS
SIMSIA JAMIESON, 1972 (MEGASCOLECIDAE: OLIGOCHAETA) WITH A
 NUMERICAL ANALYSIS OF INTERSETAL RATIOS

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Abstract

Four further species formerly assigned to *Plutellus* s. Michaelsen are transferred to *Simsia*, viz. *Cryptodrilus minor*, *Megascolides attenuatus* and *M. incertus*, all of Spencer, 1892, and *M. steeli* Spencer, 1900. *M. steeli* and *M. attenuatus* are relegated to junior synonymy in *Simsia manni* and *S. minor* respectively. A new species, *S. multituberculata*, brings the generic total for *Simsia* to nine valid species. A new subspecies, *S. intermedia papillata* is described and two species formerly assigned to *Simsia*, *S. eucalypti* (Spencer, 1900) and *S. manni* (Spencer, 1892) are revised. The genus is redefined and a key to species given. Intersetal ratios, which are known to yield groupings which correlate well with supra-generic taxa based on general anatomy, are shown to be of limited value for specific identification of individual specimens of *Simsia*. The poor specific segregation of ratios reflects the exceptional morphological homogeneity of this genus.

Introduction

The genus *Simsia* was erected by Jamieson (1972) for reception of seven species of which six had been assigned by Michaelsen (1900) to *Plutellus* and one was new. One of these, *Megascolides roseus* Spencer, 1892, was shown to be a junior synonym of the type species, *Simsia tuberculata* (Fletcher, 1888). Further revision of *Plutellus* reveals that four additional species of *Plutellus* s. Michaelsen must be transferred to *Simsia*, namely *Cryptodrilus minor*, *Megascolides attenuatus* and *M. incertus*, all of Spencer, 1892, and *M. steeli* Spencer, 1900. *M. steeli* is included here as a junior synonym of *Simsia manni* and *M. attenuatus* as a junior synonym of *Simsia minor*. A new species, *Simsia multituberculata* is erected for material wrongly identified by Spencer as *Megascolides incertus*. The generic total for *Simsia* is thus raised to nine valid species.

Material of the species added here to *Simsia* will be described below, together with that of species formerly referred to the genus which have not previously been revised. A new subspecies will also be defined. The value of intersetal ratios for estimation of intra- and inter-specific affinities within *Simsia* will be examined taxonomically.

Systematics

The material described in this paper requires a slight modification of the diagnosis of *Simsia* given by Jamieson (1971). Thus genus nevertheless remains very homogeneous both morphologically and geographically.

Genus *Simsia* Jamieson, 1972

Nephridia stomate, avesciculate holonephridia throughout or preceded in a few anterior segments by tufted nephridia which (always?) have composite ducts. Nephropores of holonephridia in a single series on each side (in setal lines *c* or *cd*) though pores of tufted nephridia may lie in *d* lines. Unpaired, annular, or paired sessile, (calciferous?) dilatations of the oesophagus in (XIV), XV-XVI (XVII). Dorsal intestinal typhlosole present though sometimes rudimentary. Spermathecae 2 pairs, each with a small, sessile, internally multiloculate diverticulum.

Key to the species of *Simsia*

1. One or more midventral circular or oval papilla-like genital markings present, each restricted to one segment or adjacent parts of two segments. Paired markings present or absent 2
- Midventral unpaired genital markings absent

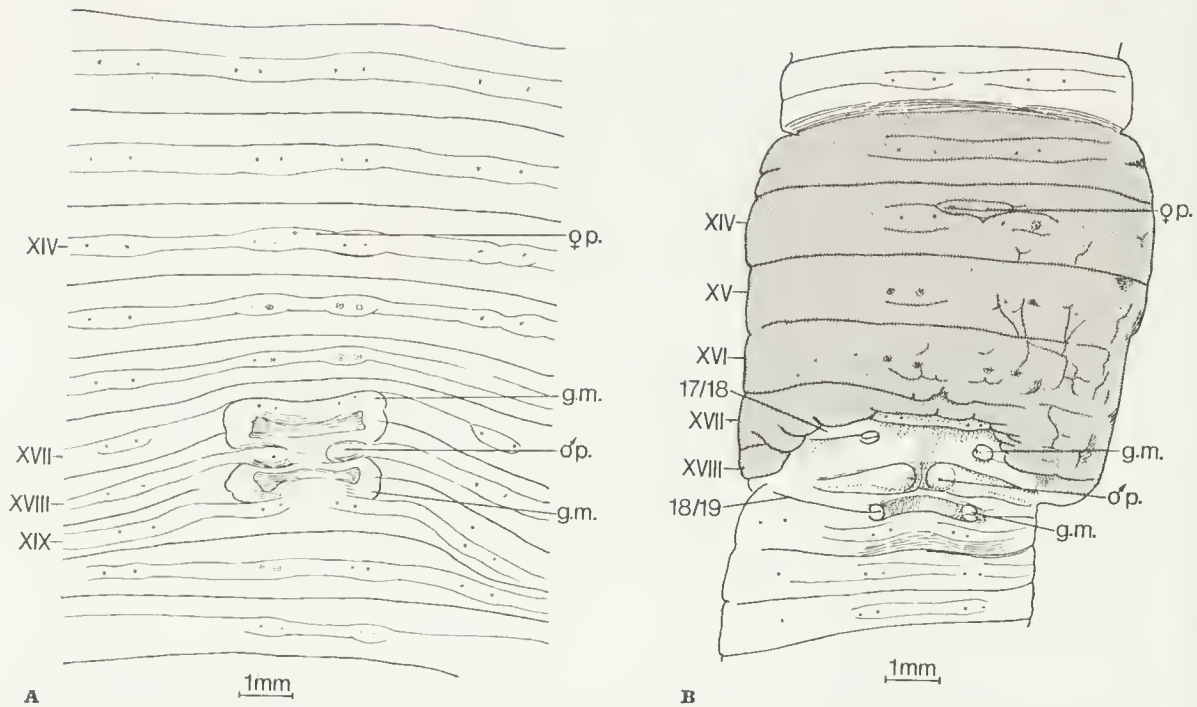


Fig. 1—Male genital field of *Simsia eucalypti* (Spencer, 1900). A, paralectotype of *Megascolides eucalypti* Spencer 1900, Nat. Mus. Vict. G1440. B, new record from Longwarry. Both by camera lucida. Clitellum shaded.

- or forming a single indefinite glandular area extending over more than two segments. Paired markings rarely present 5
2. Circular midventral genital markings present in front of and behind the male pores. None present on XVIII though a marking may occur at 18/19. Paired markings absent or inconspicuous 3
- Midventral genital marking present on XVIII and on a variable number or no other segments. Several pairs of well developed paired markings present 4
3. Two circular midventral genital markings present, one posteriorly in XVII, the other at 18/19. Paired markings absent
- S. narrensis* (Spencer, 1892)
- Circular midventral genital markings present in XVI, XVII, XIX, XX and XXI. Lateral markings poorly developed in XVI and XVII
- S. longwarriensis* Jamieson, 1971b
4. A single midventral genital marking present, forming a large raised oval area on XVIII. Paired markings present at the anterior margin of XVII and XX and a variable number of, or no, adjacent segments
- Simsia tuberculata* (Fletcher, 1888)
- Genital markings three longitudinal rows of oval tubercles in the four intersegments, 17/18-20/21
- S. multituberculata* sp. nov.
5. Paired genital markings, or a transverse depression with glandular margins, in each of intersegments 17/18 and 18/19. Spermathecal pores median to *a* lines 6
- Paired genital markings absent, or poorly developed at 17/18 and anterior XIX. Spermathecal pores in *a* lines or between *a* and *b* lines 7
6. Nephridia in the elitellar region discharging in *c* lines
- S. eucalypti* (Spencer, 1892)
- Nephridia in the elitellar region discharging between setal lines *c* and *d*
- S. manni* (Spencer, 1892)
7. A smooth midventral area, with transverse furrows suppressed, lying between the setal annulus of XVII, which forms the posterior margin of the elitellum, and the male pores.

Spermathecal diverticulum multiloculate and discrete but almost hidden in the duct wall

S. lucasi (Spencer, 1892)

—A glandular midventral field present in the vicinity of the male pores and adjacent segments but differing from that of *lucasi*. Spermathecal diverticulum protuberant from the duct 8

8. Tufted nephridia present in anterior segments, from II; followed by simple holonephridia 9

—Tufted nephridia absent. All nephridia simple holonephridia.

S. minor (Spencer, 1892)

9. Paired genital markings at 17/18 and anterior XIX

S. intermedia papillata subsp. nov.

—Paired genital markings absent

S. intermedia intermedia (Spencer, 1892)

Simsia eucalypti (Spencer, 1900)

Figs. 1A-B, 5A, 6A-B

Megascolides eucalypti Spencer, 1900: 35-36, Pl. 5, figs. 13-15.

Simsia eucalypti, Jamieson 1972.

1 = 82 mm, s = 88. Form circular in cross section, clubbed at the posterior end. Prostomium? (damaged, tanylobous, Spencer). First dorsal pore indeterminable (most anterior 4/5, first one visible usually further back, often at 12/13, Spencer). Setae in eight regular longitudinal rows throughout, commencing on II, *a* and *b* absent in XVIII. Intersetal distances (Table 1). Nephropores fairly conspicuous on the clitellum, in a single series on each side in *c* lines near the anterior borders of their segments, only sporadically recognizable elsewhere. Clitellum annular, XIII-1/3XVIII, intersegmental furrows retained but only ventrally fully developed, setae and nephropores clearly visible, dorsal pores recognizable but occluded. Combined male and prostatic pores a pair in *ab* equatorially in XVIII, each on a small papilla. Genital field ill-defined; an approximately oblong glandular area present in XVII, extending laterally beyond *b* lines, posteriorly to abut on the male porophores, and anteriorly to include setae *a* and *b* of XVII; a similar area extending from the male porophores as far as, but not including, the setal annulus of XIX; each tumid

area with a deep transverse linear depression corresponding with intersegment 17/18 or 18/19. No other accessory genital markings present (see Remarks). Female pores a pair of small orifices anteromedian of setae *a* of XIV at about 1/3 *aa*. Spermathecal pores two pairs of faint, slitlike depressions shortly median to *a* lines and near the anterior borders of VIII and IX.

