

Table 14.3. ANNELID GIANT THROUGH-CONDUCTION SYSTEMS.

Group	Fibers		Cell bodies				Fiber diameter ( $\mu$ )	Conduction Velocity, 18-24° C (m/sec)
	No.	Detail	Motor branches	Uni- or multi-cellular		Additional Features		
				Location				
<b>A. Archiannelida</b>								
Polygordiidae	0-1	sev (?)				followed into brain		
<b>B. Polychaeta Errantia</b>								
Nereidae (3)	5					<i>Neanthes</i> :		
		2 lg lat	0	mult	each seg (1)	with segmtl septa	30-37	5
		1 median	0	mult	each seg	with segmtl septa (?)	15-18	4.5
		2 medial	0	uni	each seg	synaptic but fast thru-cond	7-9	2.5
Syllidae	0							
Hesionidae	0							
Aphroditidae (3)	0					lg intrasegmtl motor units		0.5 (ng) (2)
Polynoidae (3)	2 or 4					<i>Lepidametria</i> , with 2	20-30	5
		2 lats, lg	+			<i>Lepidasthenia</i> : enter c-e-c, end in subesoph g; (+ segm motors)		
		2 + medials, sm	0					
Sigalionidae	22+	14 ap, long	0	uni, bi	brain and cord	<i>Sthenelais</i> : (+ segmtl motors)		2 (2)
		8 + pa, short						
Polyodontidae	2	sm						
Chrysopetalidae								
Phyllodocidae	0							
Tomopteridae	1	possibly more						
Nephtyidae (3)	4	2 lg and sev sm				<i>Nephtys</i> :	20-25	5
Amphinomidae	0							
Euphrosynidae	0							
Eunicidae (3)	1	very lg			no lg cells	<i>Marphysa</i> :	170	10
Onuphidae (3)	1	very lg				<i>Diopatra</i> :	110	10
Lumbrineridae(3)	4							
		1 very lg,			ant g, lg	<i>Lumbrineris</i> :	130	10
		3 sm					20-25	4-5
Arabellidae (3)	0	many short giants		mult (?)	segs II-XX, lg	probably short, relaying, 0-6 per xs		1.5 (ng) (2)

Dorvilleidae	0							
Glyceridae (3)	8-14	8 + lg 2-6 sm		in brain (?), lg	Glycera:	15-20	3-4	
Ichthyotomidae	sev	sm						
Lysaretidae	20-30	15-21 6-8	uni uni	2± each ant, lg post cord, sm	Halla: fibers run posteriorad, maybe fuse fibers run anteriorad, <i>Oligagnathus</i>	8-40		
Sphaerodoridae	0							
Paronidae								
Typhloscolecidae								
<b>C. Polychaeta Sedentaria</b>								
Orbiniidae (3)	1-2	both median			<i>Haploscoloplos</i> :	20-35	7	
Spionidae	1-2	lg		in brain (?)	<i>Polydora</i> :	22-30		
Chaetopteridae (3)	0							
Magelonidae	1	lg	mult	brain (?), lg	double ant to VII, enters c-e-c			
Oweniidae	0							
Terebellidae (3)	0				<i>Amphitrite</i>			
	1	lg		cord paired	<i>Pista</i> :	48	2-4	
	1	lg	mult	cord, lg	<i>Lanice</i>			
Ampharetidae	sev	0-3 per xs each 1-2 seg	uni (?)	cord	<i>Ampharete</i> , <i>Amphicteis</i> branch and anast (?)			
	2	lg			<i>Melinna</i>			
Pectinariidae	0							
Cirratulidae (3)	0				<i>Cirriformia</i>		0.9 (ng) (2)	
	1	lg			<i>Dodecaceria</i>			
Capitellidae	0-4	varies along cord	mult	cord, lg	<i>Notomastus</i> , <i>Mastobranchus</i> possible anast and discont fibers, good "myelin" sheath <i>Capitella</i> sp			
	0							
Opheliidae	sev	sm, irreg						
Maldanidae (3)	2	unpaired	mult	cord (in epith)	<i>Clymenella</i> :	35 max	4 max	
	(3)	lg, 1 per xs			<i>Maldane</i> : 1 ant, 1 post	65		
Arenicolidae	1-3	varies along cord	+	mult	each seg, 50-80 μ	<i>Arenicola cristata</i>	15-25	2
	0				<i>Branchiomaldane</i>			

