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## Parasitic worms mainly from Celebes. Part 10. Nematodes of Birds and Mammals

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# Parasitic worms mainly from Celebes. Part 10. Nematodes of Birds and Mammals\*

Satyu Yamaguti

## Abstract

Acuariidae Seurat, 1913 1. *Cheilospirura hamulosa* (Dies., 1851) Spiruridae Oerley, 1885 2. *Arduenna strongylina* (Rud., 1819) Railliet et Henry, 1911 Physalopteridae Leiper, 1908 3. *Physaloptera tumefaciens macaci* n. subsp. Strongylidae Baird, 1853 4. *Oesophagostomum maurum* Hung, 1926 5. *Oesophagostomum dentatum* (Rud., 1803) 6. *Ternidens simiae* n. sp. 7. *Globocephalus simiae* n. sp. 8. *Bourgelatia didueta* Railliet, Henry et Bauche, 1928 9. *Stephanurus dentatus* Diesing, 1839 Trichostrongylidae Leiper, 1912 10. *Mecistocirrus digitatus* (v. Linstow, 1906) Railliet et Henry, 1912 Filariidae Claus, 1885 11. *Setaria labiatopapillosa* (Aless., 1838) 12. *Setaria Bernardi* Railliet et Henry, 1911 Trichuridae Railliet, 1915 13. *Trichuris trichiura* (Linne, 1771) Stiles, 1901

**Parasitic worms mainly from Celebes**  
**Part 10. Nematodes of Birds and Mammals**

With 4 Plates

By

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Contents

Acuariidae Seurat, 1913	134
1. <i>Cheilospirura hamulosa</i> (Dies., 1851)	134
Spiruridae Oerley, 1885	135
2. <i>Arduenna strongylina</i> (Rud., 1819) Railliet et Henry, 1911	135
Physalopteridae Leiper, 1908	136
3. <i>Physaloptera tumefaciens macaci</i> n. subsp.	136
Strongylidae Baird, 1853	138
4. <i>Oesophagostomum maurum</i> Hung, 1926	138
5. <i>Oesophagostomum dentatum</i> (Rud., 1803)	139
6. <i>Ternidens simiae</i> n. sp.	140
7. <i>Globocephalus simiae</i> n. sp.	141
8. <i>Bourgelatia diducta</i> Railliet, Henry et Bauche, 1928	143
9. <i>Stephanurus dentatus</i> Diesing, 1839	143
Trichostrongylidae Leiper, 1912	144
10. <i>Mecistocirrus digitatus</i> (v. Linstow, 1906) Railliet et Henry, 1912	144
Filariidae Claus, 1885	145
11. <i>Setaria labiatopapillosa</i> (Aless., 1838)	145
12. <i>Setaria Bernardi</i> Railliet et Henry, 1911	145
Trichuridae Railliet, 1915	146
13. <i>Trichuris trichiura</i> (Linné, 1771) Stiles, 1901	146
Literature	147
Explanation of Plates	148
Abbreviations used in Figures	149

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**ACUALIIDAE Seurat, 1913**

1. *Cheilospirura hamulosa* (Dies., 1851) Dies., 1861

Habitat and locality. Gizzard of *Gallus gallus*; Macassar.

**Material.** One male and two females.

**Male.** 13.6 mm long by 0.32 mm wide. Nerve ring and cervical papillae 0.35 mm and 0.39 mm respectively from head end. 4 cuticular cordons reaching to near posterior extremity without anastomosing or recurving. Buccal tube  $0.24 \times 0.03$  mm. Anterior part of esophagus  $0.91 \times 0.098$  mm, posterior part  $2.55 \times 0.154$  mm. Posterior extremity rolled into spirals. Left spicule slender, 2.4 mm long, right spicule shaped like a chopping knife, 0.18 mm long. There are four pairs of preanal and three pairs of postanal papillae; the small papillae as demonstrated by Drasche (1883) were not observed with certainty, as the male specimen could only be examined in lateral view. Tail 0.56 mm long.