Septa 10/11 and 11/12 the thickest (strongly thickened). Septal glands invest the pharynx but do not extend appreciably behind it. Gizzard in V large and strongly muscular, preceded by a muscular but easily compressible gizzard-like proventriculus in IV. Sessile vaseular swellings of the oesophagus very pronounced in XV and XVI, smaller in XIV, that in each segment grooved dorsally by the dorsal blood vessel which receives a conspicuous circumferential vessel on each side from the dilatation. Intestine commencing, with abrupt expansion, in XIX; a fairly low but distinctly developed rounded dorsal typhlosole present, beginning abruptly in anterior XXV. Dorsal blood vessel single, continuous onto the pharynx. Dorsoventral commissural vessels in VII-XII (vessels on the gizzard joining the dorsal vessel do not have recognizable connections with the ventral vessel); those in VIII and IX although valvular give off a lateral vessel to the parietes before joining the ventral vessel, and are very slender or slender respectively; those in X-XII form large latero-oesophageal hearts, each arising from the dorsal vessel and from the supra-oesophageal, and are otherwise unbranched. Supra-oesophageal vessel in X-XIII, bifurcating in the last segment. Subneural vessel absent. Lateroparietal vessels run from XII to the prostates.

Nephridia simple exonephric holonephridia in (II?) III and IV; those in V and VI forming two pairs of very large tufts with apparently composite duets which enter the body wall in *c* lines; succeeding nephridia small, exonephric, holonephridia; all nephridia avesciculate and, with the exception of the tufted nephridia, stoma. Testes and funnels not detectable; seminal vesicles a single, racemose pair, on the anterior septum of XII. Ovaries not recognizable; small masses on the posterior septum of XIII presumably are oviducal funnels. Prostates large, tu-

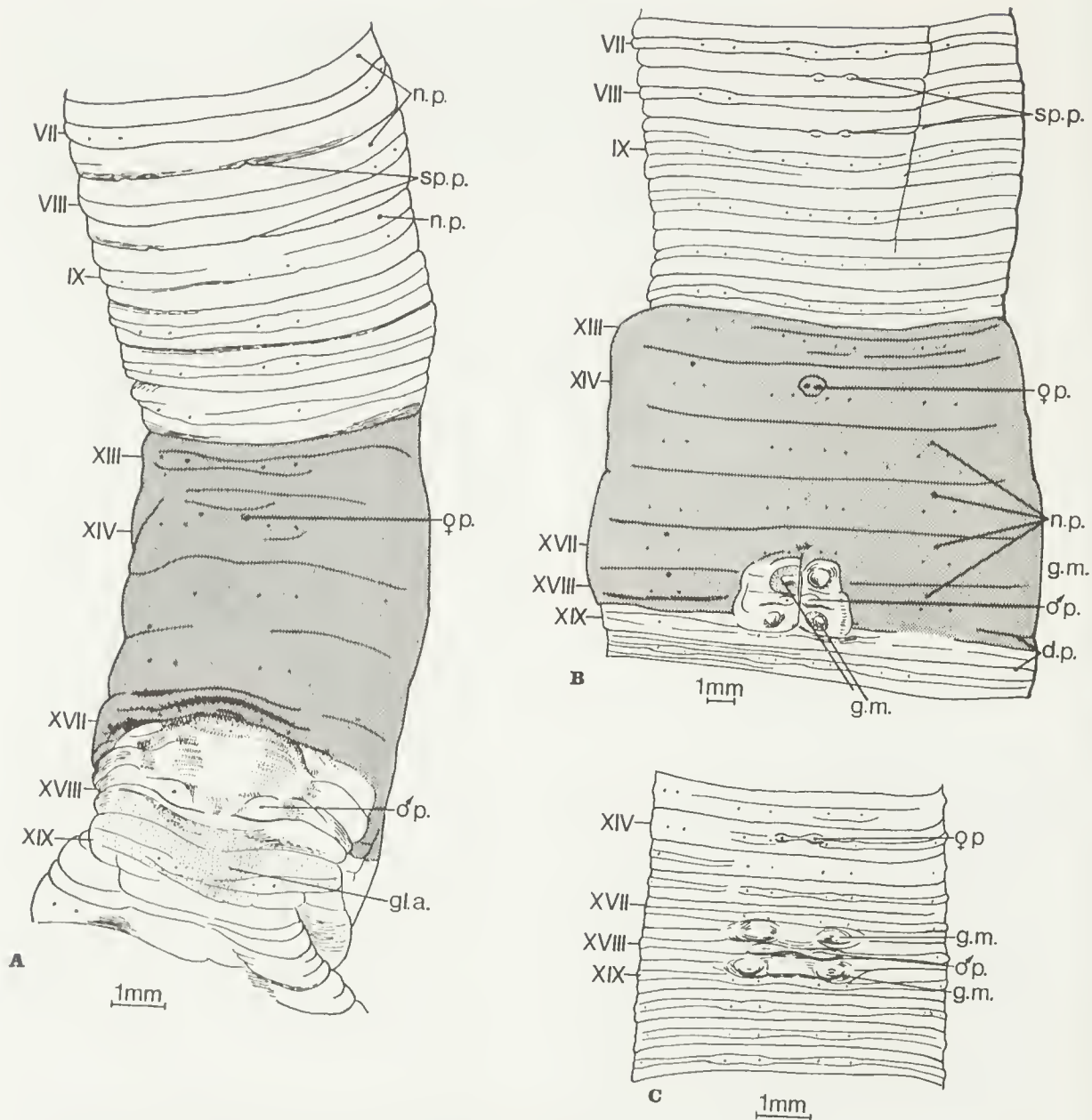


Fig. 2—Male genital fields. A, *Simsia lucasi* (Spencer, 1892), lectotype of *Cryptodrilus lucasi* Spencer, 1892, Aust. Mus. W1282. B-C, *Simsia manni* (Spencer, 1892). B, lectotype of *Megascolides manni* Spencer, 1892, Nat. Mus. Vict. G158. C, lectotype of junior synonym, *Megascolides steeli* Spencer, 1900, G168. All by camera lucida. Clitellum shaded.

bular, much coiled laterally in XVIII to which they are restricted. Vasa deferentia not visible. Penial setae not recognizable possibly owing to previous dissection as these setae are reported by Spencer. Spermathecae discharging anteriorly

only in VIII and IX, each with a large ovoid-saccular ampulla, a shorter but nevertheless unusually long and slender duct, and a multi-loculate diverticulum attached dorsolaterally near the ental end of the ducts; size uniform,

length (right spermatheca of IX) = 4.9 mm; ratio of total length of spermatheca: length duet = 2.3; ratio total length: length diverticulum = 6.3.

Material examined: an imperfectly elitellate previously dissected paralectotype, Nat. Mus. Viet. G1440 from Noojee, S. Warragul (Jensz and Smith 1969). A fully elitellate specimen from Longwarry S. via Drouin, Victoria, coll. J. T. Ryan, 14 July 1904, Nat. Mus. Viet. G1553.

Remarks: Spencer (1900) gives the type localities as 'Neerim and South Warragul'. His illustration shows two pairs of eye-like genital markings, both in *ab*, one pair at intersegment 18/19

the other at 19/20. This constitutes a notable difference from the paralectotype as does the reported presence of penial setae. Agreement of the anatomy of the paralectotype with Spencer's description is otherwise very close, even extending to restriction of the seminal vesicles to XII. It is possible that Spencer had two species before him and henceforth the characteristics described in the present account should be regarded as typical of the species.

The previously unidentified specimen from Longwarry, sympatric with *Simsia longwarriensis* Jamieson, 1972, is here considered to be indubitably conspecific with *S. eucalypti* as exemplified by the paralectotype described. The presence of eye-like accessory genital markings