(Table continues on following page)

(Continuation of Table 14.3)

Group	Fibers		Motor Branches	Cell bodies <sup>A</sup>		Additional Features	Fiber diameter (μ)	Conduction Velocity, 18-24° C (m/sec)
	No.	Detail		Uni- or Multi-cellular	Location			
<b>C. Polychaeta Sedentaria (cont.)</b>								
Scalibregmidae	0							
Flabelligeridae	2	paired						
Sternaspidae								
Sabelliidae	2	very lg				<i>Sabella</i> anast each seg		
(3)	2	very lg	0	mult		<i>Spiragraphis</i> : anast repeatedly in thorax	100-130	4-6
(3)	2	very lg	0			<i>Eudistylla</i> : 1 anast or none; reciprocal synaptic transm; enters c-e-c	200-250	4.5-7
(4)	1	very lg	+	mult	10 + sm cells per seg plus 1 pr in brain	<i>Myxocola</i> : starts in brain, paired, decussates; fuses in cord; sheath = 1% of fiber diameter	100-1000 (max 1700)	3.2-21
Serpulidae (3)	2	very lg	0	uni	in brain, lg	<i>Protula</i> : synapse at decussation	250-350	10
Sabellariidae	2	lg						
<b>Incertae sedis</b>								
Goniadidae	2 (?)	sm						
Disomidae	2	very lg				<i>Poecilochaetus</i>	83	
Myzostomida	sev 12-14		0		in groups, longit 6-7 prs cord	<i>Myzostoma</i> extends thru single lg ganglionic mass segmtl motor fibers		
Acoetidae	0							
<b>D. Oligochaeta</b>								
<b>(Superfamilies:)</b>								
Lumbricina (3) (5)	3					<i>Lumbricus</i> : segmtl septa segmtl septa synaptic connections	60-75 30-50	15-45 7-15
		1 lg median	0	mult	sev each seg			
		2 lg lats	+	mult	sev each seg			

	2				between rt and left lats. lg ventral fibers, segmtl, not thru-conducting (?)		
Phreoryctina							
Megascolecina (6)	3				<i>Pheretima</i> :		
		1 lg median	0	mult	sev each seg	septa as above	75 40
		2 lg lats	+	mult	sev each seg	septa as above	30 15
		2				lg ventral fibers, segmtl median divides into c-e-c	
Lumbriculina	3						
Branchiobdellidae	0						
Naidina	3					<i>Chaetogaster</i> , <i>Nais</i> ,	
	0					<i>Aelosoma</i>	
Enchytraeina	1-3						
Tubificina	1-3	very lg				3 posty fuse to 1 anty	
<b>E. Hirudinea</b>	0	sev thru- conducting fibers		uni		demonstrated electrophysiologically	1

anast = anastomose; anty = anteriorly; ap = anteroposterior; bi = bicellular; c-e-c = circumesophageal connective; discnt = discontinuous; g = ganglion; lat = lateral; lg = large; max = maximum; mult = multicellular, syncytial; ng = nongiant conduction in cord; pa = posteroanterior; posty = posteriorly; pr = pair; seg = segment; sev = several; sm = small; uni = unicellular; xs = cross section.

(1) By supposition from the fact of septa; not demonstrated.

(2) Determined by kymograph by Jenkins and Carlson (1903).

(3) Confirmed in one or more species of the genus by electrical recording in Bullock (1945a, 1945b, 1948, 1953).

(4) Confirmed as above, in Nicol (1948a); Nicol, and Whitteridge (1955).

(5) Confirmed as above, in Eccles, Granit, and Young (1932); Rushton and Barlow (1943); Rushton (1945, 1946).

(6) Confirmed as above, in Adey (1951).