**Female.**  $24-25 \times 0.46-0.5$  mm. Nerve ring and cervical papillae 0.44-0.45 mm and 0.38-0.4 mm respectively from head end. Buccal tube  $0.33 \times 0.047-0.057$  mm. Anterior part of esophagus  $1.26-1.3 \times 0.15-0.17$  mm, posterior part  $4.2-4.5 \times 0.3-0.31$  mm. Tail 0.28 mm long, curved ventrally in form of a hook. Vulva a little behind middle of body (13.3-13.5 mm from head end). Eggs elliptical, thick-shelled, embryonated,  $39-45 \times 24-26 \mu$ .

Though not agreeing completely with the account quoted by Cram, especially in the ratio of the two spicules and in egg size, the present worm may be safely referred to *Cheilospirura hamulosa*.

## SPIRURIDAE Oerley, 1885

2. *Arduenna strongylina* (Rud., 1819)  
Railliet et Henry, 1911  
(P. I, figs. 1-2)

**Habitat and locality.** Stomach of pig; Macassar.

**Material.** 6 males and 8 females including two young worms.

**Male.** Body  $12-13.5 \times 0.28-0.32$  mm, with fine transverse striations; lateral flange on left side only, arising immediately behind left cervical papilla which lies 0.16-0.22 mm from the head end. Right cervical papilla 0.37-0.46 mm from head end. Nerve ring and excretory pore located 0.28-0.322 mm and 0.35-0.38 mm respectively from anterior extremity. Vestibule with spiral markings,  $78-100 \mu$  long,  $27-33 \mu$  wide. Esophagus divided into two parts; anterior part 0.32-0.38 mm long, posterior part about ten

times as long (3.0-3.7 mm long), 0.126-0.16 mm wide. Tail inrolled, 0.15-0.28 mm long, with asymmetrical caudal alae (right ala the larger). Cloaca with a half-crown whose convex margin is serrate. Of the five pairs of pedunculated papillae four lie in front of the cloaca and the rest lies posterolateral to the cloacal aperture. Three pairs of sessile papillae between cloacal aperture and tail tip; middle pair being nearer to the anterior than to the posterior. Spicules unequal and dissimilar, right one 0.42-0.6 mm long, left one 2.2-3.1 mm long.

**Female.** Body 15-19×0.28-0.36 mm. Left cervical papilla 0.16-0.21 mm, right one 0.35-0.48 mm, from head end. Nerve ring and excretory pore situated 0.28-0.366 mm and 0.35-0.43 mm respectively from head end. Vestibule 78-100×30-33  $\mu$ . Anterior part of esophagus 0.3-0.38×0.048-0.054 mm, posterior part 3.1-3.7×0.14-0.17 mm. Tail 0.19-0.27 mm long. Vulva a little in front of middle of body, but behind it in two smallest individuals 15 mm and 15.3 mm long respectively. Eggs elliptical, thick-shelled, embryonated, with polar plugs, 39-51×21-27  $\mu$ . Full-grown eggs show dotted markings on the surface.

### PHYSALOPTERIDAE Leiper, 1908

#### 3. *Physaloptera tumefaciens macaci* n. subsp. (Pl. I, figs. 3-7)

Host and locality. *Macacus* sp.; Celebes.

Material. A number of mature males and females, fixed in alcohol and mounted in lactophenol-gelatine.

**Male.** Body 36-45×1.5-1.8 mm. Head surrounded by colarette. Lateral lip with a pair of submedian papillae and a lateral amphid externally. Anteromedially it is produced into a conical lobe which bears a blunt chitinous outer tooth and a row of three inner teeth whose tip may be round or incised. Nerve ring, cervical papillae and excretory pore situated 0.6-0.77 mm, 1.0-1.2 mm and 1.22-1.26 mm respectively from head end. Esophagus 7.4-7.9 mm long by 0.43-0.52 mm wide, anterior muscular portion 0.56-0.74 mm long, posterior glandular portion 6.7-7.3 mm long. Posterior extremity curved ventrally, tail 1.7-2.1 mm long, with lateral alae supported by 4 pairs of pedunculated papillae. 13

sessile papillae are arranged on the ventral surface with numerous longitudinal series of cuticular elevations just as described by Henry and Blanc. Spicules equal or subequal, 0.56–0.7 mm long on the right, 0.65–0.73 mm long on the left.