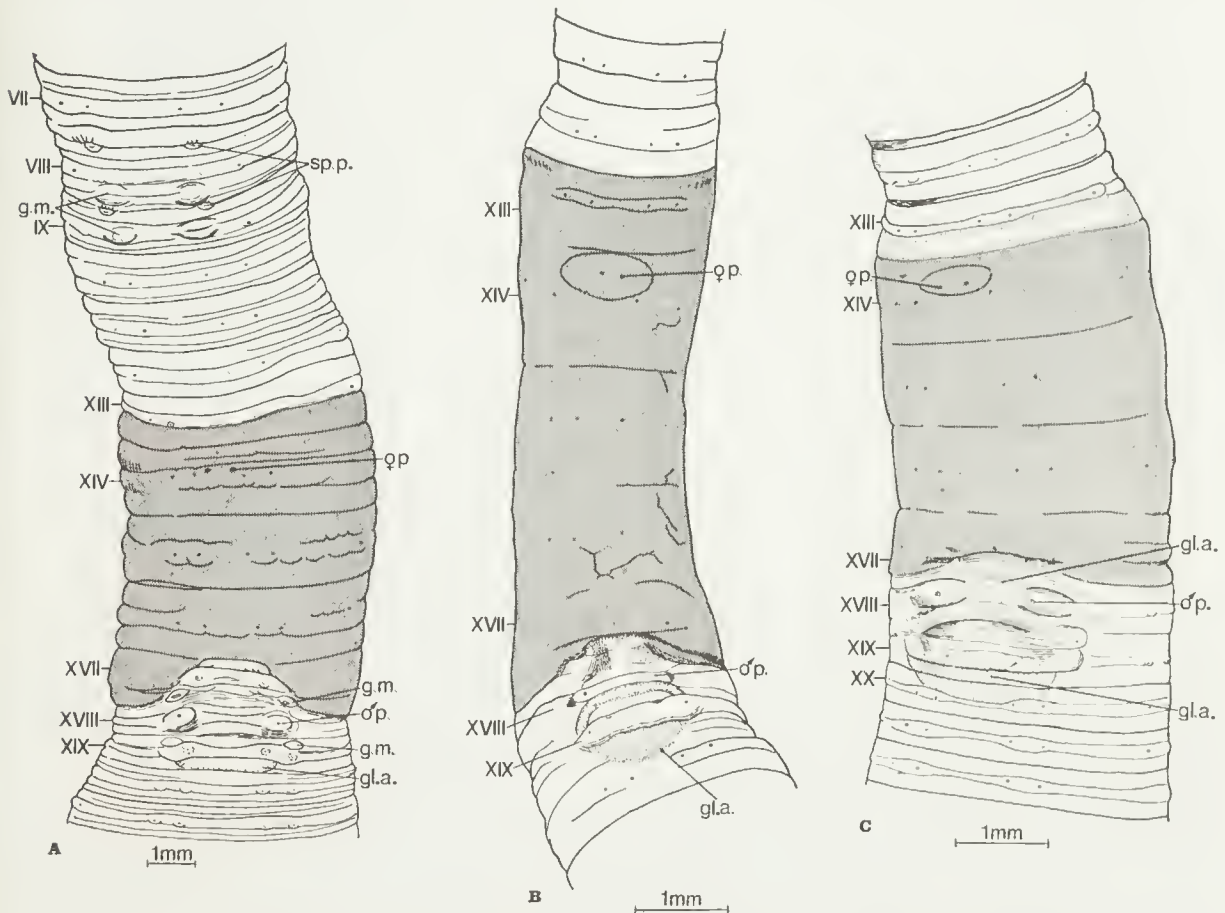


Fig. 3—Male genital fields. A, *Simsia intermedia papillata* subsp. nov. Nat. Mus. Viet. holotype G52. B-C, *Simsia minor* (Spencer, 1892). B, lectotype of junior synonym *Megascolides attenuatus* Spencer, 1892, Nat. Mus. Viet. G176. C, probable syntype of *Cryptodrilus minor* Spencer, 1892, Aust. Mus. W1283. By camera lucida. Clitellum shaded.

in intersegmental transverse depressions accords both with the new description and that of Spencer, although in the latter account both pairs of markings were stated to be posterior to the male pores. The depressions were so deeply recessed in the paralectotype that eye-like markings if present would have been undetectable.

The Longwarry specimen agrees in all respects with the description of the paralectotype with the following reservations or additions:

l = 93 mm, w (midclitellar) = 6 mm, s = 93 (posterior amputee?) Prostomium apparently tanylobous. First visible dorsal pore 11/12 but pores poorly visible throughout the body. Intersetal distances (Table 1). Clitellum XIII-2/3 XVIII, interrupted ventrally from 1/3XVII posteriorly. Genital field with a pair of eye-like accessory genital markings in each intersegmental depression, those in 17/18 immediately lateral to *b* lines, those in 18/19 in *b* lines. Spermathecal pores a little further median at 1/4 *aa* from *a*. Typhlosole well developed, although not high, a broad ridge commencing at anterior XXIII and at first low. A pair of large latero-oesophageal vessels visible in VI anteriorly. Ovaries, large fan-shaped laminae with many chains of large oocytes, and funnels in XIII; small ovisacs in XIV. Vas deferens joining the ental end of the prostate duct. Penial setae absent. Spermathecae as in the paralectotype; length of right spermatheca of IX = 4.4 mm; ratio of total length: length duct = 2.3; ratio of total length: length diverticulum = 5.6.

Simsia intermedia (Spencer, 1892)

Simsia intermedia papillata subsp. nov.

Figs. 3A, 5F, 6F

Cryptodrilus willsiensis, Jensz and Smith 1969, p. 93 (non) *Cryptodrilus willsiensis* Spencer, 1892, p. 140.

l?, s? (fragmented), w (midclitellar) = 5 mm. Circular in cross section, canalicula absent. Prostomium prolobous (?), damaged, peristomium with numerous longitudinal grooves. First dorsal pore (?). Setae in eight longitudinal rows; *b*, *c* and *d* lines very irregular in the detached posterior ends. Intersetal distances (Table 1). Nephropores moderately conspicuous whitish points in *c* lines near the anterior borders of their segments, observed from VII

posteriorly. Clitellum annular, posterior 1/3 XIII-XVII, but interrupted ventrally in *aa* in XVII by the male genital field; intersegments, setae and nephropores visible; dorsal pores not determinable owing to previous dissection. A pair of combined male and prostatic pores on XVIII in *ab*, on moderately large papillae. The midventral surface from the anterior margin of XVII to the posterior margin of XIX forming an indistinct glandular area bearing the male porophores laterally. A pair of small elliptical genital markings present at 17/18, and a further pair anteriorly in XIX, in *b* lines. Female pores inconspicuous, anteromedian of setae *a* of XIV. Spermathecal pores two pairs, in 7/8 and 8/9, in *a* lines; paired suggestions of elliptical genital markings accompanying them, posteriorly in VIII and anteriorly in IX.

Septa: 9/10 and 10/11 the thickest (very strong). Last evident septal glands in IV. Brain at the junction of II and III, mainly in the latter segment. Dorsal blood vessel single; commissural hearts of IX slender and dorsoventral only; those of X-XII large, latero-oesophageal hearts; supra-oesophageal vessel indistinct, not certainly continuous intersegmentally, in IX-1/2 XIII. Subneural vessel absent. Gizzard large in V; oesophagus intact only from IX posteriorly; in IX-XV with encircling vascular striae but no extra-mural dilatations or calciferous glands apparent, possibly owing to damage; intestine?

Nephridia: a pair of large tufts in II, exonephric, each with a composite duct discharging in *c* line; smaller but similar nephridia in III and IV; ducts passing anteriorly and slightly laterally to enter the body wall; possibly no simple holonephridia until VII; these stomate and avesiculate. Small testes and iridescent sperm funnels in XI only; seminal vesicles racemose, restricted to XII in both specimens. Ovaries, consisting of many chains of large oocytes in XIII; no ovisacs seen. Prostates tubular but with the walls very thick relative to the almost unrecognizable central lumen and superficially minutely lobulated; long, with several, tightly adpressed bends; the short muscular duct almost as wide as the glandular portion. Between and partly obscuring the prostate ducts is a very conspicu-

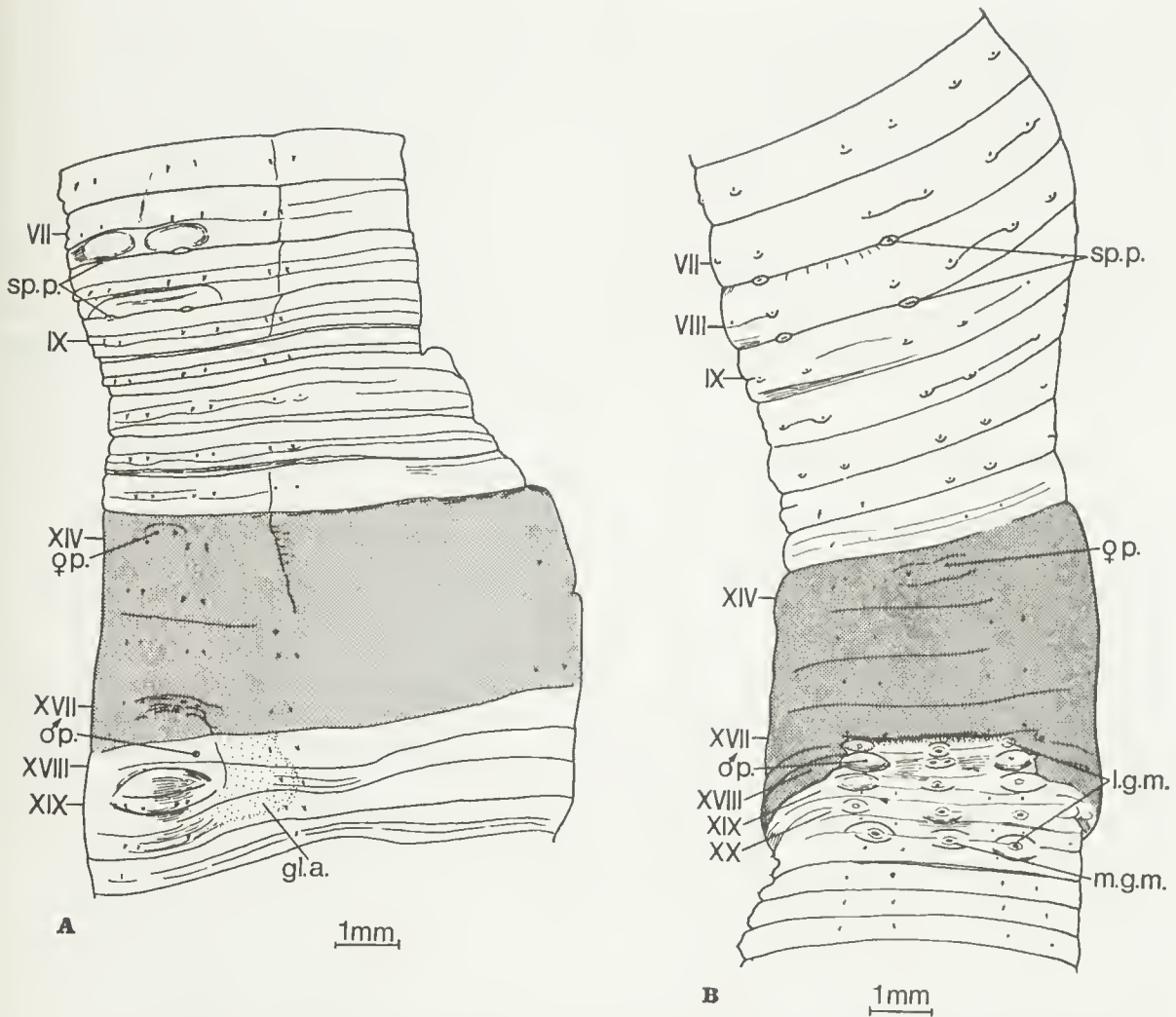


Fig. 4—Male genital fields. A, paralectotype of *Simsia minor* (Spencer, 1892), Nat. Mus. Vict. G1435. B, *Simsia multituberculata* sp. nov., holotype, G175. All by camera lucida. Clitellum shaded.

ous hemispheroidal racemose genital marking gland, filling segments XVII, XVIII and XIX. Spermathecae two uniform pairs, discharging anteriorly in VIII and IX, each with a bent, elongate saccular ampulla, and sessile, subspheroidal, multiloculate diverticulum at the junction of the ampulla and the very short, narrow duct. Length of right spermatheca of IX = 4.5 mm; ratio of total length: length duct = 12.5; ratio of total length: length diverticulum = 7.4.

Material examined: Five fragments, of which two are heavily dissected clitellate portions (one

of these lacking the anterior segments) stated by Jenz and Smith (1969) to be syntypes of *Cryptodrilus willsiensis* Spencer, 1892, Nat. Mus. Vict. G52. Although from the type locality (undated), the specimens were unaccompanied by a Spencer label and do not accord with the type description of *C. willsiensis* which is a pluteoid distinct from the genus *Simsia*. The complete anterior portion is here designated the holotype and the anterior amputec the paratype.

This entity is imperfectly described because of the poor condition of the two known speci-

mens. Description was warranted by its misidentification as *Cryptodrilus willsiensis*. It has close similarities with both *Simsia minor* and *Simsia intermedia*, both of Spencer, 1892 but the presence of anterior tufted nephridia supports identification with *S. intermedia*. The presence of paired accessory genital markings is here considered to merit separate subspecific status but the paucity of our knowledge of variation in the population of *S. intermedia* from the type locality, and of the anatomy and variability of the Mt. Wills morph leave the status of the latter material uncertain.

***Simsia lucasi* (Spencer, 1892) n. comb.**

Figs. 2A, 5E, 6C

Cryptodrilus lucasi Spencer, 1892, p. 143, Pl. 16, figs. 28-30, Pl. 19, fig. 72.

Megascolides lucasi; Beddard 1895, p. 489.

Plutellus lucasi; Michaelsen 1900, p. 168; Jamieson 1972, p. 88.

1 = 102, w (midclitellar) = 5.7 mm, s = 150. Form moderately stout, slightly clubbed posteriorly, circular in cross section throughout; segments distinctly triannulate after the first two, excepting the clitellum. Only the clitellum pigmented (brown) in alcohol. Pigment spots present laterally and dorsally in some anterior and posterior segments. Prostomium epilobous 1/3, dorsal tongue wedge shaped, closed by a transverse furrow; peristomium with many longitudinal grooves. First dorsal pore 4/5. Setae in eight longitudinal rows, becoming irregular posteriorly; *a* and *b* absent in XVIII. Intestinal distances (Table I). Nephropores anterior in their segments, in *d* lines in each of II-VI, thereafter in *c* lines throughout. Clitellum annular XIII-2/3 XVIII; dorsal pores suppressed, intersegmental furrows and nephropores present although faint. Combined male and prostatic pores equatorial in *a* lines of XVIII on a pair of small inconspicuous papillae. The setal annulus of XVII forming an arch-shaped thickening bounding a smooth unsegmented depressed area which extends to the male porophores; the entire ventral surface from 1/2 XVII-XIX appearing glandular. Female pores shortly anteromedian of setae *a* of XIV. Spermathecal pores visible as two pairs of low papillae in

7/8 and 8/9, slightly embaying the preceding segment, in *ab* shortly lateral of *a* line.

Septa 5/6-9/10 very strongly, 10/11 and 11/12 strongly thickened; 12/13 and 13/14 slightly thickened; the remainder thin. Last septal (pharyngeal) glands in IV. Dorsal blood vessel single, continuous onto the pharynx; dorsoventral commissural vessels in V-XII; all valvular, increasing in thickness posteriorly; those in VIII-IX moderately thick and heart-like, dorsoventral only; those in X-XII forming three pairs of large latero-oesophageal hearts, each receiving a connective from the dorsal vessel and the supra-oesophageal vessel. Supra-oesophageal vessel in IX-1/2 XIII; single anteriorly; posteriorly double segmentally, single intersegmentally. Subneural vessel absent. Gizzard very large and firmly muscular in V, stoutly fusiform and enveloped anteriorly by a rim-like posterior fold of the crop-like oesophagus. Oesophagus almost suppressed in VI and VII by backward extension of the gizzard; moderately moniliform, vascularized and internally rugose in IX-XIII; similar but narrow in XIV; in each of XV and XVI bearing a conspicuous outpouching on each side which, although sessile, has a restricted opening into the oesophagus; the internal wall of each pouch forming numerous high, fairly thin lamellar folds which touch but do not unite across its lumen; each pouch sending a conspicuous circumferential vessel to the dorsal vessel. Oesophagus in XVII narrow and thin walled. Intestine commencing in XVIII; a high, wide, rounded dorsal typhlosole occupying about one third of the intestinal lumen commencing in XXV.

Nephridia in II-VI much coiled to the extent of forming conspicuous tufts, though with only a few convoluted loops, in II; ducts (apparently simple) opening anterior to seta *d* in the same segment as the nephridium. In VII posteriorly the nephridia discharge in *c* lines; all are avesiculate. Small preseptal funnels were demonstrated in XII posteriorly but necks connecting nephridia with the preceding septum were demonstrated forward into the region of tufted nephridia; all nephridia are probably, therefore, stomate. (Testes?), sperm masses and weakly iridescent sperm funnels in X and XI; seminal vesicles racemose, in IX and XII.

Large diffuse stalked ovaries with many rows of large oocytes and small funnels in XIII; large racemose ovisacs pendant from the posterior face of septum 13/14 into XIV, not directly associated with the oviducal

funnels. Prostates thickly tubular, with several closely adpressed coils and a short muscular duct, restricted to XVIII. Penial setae absent. Spermathecae uniform; two pairs opening anteriorly in VIII and IX each with an elongate

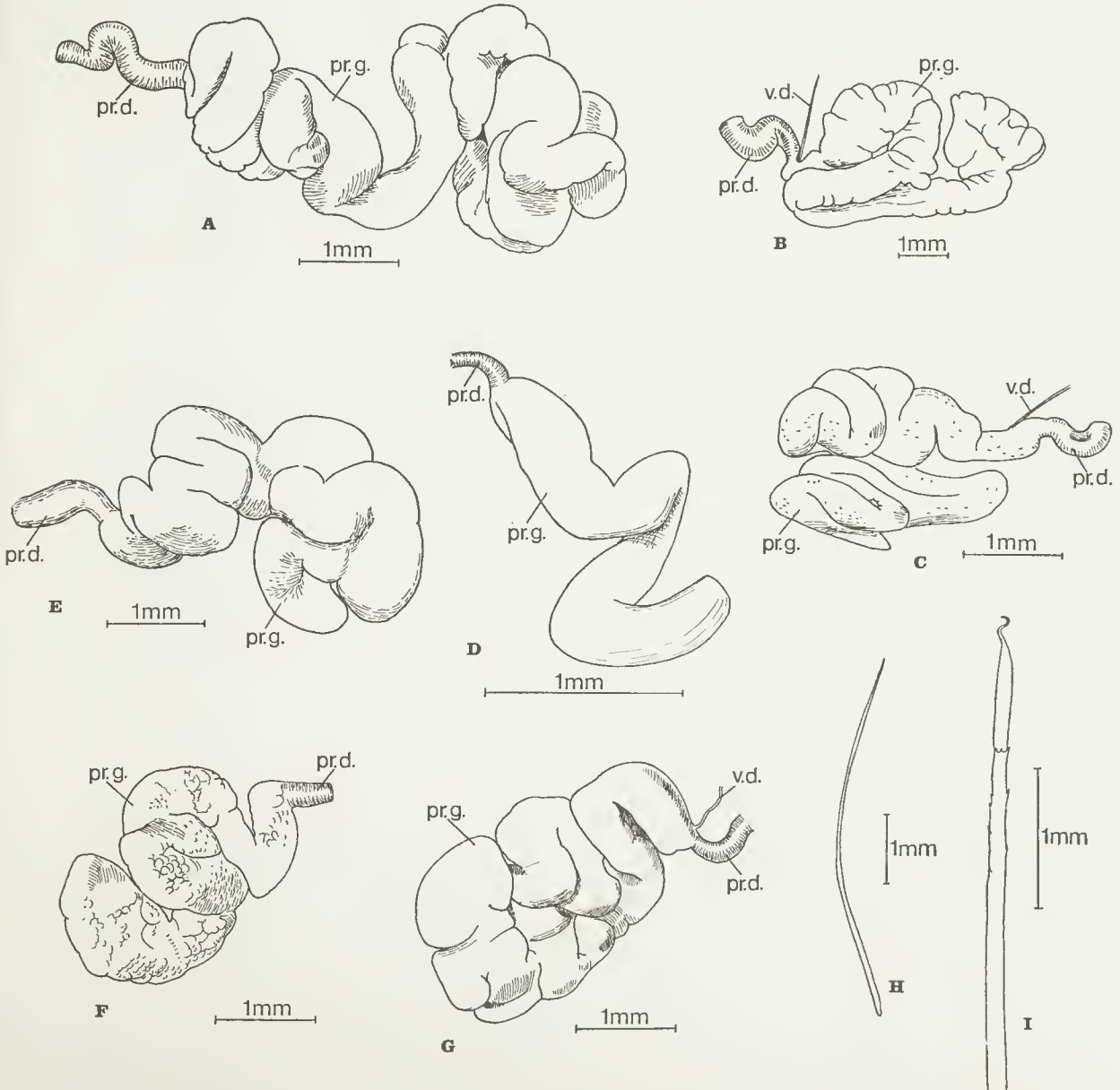


Fig. 5—Prostate glands. A, *Simsia eucalypti* (Spencer, 1900), paralectotype of *Megascalides eucalypti* Spencer, 1900, Nat. Mus. Vict. G1440. B-C, *Simsia manni* (Spencer, 1892). B, lectotype of *Megascalides manni* Spencer, 1900, G158. C, lectotype of junior synonym, *Megascalides steeli* Spencer, 1900, G168. D, *Simsia minor* (Spencer, 1892), lectotype of junior synonym, *Megascalides attenuatus* Spencer, 1892. E, *Simsia lucasi* (Spencer, 1892), lectotype of *Cryptodrilus lucasi* Spencer, 1892, Aust. Mus. W1282. F, *Simsia intermedia papillata* subsp. nov. Nat. Mus. Vict. holotype, G52. G-I, *Simsia multituberculata* sp. nov., holotype, G175. G, prostate gland. H-I, a penial seta. All by camera lucida.

saclike ampulla and externally wide, poorly demarcated duct which bears at mid length an iridescent multiloculate, rosette like diverticulum which is embedded in the external wall of the duct though separable from it by dissection. In a cleared mount the duct is seen to consist of an ental wide half and a narrow tortuous tube forming the ectal half, which is concealed in a glandular (?) and vascular investment which latter constitutes the externally observable duct. Length left spermatheca of VIII = 3.6 mm; ratio of total length of spermatheca: length duct = 2.4; ratio of total length: length diverticulum = 7.3.