As dissected out in the fresh state the filiform testis about 30 mm long forms a loop while descending, and another loop before leading into the vesicula seminalis, from which it is sharply constricted off. Vesicula seminalis 3.6–4.3 × 0.35–0.43 mm, ductus ejaculatorius 2.2–2.8 × 0.25–0.4 mm.

**Female.** Body 54–58 × 1.8–0.2 mm. Head as in male. Nerve ring, cervical papillae and excretory pore situated 0.67–0.81 mm, 1.06–1.4 mm and 1.27–1.4 mm respectively from head end. Esophagus 8.6–9.6 mm long by 0.51–0.61 mm wide, anterior muscular portion 0.77–0.98 mm long, posterior glandular portion 7.8–8.8 mm long. Tail 0.7–0.98 mm long, Vulva situated 9.5–11.5 mm from anterior extremity, dividing body length in ratio of 1:4–5. Ovaries 4, filiform, convoluted, 35–40 mm long; receptaculum seminis uterinum at commencement of each uterus; uteri 4, tapering posteriorly, 65–75 mm long, abruptly attenuated as they turn backward at about level of posterior end of esophagus toward the dilated unpaired uterus which is 0.7–1.3 mm long by 0.42–0.47 mm wide. Vagina 1.5–2.1 mm long, narrow, directed forward from vulva. Eggs elliptical, thick-shelled embryonated, measuring 45–51 × 27–29  $\mu$  in life.

In the following is given a table of comparison of measurements between *P. tumefaciens* and the present worm.

Authors	Henry and Blanc	Yamaguti
Body { male ... ..	32–35 × 1.3–1.35	36–45 × 1.5–1.8
{ female ... ..	38–42 × 1.8–2.0	54–58 × 1.8–2.0
Esophagus { male ... ..	7–7.5	7.4–7.9
{ female ... ..	9.0	8.6–9.6
Tail of male ... ..	1.8	1.7–2.1
Spicules ... ..	0.4–0.74	0.56–0.73
Vulva from anterior extremity	10	9.5–11.5
Eggs ... ..	52–55 × 33–36 $\mu$	45–51 × 27–29 $\mu$

As compared with the original description of *Physaloptera tumefaciens* by Henry and Blanc the present worm differs in egg

size as well as in body length, though agreeing completely in other characters. To the difference in body length cannot be attached much importance, because such long nematodes are subject to considerable variation in length according to age. The difference in size of such thick-shelled eggs, however, is of great importance in differentiating the species related to each other so far as the ranges of variation are entirely separated one from the other as in the present instance, so that I would regard provisionally the worm in question as representing a new subspecies of *P. tumefaciens* unless the egg measurements are emended later for the latter species.

### STRONGYLIDAE Baird, 1853

#### 4. *Oesophagostomum maurum* Hung, 1926 (Pl. I, figs. 8-9; Pl. II, figs. 10-11)

Habitat and locality. Large intestine of monkey; Celebes.

Material. Numerous mature males and females.

**Male.** Body  $10-12 \times 0.35-0.36$  mm. Head  $95-105 \mu$  in diameter, mouth collar delimited behind by annular constriction from cephalic vesicle. Submedian papillae projecting very prominently. Buccal capsule short, trapezoidal in optical section,  $18-21 \mu$  long  $57-66 \mu$  wide at base with its wall thickened anteriorly and forming just behind the anterior margin an inconspicuous internal annular ledge on which the leaf-crown rests. Latter single, consisting of 10 blunt-pointed triangular elements. Nerve ring and cervical papillae  $0.22-0.25$  mm and  $0.32-0.42$  mm respectively from head end. Ventral cervical groove and excretory pore  $0.22-0.27$  mm from anterior extremity. Esophagus  $0.5-0.57$  mm long,  $81-93 \mu$  wide at anterior funnel,  $114-150 \mu$  wide at posterior swelling. In the esophageal funnel there are three (one dorsal and two sub-ventral) tooth-like projections as described by Hung. Dorsal lobe of bursa reaching as far back as lateral lobes; ventral ray cleft to base, externolateral and other laterals with common base, medio-lateral and posterolateral pressed against each other, externodorsal arising from base of dorsal which is bifurcate for about half its length, with a small digitiform outer twig on each branch. Genital cone simple, paired; prebursal papillae present. Spicules alate, equal,  $1.2-1.4$  mm long; gubernaculum  $95-140 \mu$  long.

**Female.** Body 12-15×0.42-0.5 mm. Head 99-111  $\mu$  in diameter, buccal capsule 20-24×63-70  $\mu$ . Nerve ring located 0.22-0.27 mm, and cervical papillae 0.36-0.45 mm, from anterior extremity. Esophagus 0.54-0.6 mm long, 87-100  $\mu$  wide in front, 150-168  $\mu$  wide behind. Tail pointed conical, 0.14-0.18 mm long. Vulva 0.16-0.224 mm in front of anus, 0.35-0.42 mm from tail end. Eggs elliptical, thin-shelled, containing segmented ova. As fixed in alcohol and measured in water they are 63-69  $\mu$  by 36-40  $\mu$ , but in lactophenol mounts subjected to slight cover glass pressure they measure 60-75  $\mu$  by 42-48  $\mu$ .

The present description agrees with the original by Hung better than with that by Sandground so far as the measurements of the female are concerned, as shown in the following table.

Authors	Hung	Sandground	Yamaguti
Body { male ... ..	—	16	10-12
female ... ..	12-13	19-21	12-15
Cervical groove from head end in female ... ..	0.28-0.29	0.28	0.22-0.27
Length of esophagus in female ... ..	0.55-0.58	0.71	0.54-0.6
Vulva from tail end ... ..	0.35-0.4	0.445-0.5	0.35-0.42
Eggs ... ..	—	56×39 $\mu$	60-75×36-42 $\mu$
Spicules ... ..	—	1.35	1.2-1.4
Gubernaculum ... ..	—	0.11	0.095-0.14

##### 5. *Oesophagostomum dentatum* (Rudolphi, 1803)

Syn. *O. quadrispinulatum* Macrone, 1901

*O. longicaudum* Goodey, 1925

(Pl. II, figs. 12-14)

Habitat and locality. Large intestine of pig; Macassar abattoir.

Material. Three mature males and one female.

The measurements taken from the present material are given in the following table in comparison with those of Railliet, Henry and Bauche from the pig of Annam as well as with those of mine of 1935 from the Japanese pig.



Authors	Railliet, Henry & Bauche (1919)	Yamaguti (1935)	Yamaguti (present)
Body { male ... ..	6.8-8.2	8.12-8.68	7.1-7.4
	×0.26-0.33	×0.36-0.42	×0.3-0.36
Body { female ... ..	8-12	8.0-10.7	8.5×0.42
	×0.32-0.5	×0.39-0.45	
Cervical groove from head end ... ..	0.16-0.19	0.14-0.33	0.18-0.2
Cervical papillae from head end ... ..	0.3-0.35	—	0.29-0.37
Esophagus ... ..	0.375-0.4	0.35-0.42	0.35-0.42
Spicules ... ..	0.775-0.85	0.88-1.1	0.73-0.8
Gubernaculum ... ..	0.105-0.11	—	0.09-0.105
Tail of female ... ..	0.4-0.5	0.23-0.53	0.43
Vulva from tail end ... ..	0.825-0.86	0.3-0.49 from anus	0.85
Eggs ... ..	60-78 × 37-46 <sup>μ</sup>	61-70 × 36-42 <sup>μ</sup>	60 × 45 <sup>μ</sup>

6. *Ternidens simiae* n. sp.