Material examined: Three clitellate specimens labelled 'Crypto lucasi. Tallarook, Goulbourn R. Jan 92, A.M.S.L.', Aust. Mus. Sydney, W1282. This label indicates that the specimens are part of the type-series. Only one specimen, here designated the lectotype, was used for the above account but the other two specimens were observed to be closely similar, in external and internal anatomy, including intersetal ratios, and are here designated paralectotypes.

A single fragmented heavily dissected specimen with no locality data, Nat. Mus. Vict. G84, according in general anatomy with the lectotype but yielding no data as to extent of supra-oesophageal vessel, details of excretory system, form of alimentary canal behind XIV and morphology of the female gonads and ducts.

Remarks: Demonstration for the first time of calciferous dilations in XV and XVI and an intestinal typhlosole; and confirmation of the presence of multiloculate rosette-like spermathecal diverticula on two pairs of spermathecae, indicate that *Megascolides lucasi* must be transferred to *Simsia*. Its assignment to the latter genus is supported by general morphology, including the setal ratios.

Simsia manni (Spencer, 1892)

Figs. 2B-C, 4B-C, 6D-E

Megascolides manni Spencer, 1892, pp. 149-150, Pl. 17, figs. 46-48, Pl. 19, fig. 78.

Megascolides manni, Beddard 1895, p. 490.

Plutellus manni, Michaelsen 1900, p. 169.

Simsia manni, Jamieson 1972.

Megascolides steeli Spencer, 1900, p. 34, Pl. 4, figs. 10-12.

l = 250 mm, 120 mm; w (midclitellar) =

? mm, 6 mm, s = 280, 327 (*manni* and *steeli* respectively). Form elongate or moderately stout, circular or trapezoidal in cross section respectively; secondary annulation well developed. Prostomium canaliculate and with a transverse groove at about 1/4 peristomium. First dorsal pore indeterminable. Setae in eight regular longitudinal rows throughout; *a* and *b* absent in XVIII. Intersetal distances (Table 1). Nephropores anterior in their segments, observable in *d* lines in III-VIII (*manni*) or III-VII (*steeli*) and seen in mid *cd* in VIII-XIV and in XX posteriorly in *steeli* but recognizable at this site only on the clitellum in *manni*. Clitellum annular, strongly developed and prominent, embracing XIII-XVIII (= six segments); intersegments represented only by transverse lines, setae and nephropores visible; dorsal pores obscured (*manni*); not developed in the lectotype of *steeli*. Combined male and prostatic pores a pair in XVIII on small papillae in *a* lines. Accessory genital markings two pairs of elliptical low mounds, usually with pore-like centres visible, in 17/18 and 18/19 in *ab* (both taxa); the markings and male pores lying on an approximately rectangular tumid area at maturity (*manni*). Female pores shortly antero-median to setae *a*; closer together in *manni* than in *steeli*. Spermathecal pores inconspicuous, two pairs, in 7/8 and 8/9, median of *a* lines (*manni*), not visible in the lectotype of *steeli* but stated by Spencer to be in *a* lines.

Septa: 10/11 and 11/12 the thickest (very strong). Dorsal vessel single; commissurals of IX forming slender hearts which are dorso-ventral only; those of X-XII forming three pairs of large latero-oesophageal hearts; latero-oesophageal hearts, like those of IX each sending a branch basally to the parietes (both taxa); supra-oesophageal observable in X-XII in *steeli* but not distinguishable in the lectotype of *manni*. Gizzard large and firmly muscular, apparently in VI; dorsal typhlosole represented only by a slight internal ridge (both taxa); alimentary canal otherwise too severely macerated for description in *steeli*. In *manni* oesophagus conspicuously dilated (calciferous?) in XV-XVI and grooved middorsally; still wide in XVII; very narrow in XVIII; intestine commencing at 18/19.

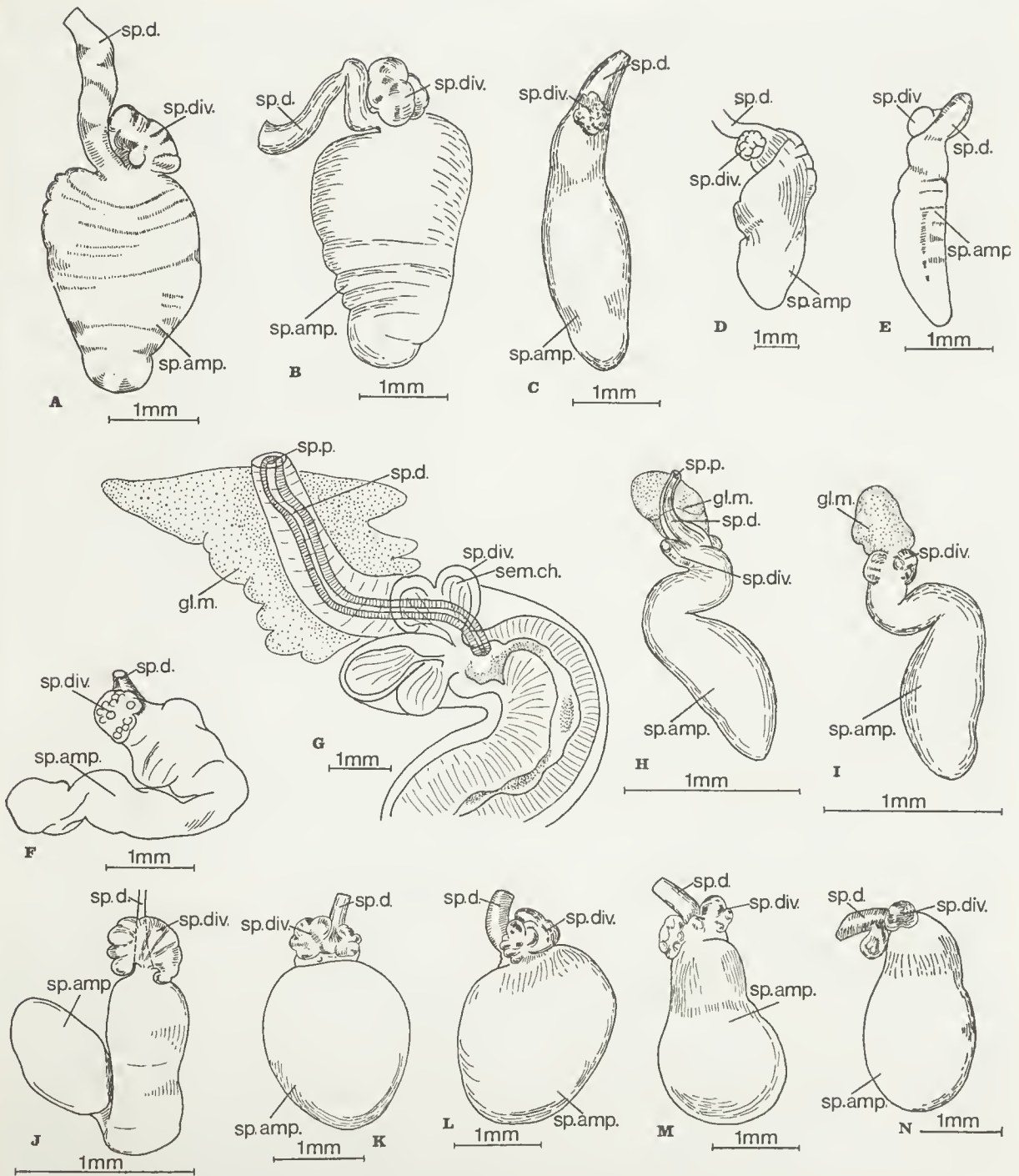


Fig. 6—Spermathecae. (R = Right, L = Left, roman numerals indicate segment). A-B, *Simsia eucalypti* (Spencer, 1900). A, new record from Longwarry (R. IX). B, paralectotype of *Megascolides eucalypti* Spencer, 1900, Nat. Mus. Vict. G1440 (R. IX). C, *Simsia lucasi* (Spencer, 1892), lectotype of *Cryptodrilus lucasi* Spencer, 1892, Aust. Mus. W1282 (L. VIII). D-E, *Simsia manni* (Spencer, 1892). D, lectotype of *Megascolides manni* Spencer, 1892, Nat. Mus. Vict. G158 (R. VIII). E, lectotype of junior synonym, *Megascolides steeli* Spencer, 1900, G168 (L. IX). F, *Simsia intermedia papillata* subsp. nov. (R. IX), Fig. 5F. G-J, *Simsia minor* (Spencer, 1892). G-I, lectotype of junior synonym, *Megascolides attenuatus*, duct and ventral and dorsal views respectively of a spermatheca (R. VIII). J, paralectotype of *Cryptodrilus minor* (Spencer, 1892), G1435 (R. IX). K-N, *Simsia multituberculata* sp. nov. holotype, G175 (R, L. VIII; R, L. IX, respectively).

Nephridia avesciculate a pair of small exonephric holonephridia in IV; large paired stomate tufts, in each of segments V-VII, each tuft with approximately 100 loops and discharging through the parietes by a double terminal duct; nephridia in this region apparently discharging a segment or more anterior to their main bodies. Nephridia in VIII posteriorly, simple, exonephric stomate, avesciculate holonephridia discharging to the exterior in the segment containing the post-septal body (*manni*, data of Horan, pers. comm.; *steeli* reported to be similar but additional simple nephridia demonstrated in II and III). Large much divided laminar testes and large iridescent sperm funnels free in X and XI, racemose seminal vesicles in XI and XII (*manni*), iridescence confined to the funnels of XI in *steeli* and anterior testes not recognizable. Laminar ovaries with many chains of oocytes and funnels in XIII (both taxa), ovisacs in XIV in *manni* but not in *steeli*. Prostates long, much coiled, depressed tubes with sinuous muscular ducts which receive the vasa deferentia entally. Penial setae absent. Spermathecae two pairs, discharging anteriorly in VIII and IX, one or more reflexed into the preceding segment; ampulla elongate ovoid, more or less sacculated; duct shorter, bearing a small multiloculate diverticulum near its ental end (both taxa). Dimensions of right anterior and left posterior spermatheca of *manni* and *steeli* respectively: = 5 mm, 2.8 mm; ratio of total length of spermatheca: length duct = 2.8, 3.5; ratio of total length: length diverticulum = 7.0 (both taxa).

Material examined:

The previously dissected, clitellate lectotype of *Megascolides manni*, S. Warragul, Victoria, coll. W. Mann July 1891, Nat. Mus. Vict. G158.

The acitellate, macerated lectotype of *Megascolides steeli*, Warragul, coll. T. Steel April 1892, Nat. Mus. Vict. G168.

Remarks: *M. steeli* is here synonymized with *M. manni* on the grounds of general similarity, including the unusual disposition of the nephropores, in conjunction with close agreement of intersetal ratios. *M. manni* var. *variabilis* Spencer, 1892, requires no separate status, its supposedly distinctive male genital field being

characteristic of the lectotypes of both *M. manni* and *M. steeli*.

Simsia minor (Spencer, 1892) n. comb.

Figs. 3B-C, 5D, 6G-J

Cryptodrilus minor Spencer, 1892, p. 144, Pl. 16, figs. 31-33, Pl. 19, fig. 73.

Megascolides attenuatus Spencer, 1892, p. 155, Pl. 19, figs. 61-62, 82.

Megascolides minor, Beddard 1895, pp. 489-490.

Megascolides attenuatus, Beddard 1895, p. 491; Sweet 1900, p. 112.

Plutellus attenuatus, Michaelsen 1900, p. 169.

Plutellus minor, Michaelsen 1900, p. 170.

External morphology: (Specimens previously referred to *C. minor*, only): l?, 83 mm; w (midclitellar) 3 mm (both specimens); s = ?, 121 (G1435 and W1283 respectively). Form circular in cross section throughout; weakly triannulate. Pigmentless buff in alcohol. Prostomium epilobous 1/3, a deep middorsal furrow running from the prosotomium to 1/2 segment II. First dorsal pore 5/6. Setae in eight longitudinal rows, regular except on the posterior 14 segments where all rows become irregular (W1283); *ab* absent in XVIII (both specimens).

Nephropores sporadically visible, at the anterior borders of their segments in *c* lines (both specimens). Clitellum annular slightly protuberant, embracing XIV-XVII, with some clitellar modification of XIII in W1283; dorsal pores occluded but faintly visible; setae and nephropores retained; intersegmental furrows faint or obscured.

Male genital field: male pores a pair of minute apertures at the sites of the absent setae *ab* of XVIII, in W1283 on transversely elliptical papillae extending somewhat beyond *a* and *b* lines medianly and laterally. An approximately circular midventral area, extending from the setal zone of XVII to that of XX and laterally attaining a maximum width, in XVIII or XIX of slightly less than or slightly more than *bb*; this glandular field interrupted centrally from approximately 18/19 to the anterior limit of the setal annulus of XIX in such a way that a tumid, glandular arc is evident behind the male pores. Female pores anteromedian of setae *a* of XIV, on minute papillae. Spermathecal pores two pairs of minute ellipses in *ab* of 7/8 and

8/9; each in G1435 preceded by postsetal tumescence of the preceding segment.

Some anterior septa thickened; 9/10 the thickest, being quite strong. Dorsal blood vessel single, continuous onto the pharynx. Hearts well developed in X-XII. Supra-oesophageal vessel visible in XII but supra-oesophageal connectives to hearts not verifiable owing to poor condition of material. Subneural vessel absent. Gizzard large and cylindrical, in V; oesophagus vascular and moniliform in XII-XVII, and narrow in XVIII, in G1435; in W1283 large annular dilatations in 1/2 XIV, XV, XVI and XVII, have the appearance of sessile unpaired calciferous glands. Intestine beginning in XIX, with a large constricted oesophageal valve; dorsal typhlosole present, a rounded tortuous ridge beginning at 19/20; muscular thickening absent (both specimens).

Nephridia: all simple exonephric, avesciculate holonephridia; funnels not observed in nephridia of the forebody but connections with the anterior septum of each segment clearly visible. Terminal ducts of nephridia of segments II-V all enter the parietes anteriorly in II; composite ducts and pronounced coiling or tufting of nephridia not developed. In the posterior 13 or so segments, nephridia are thicker and slightly more coiled and the single funnels are easily detectable (W1283, Horan pers. comm.). Metandric; iridescent convoluted male funnels seen only in XI and small, racemose seminal vesicles only in XII. Ovaries consisting of united long chains of fairly large oocytes; ovisacs absent. Prostates coiled, tubular with distinct muscular duct (W1283); similar in G1435 but precise form indeterminable owing to previous damage. Penial setae absent. Spermathecae discharging anteriorly in their segments, each with a broadly digitiform sometimes reflexed ampulla and a much shorter, slender duct; a multiloculate iridescent dorsoventrally depressed diverticulum lying dorsally over and joining the junction of duct and ampulla; approximately uniform in size, length (G1435, right spermatheca of IX) = 2.5 mm; ratio total length: length duct = 5.8; ratio total length: length diverticulum = 9.1.

Material examined: A single, much dissected paralectotype, Ellinbank, S. Warragul, coll. W.

Mann Aug. 1891, Nat. Mus. Vict. G1435. A previously undissected clitellate specimen, used for the above account, and a dissected acelitellate specimen used only for setal ratios, Aust. Mus. W1283; this material is labelled *Cryptodrilus minor*, apparently in Spencer's handwriting, and is probably part of the type-series.

Remarks: It is here considered that *Megascolides attenuatus* Spencer, 1892, is a junior synonym of *Cryptodrilus minor* Spencer, 1892. The following description of the lectotype of *M. attenuatus* allows comparison of the two entities.

Megascolides attenuatus Spencer, 1892

Figs. 3B, 5D, 6G-I

l = 122 mm, w (midclitellar) = 1.9 mm, s = 166. Circular in cross section throughout. Pigmentless buff in alcohol, clitellum dark brown (worms grey in life, Spencer). Prostomium prolobous. First dorsal pore very conspicuous, 4/5. Setae small, in eight longitudinal rows, commencing in II, which become irregular posteriorly (in last 15 segments); *ab* absent in XVIII. Intersetal distances (Table 1).

Nephropores in *c* lines but only sporadically visible. Clitellum annular, well developed but not protuberant, embracing XIII-XVIII dorsally but interrupted ventrally in 1/2 XVII-XVIII; dorsal pores present in a middorsal furrow extending from XII-XIX; setae retained but less distinct; intersegmental furrows weak. Male pores equatorial in *ab*, nearer *a* of XVIII on a transverse band; the midventral region from the male pores almost to the setal annulus of XX glandular and tumid, the glandular field extending maximally, at the equator of XIX, to shortly beyond setae *b*. Female pores a pair of small orifices at about 1/3 *aa*, midway between the setal arc and the anterior border of XIV, in a common glandular field. Spermathecal pores two pairs, minute, on minute almost inappreciable papillae near the posterior limits of VII and VIII, in *ab* nearer *a*.

Septal thickening: 4/5 and 5/6 very delicate; 6/7-11/12 progressively thickened but 11/12 still only moderately thick, 12/13 and 13/14 moderately thickened but less than 11/12; the remainder slightly thickened to unthickened. Last septal (pharyngeal) glands anterior in IV.

Dorsal vessel single, continuous onto the pharynx. Dorsoventral commissural vessels in V-XII; those in V-IX progressively wider posteriorly, those of IX still, however, only about half as wide as those of X-XII which form three pairs of latero-oesophageal hearts each of which is attached directly to the dorsal vessel and receives a connective from the supra-oesophageal vessel. The latter vessel well developed, and free from the oesophagus, in X-XII, exceedingly thin in IX; not represented in other segments. Subneural vessel absent.

Gizzard large, almost cylindrical and firmly muscular, in V; oesophagus narrow and thin walled, not forming a proventriculus, in IV; its surface in VII, VIII and IX drawn out into innumerable long, fine (glandular?) processes which form in each segment a tuft obscuring the gut. Oesophagus narrow and chloragogenous-looking in X-XVIII, especially so in XIII posteriorly; lacking appreciable dilatation but with two pairs of conspicuous vessels to the dorsal vessel in XV and XVI (damaged in XVII) which are presumed to represent homologues of the (calciferous?) dilatations of other *Simsia* species. Intestine commencing with abrupt expansion in XX, the gut in XIX with deeply folded internal walls and externally distinguished by the opacity of its walls from the thin walled intestine and pinched off at each border of the segment; a deep tortuous narrow lamelliform dorsal typhlosole commencing in XXI; muscular thickening of the intestine absent.