(Pl. II, figs. 15-18; Pl. III, fig. 19)

**Habitat.** Large intestine of monkey from Celebes.**Material.** 6 males and 3 females, all mature.

**Male.** Body 8.1-9.2 mm long by 0.35-0.42 mm wide. Head directed a little dorsally, 156-165 $\mu$  in diameter, mouth collar not well marked off, with a pair of distinct lateral amphids, two pairs of submedian papillae, and a dorsal opening of esophageal ridge. No cephalic vesicle. Ventral cervical groove reaching over lateral margins at level of posterior end of esophageal funnel. Excretory pore, nerve ring and cervical papillae situated 0.24 mm, 0.36 mm and 0.46 mm respectively from head end. External leaf-crown consisting of 23-24 elongate, pointed elements, arising from anterior margin of buccal capsule; internal leaf-crown not developed, though small tooth-like structures are seen inside the base of the external leaf-crown. Buccal capsule subglobular, 0.135-0.15×0.15-0.17 mm, with distinct dorsal gutter. Esophageal funnel dilated, with three teeth 75-90 $\mu$  long and projecting into buccal capsule; each tooth laminate, with lateral edges curved inwards, divided anteriorly into three wings, of which the middle projects further forward than the lateral. In transverse section through the three

wings the tooth appears like a greek letter  $\omega$ . Esophagus club-shaped,  $0.65 - 0.77 \times 0.18 - 0.21$  mm, posterior appendage three-valved, hanging down into intestine. Bursa copulatrix divided distinctly into a small dorsal lobe and two symmetrical lateral lobes; ventral ray cleft to base, three laterals arising from common trunk, mediolateral and posterolateral fused proximally but pressed against each other for greater distal portion; externodorsal arising from a common trunk with dorsal; dorsal bifurcate, each branch giving off a short lateral twig reaching to the notch separating the dorsal lobe from the lateral. An additional rudimentary twig may be present. Genital cone simple. Prebursal papillae present. Spicules equal, alate,  $1.0 - 1.15$  mm long; gubernaculum scoop-shaped,  $0.11 - 0.15$  mm long.

**Female.** Body  $9.9 - 10.5 \times 0.42$  mm. Head  $0.18$  mm in diameter. Buccal capsule  $0.15 \times 0.174 - 0.18$  mm, buccal teeth  $90 - 100 \mu$  long. Excretory pore, nerve ring and cervical papillae located  $0.25$  mm,  $0.39$  mm and  $0.56$  mm respectively from head end. Esophagus  $0.77 - 0.81 \times 0.2 - 0.24$  mm. Tail pointed,  $0.25$  mm long. Vulva  $0.53 - 0.61$  mm in front of anus,  $0.75 - 0.86$  mm from tail end. Vagina  $0.25 - 0.35$  mm long. As fixed in alcohol and measured in water the elliptical thin-shelled eggs containing segmented ova are  $69 - 78 \mu$  long by  $36 - 45 \mu$  wide.

This species differs from *T. deminutus* (Railliet et Henry, 1905) in the buccal tooth consisting of three lamellae instead of two. The other differences in measurements are given in the following table.