Nephridia large, thickly tubular avesculate (stomate?) holonephridia, the postseptal bodies commencing in II; the slender ducts entering the parietes in front of setae *c*. Testes, free sperm masses and large robust iridescent sperm funnels free in X and XI; seminal vesicles two pairs, in IX and XII, racemose, the posterior the larger. Prostates a pair of stout tubes, bent twice, in XVIII and XIX, each with a short, narrow muscular duct. The duct embedded in glandular masses which extend on the ventral body wall from posterior XVII-posterior XIX and correspond with the external genital field. (The two vasa deferentia of each side remain separate, running up within the muscular wall of the spermiducal duct, and entering the duct

as it leaves the gland, Sweet 1900). Penial setae not recognizable (see Remarks). Ovaries very large firm laminae, each consisting of many rows of large oocytes, radiating laterally from basal strands attached near the ventral nerve cord; they and the funnels in XIII; ovisacs absent. Spermathecae two pairs, discharging anteriorly, the ampulla an elongate bent sac the narrow ectal end of which joins a narrow much shorter duct; 2 multiloculate diverticula, with spermatozoal iridescence, present one on each side at the junction of duct and ampulla; the duct embedded in a glandular mass. Size uniform, length of right spermatheca of VIII = 1.9 mm; ratio total length: length duct = 3.9; ratio total length: length diverticulum = 8.3.

Material examined: Lectotype, a previously undissected clitellate specimen, from Warragul, Nat. Mus. Vict. G176.

Remarks: Sweet (1900) noted on each side just behind the opening of the prostate duct a slightly muscular sac enclosing a long curved penial seta. Neither follicles nor penial seta are visible in the lectotype despite exhaustive examination. The possibility that the genital marking glands have obscured these cannot, however, be rejected.

Simsia multituberculata n.sp.

Figs. 4B, 5G, I, 6K-N

1 = 49, ?, 80 mm, w (midclitellar) = 4.5 mm, s = 126, ?, 137 (holotype and two paratypes, respectively). Form moderately stout; circular in cross section throughout; anterior segments widest. Colour in alcohol pale brown (but unpigmented?); clitellum pigmented. Prostomium tanylobous, with faint median dorsal groove (three specimens). Setae in eight regular longitudinal rows throughout, commencing on II; *ab* absent in XVIII.

Nephropores visible (preclitellar to about segment V, clitellar and occasionally postclitellar) on the anterior borders of their segments, in *c* lines. Clitellum annular, moderately protuberant, embracing XIV-XVIII (three specimens) with some clitellar modifications of XIII in the holotype; interrupted ventrally posteriorly from the setal arc of XVII by the male genital field. Male pores approximately equatorial on XVIII, in *ab*, on oval porophores

which extend slightly beyond *a* and *b* lines, medianly and laterally. Accessory genital markings three longitudinal rows of oval tubercles in the four intersegments 17/18, 18/19, 19/20 and 20/21, each intersegment thus with a pair of tubercles (in *ab* or, in 19/20 in *b*) and a median tubercle; an additional unpaired median tubercle present in approximately the same transverse line as the male pores in XVIII; the median and right marking of intersegment 20/21 not developed in paratype 2. Each tubercle has a pore-like central area which is transversely duplicated in that of XVIII in the holotype. Female pores small slits anteromedian of setae *a* of XIV. Spermathecal pores two pairs on small but conspicuous papillae in *a* lines of 7/8 and 8/9.

Internal anatomy (holotype). Septal thickening: 3/4-7/8 thin, 5/6 being so attenuated by the gizzard as to be barely perceptible; 8/9 moderate; 9/10-13/14 fairly strong; the remainder thin. Last pharyngeal glands in IV. Dorsal blood vessel single; continuous onto the pharynx. Dorsoventral commissural vessels in IV-XII; those in IV to IX slender, though increasing in thickness posteriorly; those in X to XII forming large latero-oesophageal hearts, each connected with the dorsal vessel and receiving a connective from a supra-oesophageal vessel which is visible in VIII-XII. Subneural vessel absent. Oesophagus unusually long and tortuous in front of the gizzard. Gizzard large, globose, and strongly muscular, in V; oesophagus greatly expanded in XV and XVI to form two unpaired annular (calciferous?) dilations; moniliform and vascularized, though narrow, in IX-XIV; narrow in XVII. Intestine beginning, with abrupt expansion, anteriorly in XVIII; a thickly laminar dorsal typhlosole commencing in XXIV. Nephridia small tufts in II and III; avesiculate holonephridia in succeeding segments which are slightly more coiled in the anterior few segments; the tufts in II discharging by a wide duct anteriorly, at furrow 0/1 in or above *d*; exit of those of III not seen; the remaining nephridia with ducts entering the parietes in *c* lines. Testes, large lobed iridescent sperm funnels and free sperm masses in X and XI; seminal vesicles in IX and XII, those in IX small and only slightly racemose, those in XII

larger, elongate and lobulated. Prostates restricted to an enlarged segment XVIII; very much coiled tubes, the folds adpressed, irregular in cross section and entally fused; vasa deferentia joining the gland shortly ental of its junction with the curved, relatively short, muscular duct. Penial setae gently bowed, the eetal end with a few scattered anteriorly directed minute spines some of which near the tip form a single serrated annulus; the tip of the seta drawn out into a very slender S-shaped process. Length of a well developed seta, 0.51 mm, width of the shaft generally 7 μ , slightly wider entally. Ovaries large folded laminae with many strings of large oocytes in XIII; ovisacs large laminae with several chains of oocytes on the anterior septum of XIV. Spermathecae two pairs; each with an ovoid or bulbous ampulla, a narrow short duct, and two lateral multiloculate diverticula which are not completely separate one from the other. Size of the spermathecae approximately uniform; length (four spermathecae of holotype) = 2.6-3.2 mm; ratio of total length: length duct = 2.7-3.2; ratio total length: length diverticulum = 7.4-8.5.

Material examined: the holotype, a complete specimen which had previously been dissected; and two paratypes of which one (paratype 1) is a previously dissected posterior amputee and the other an undissected complete specimen; all specimens clitellate; labelled in Spencer's hand '*Megascolides incertus* Blak Spur, Oct. '95', Nat. Mus. Viet. G175.

Simsia tuberculata (Fletcher, 1888)

- Notoscolex tuberculatus* Fletcher, 1888, p. 611-614.
Megascolides tuberculatus, Beddard 1895, p. 494; Spencer 1892, p. 156.
Plutellus tuberculatus, Michaelsen 1900, p. 168; Jamieson 1971a, p. 88.
Megascolides roseus Spencer, 1892, pp. 153-154, Pl. 18, figs. 58-60; Pl. 19, fig. 81; Beddard 1895, p. 491; Sweet 1900, p. 112.
Plutellus roseus, Michaelsen, 1900, pp. 167-168; Jamieson 1971a, p. 88.
Simsia tuberculata, Jamieson 1972, This volume.
Megascolides incertus Spencer, 1892, pp. 151-152, Pl. 18, fig. 52-54; Pl. 19, fig. 80.
Megascolides incertus, Beddard 1895, p. 490.
Plutellus incertus, Michaelsen 1900, p. 167; Jamieson 1971, p. 87.

Prostomium tanylobous. First visible dorsal pore 18/19. Setae small and difficult to discern;

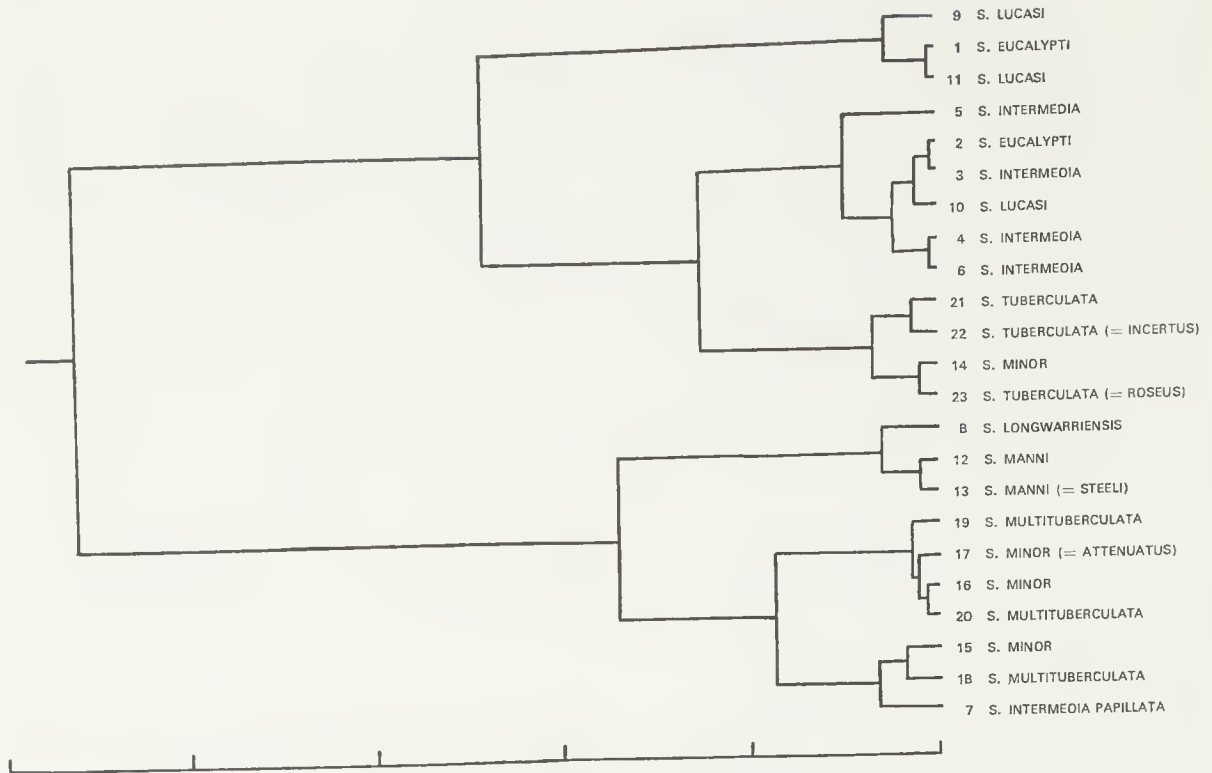


Fig. 7—Dendrogram of intertaxon (inter-ratio) distances in the genus *Simsia*.

in eight regular longitudinal rows (throughout?), commencing in II; *a* and *b* absent in XVIII. Intersetal distances (Table 1). Nephropores not visible. Clitellum annular, embracing 1/2 XIII-2/3 XVIII; setae and intersegmental furrows retained but less distinct; dorsal pores not recognizable. Combined male and prostatic pores a pair on XVIII in *a*. Paired eye-like accessory genital markings presetally in *ab* in XV, XVI, XVII, XX, XXI and XXII in all of which they impinge on the anterior intersegment; a single midventral marking in XVIII. Female pores small slits anteromedian of setae *a* of XIV. Spermathecal pores not visible. General internal anatomy as for *S. tuberculata* (Jamieson 1971b).

Material examined: A clitellate posterior amputee with the registration '*Megascolides incertus*, now *Plutellus incertus* (Sp.), Victoria, presented by J. J. Fletcher (Nov. 1924), identified by Prof. B. Spencer', Aust. Mus. Sydney, W1276; here designated the lectotype of the junior synonym *Megascolides incertus* Spencer.

Remarks: The above brief account, coupled with Spencer's description, is sufficient to leave no doubt that *Megascolides incertus* is a junior synonym of *Simsia tuberculata*. Location of additional paired accessory genital markings in the specimens of *incertus* in XV and XVI is a not unexpected extension of the genital field of *S. tuberculata*.

Intersetal Ratios

Table 1 lists intersetal distances for species of *Simsia* described here and in Jamieson (1971b). These are subjected to numerical analysis below.

Methods

The four setae on each side of a segment are designated, in the ventral to dorsal direction, *a*, *b*, *c*, and *d*. The distances *aa: ab: bc: cd: dd: dc: cb: ba* are measured by means of a camera lucida (alternatively a graticule or scale in the ocular may be used). The specimen is held down by a glass slide or coverglass, avoiding

TABLE I
Inter-set distances in the genus *Simsia*

	aa						ab			bc			cd			dd			dd:u							
	mm		st		st/ab		mm		st		st/ab		mm		st		st/ab				mm		st		st/ab	
1	1.39	10.12	2.78	0.50	3.64	1.00	2.14	15.58	4.28	0.71	5.17	1.42	5.64	41.07	11.28	0.41	G.1440	Paralectotype								
2	1.72	10.36	2.33	0.74	4.44	1.00	2.25	13.53	3.05	0.91	5.50	1.24	7.09	42.71	9.62	0.43	G.1553									
3	1.29	9.82	2.26	0.57	4.34	1.00	1.79	13.60	3.13	0.71	5.41	1.25	5.71	43.49	10.02	0.44	G.58									
4	1.29	10.69	2.58	0.50	4.14	1.00	1.50	12.43	3.00	0.54	4.47	1.08	5.71	47.31	11.43	0.47	G.1406									
5	1.29	9.71	2.01	0.64	4.82	1.00	1.50	11.29	2.34	0.79	5.94	1.23	6.14	46.20	9.59	0.46	G.72									
6	1.29	10.62	2.58	0.50	4.12	1.00	1.57	12.93	3.14	0.64	5.27	1.28	5.43	44.73	10.86	0.45	G.86									
7	1.72	13.49	2.50	0.70	5.51	1.00	1.54	12.12	2.20	0.91	7.16	1.30	4.70	36.91	6.70	0.36	G.52	Holotype								
8	0.88	8.19	1.79	0.50	4.59	1.00	1.53	14.26	3.10	0.95	8.85	1.92	3.90	36.39	7.93	0.36	G.1552	Holotype								
9	1.23	8.66	3.18	0.39	2.72	1.00	2.18	15.35	5.64	0.53	3.71	1.36	6.77	47.77	17.56	0.48	G.84									
10	1.58	8.91	2.25	0.70	3.96	1.00	2.42	13.66	3.45	0.84	4.75	1.20	8.21	46.34	11.70	0.46	W.1282	Lectotype								
11	1.82	10.24	3.06	0.60	3.35	1.00	2.81	15.75	4.70	0.77	4.33	1.29	7.65	42.91	12.81	0.43	W.1282	Paralectotype								
12	1.29	9.57	1.64	0.79	5.85	1.00	2.07	15.43	2.64	1.07	7.98	1.36	4.29	31.91	5.45	0.32	G.158	Lectotype								
13	1.30	9.08	1.69	0.77	5.38	1.00	2.07	14.46	2.69	1.09	7.61	1.41	5.16	36.03	6.70	0.36	G.168	Lectotype								
14	0.95	12.55	2.97	0.32	4.23	1.00	0.95	12.55	2.97	0.46	6.08	1.44	3.16	41.74	9.87	0.42	G.1435	Paralectotype								
15	0.70	11.13	1.80	0.93	6.20	1.00	0.81	12.88	2.08	0.42	6.68	1.08	2.35	37.36	6.03	0.37	W.1283(1)									
16	0.67	10.79	2.39	0.28	4.51	1.00	0.84	13.53	3.00	0.42	6.76	1.50	2.46	39.61	8.78	0.40	W.1283(2)									
17	0.56	10.59	2.43	0.23	4.35	1.00	0.75	14.18	3.26	0.42	7.94	1.83	1.93	36.48	8.39	0.36	G.176	Lectotype								
18	1.47	11.76	2.07	0.71	5.68	1.00	1.66	13.29	2.34	1.07	8.56	1.51	4.14	33.14	5.83	0.33	G.175	Holotype								
19	1.47	12.36	2.89	0.51	4.28	1.00	1.65	13.87	3.24	0.89	7.48	1.75	4.32	36.33	8.49	0.36	G.175	Paratype								
20	1.61	11.63	2.37	0.68	4.91	1.00	1.84	13.29	2.71	1.07	7.73	1.57	5.05	36.48	7.43	0.36	G.175	Paratype								
21	2.21	13.64	3.60	0.61	3.79	1.00	2.33	14.39	3.80	0.88	5.41	1.43	6.35	39.18	10.34	0.39	G.172	Lectotype								
22	2.57	11.76	3.00	0.86	3.92	1.00	3.14	14.38	3.67	1.07	4.90	1.35	9.14	41.83	10.67	0.42	W.1276	Lectotype								
23	2.29	12.12	3.20	0.71	3.79	1.00	2.43	12.88	3.40	0.89	4.73	1.25	8.50	45.08	11.90	0.45	W.1278									

undue compression. When each intersetal distance is to be measured the glass is depressed sufficiently to flatten the body surface between the two adjacent setae. A measurement of the arc rather than the chord between the two setae is thus obtained. Very large intersetal distances, for instance *dd*, which may exceed one half of the circumference, are measured in two or more sections. Intersetal distances are expressed in millimetres and, to allow comparison between specimens, are also expressed relative to a constant total (periphery) of 100. Direct comparison of ratios between individuals without recourse to additional computations is also facilitated by stating the distances as ratios relative to one of the distances (*ab*) expressed as unity and by giving the ratio of the dorsal median intersetal distance (*dd*) to the circumference of the segment (*u*). In the computer study, paired intersetal distances (*ab*, *bc*, *cd*) were each averaged and *dd* was omitted as it was assumed that for *n* intervals the degrees of freedom were *n*-1. Four attributes (*aa*, *ab*, *bc*, and *cd*) were therefore used in the computations.

Inter-taxon (i.e. inter-ratio) distances were calculated after standardization of attributes (setal ratios) according to the Euclidean model of Burr (1968); the subsequent fusion strategy was the same author's 'incremental sum of squares' (Burr 1970), which minimizes the increase in within-group sum of squares at each fusion.

Results. The dendrogram representing relative distances of intersetal ratios is given in Fig. 7. **Conclusions.** The morphological homogeneity of the genus *Simsia* is reflected in the intersetal ratios of the constituent species. Thus overlap of ratios between unquestionably distinct morphospecies is frequent and suggests that ratios of individual specimens would be of limited value for specific identification in this genus. Whether intersetal ratios of the constituent species form parameters diagnostic of each species requires investigation of larger samples than are at present available. From the dendrogram some differentiation of intersetal ratios can nevertheless be seen to have accompanied speciation as only two of the eight species studied occur on both branches of the major dichotomy (final fusion at greatest 'intertaxon'

distance) and, usually, individuals or representatives of synonyms of a single species fuse at small intertaxon distances. One of the taxa, *S. intermedia*, which appears to cross the major dichotomy does not indisputably do so as only its subspecies *S. i. papillata* occurs on one of the branches and the affinity of this subspecies with *S. intermedia*, as adjudged from general anatomy, cannot be considered settled. It shows close general resemblance to *S. minor*, with which it clusters in the dendrogram. Identification with *S. intermedia* was determined by the mutual possession of tufted nephridia which are not known in *S. minor*. Specific distinction from both *S. minor* and *S. intermedia* cannot be ruled out on present evidence.

Acknowledgements

The author gratefully acknowledges the cooperation of Dr B. J. Smith of the National Museum of Victoria and Miss E. C. Pope of the Australian Museum, Sydney, in providing the material which is the subject of this study. Special thanks are due to Dr W. Williams, Division of Tropical Pastures, C.S.I.R.O., Brisbane, for advice on numerical analysis of data. Thanks are also due to Mr E. Bradbury for discussion of the manuscript and for measuring ratios. The illustrations are by the author. The work was made possible by tenure of Australian Research Grants Committee grant no. 239280-R-ZOOL-ARGC-120-71.

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Abbreviations used in figures

d.p. = dorsal pore, ♀ p. = female pore, g.m. = accessory genital marking, gl. a. = glandular area, gl. m. = glandular (?) mass, l.g.m. = lateral accessory genital marking, ♂ p. = male pore, m.g.m. = median accessory genital marking, np. = nephropore, pr.d. = prostatic duct, pr.g. = glandular portion of prostate, sem. ch. = seminal chamber, sp. amp. = spermathecal ampulla, sp.d. = spermathecal duct, sp. div. = spermathecal diverticulum, sp.p. = spermathecal pore, v.d. = vas deferens.