	<i>T. deminutus</i>	<i>T. simiae</i>
Body { male ... ..	$9.5 \times 0.56$	$8.1 - 9.2 \times 0.35 - 0.42$
{ female ... ..	$11.7 \times 0.65$	$9.9 - 10.5 \times 0.42$
Leaf-crown elements ... ..	22	23 - 24
Esophagus { male ... ..	$0.66 \times 0.236$	$0.65 - 0.77 \times 0.18 - 0.21$
{ female ... ..	$0.86 \times 0.25$	$0.77 - 0.81 \times 0.2 - 0.24$
Vulva from tail end ... ..	0.68	0.75 - 0.86
Eggs ... ..	$60 - 65 \times 38 - 40 \mu$	$69 - 78 \times 36 - 45 \mu$

7. *Globocephalus simiae* n. sp.  
(Pl. III, figs. 20 - 23)

**Habitat.** Small intestine of monkey from Macassar.

**Material.** 3 males and 7 females, all mature.

**Male.** Body  $5.4-5.7 \times 0.28-0.3$  mm. Head with a pair of lateral amphids and two pairs of submedian papillae. Mouth simple, directed anterodorsally. Nerve ring, excretory pore and cervical papillae situated  $0.4-0.44$  mm,  $0.44-0.48$  mm and  $0.48-0.51$  mm respectively from head end. Buccal capsule elongated, subglobular,  $0.17-0.18$  mm in length, with greatest diameter of  $0.1-0.114$  mm in front of middle, its wall thickest behind middle, longer and more convex ventrally than dorsally, without teeth or anything alike. Esophagus claviform,  $0.54-0.6 \times 0.13-0.14$  mm, with valvular appendage behind. Bursa copulatrix with prominent triangular lateral lobes, from which the ventral lobe is marked off by a shallow incision, but the dorsal lobe is not so distinctly separated; ventral ray cleft to base, three lateral rays with common base, posterolateral reaching to tip of lateral lobe, externodorsal arising from a common trunk with the dorsal which is divided into two trifurcate branches. Genital cone with several small horn-like projections. Spicules slender, alate,  $0.52-0.54$  mm long. Gubernaculum  $43-75 \mu$  long. Prebursal paired papillae present.

**Female.** Body  $6.4-7.6 \times 0.36-0.39$  mm. Buccal capsule  $0.19-0.23 \times 0.13-0.15$  mm. Nerve ring, excretory pore and cervical papillae located  $0.47-0.54$  mm,  $0.47-0.56$  mm and  $0.476-0.57$  mm respectively from head end. Esophagus  $0.64-0.73 \times 0.16-0.18$  mm. Tail conical, without spike,  $0.18-0.23$  mm long. Vulva  $2.3-3.0$  mm from tail end, dividing body length in ratio of  $1.6-1.9:1$ .

	<i>G. asimilius</i> (Railliet, Henry et Joyeux, 1812)	<i>G. simiae</i> n. sp.
Body { male ... ..	$4.75-5.2 \times 0.26-0.3$	$5.4-5.7 \times 0.28-0.3$
{ female ... ..	$6.5-7.8 \times 0.32-0.38$	$6.4-7.6 \times 0.36-0.39$
Buccal capsule ... ..	$0.24-0.255 \times 0.14-0.15$	$0.17-0.23 \times 0.1-0.15$
Esophagus ... ..	$0.575-0.63 \times 0.175-0.225$	$0.54-0.73 \times 0.13-0.18$
Spicules ... ..	$0.66-0.7$	$0.52-0.54$
Gubernaculum ... ..	$107-125 \mu$	$63-75 \mu$
Vulva dividing body in ratio of ... ..	$1.5:1$	$1.6-1.9:1$
Tail ... ..	$0.18$ , with terminal spike	$0.18-0.23$ , without terminal spike
Eggs ... ..	$48-56 \times 28-32 \mu$	$57-63 \times 36-54 \mu$

Eggs elliptical,  $57-63 \times 36-51 \mu$  containing segmented ova. As is evident from the following table the present species differs from the only known member of the genus from the monkey chiefly in the length of the spicules, egg size and the tail of the female lacking a terminal spike.

*Globocephalus macaci* Smith, Fox and White, 1908, belongs to *Ternidens*, and is probably identical with *T. deminutus* Railliet et Henry according to Railliet, Henry and Joyeux.

8. *Bourgelatia diducta* Railliet, Henry et Bauche, 1929  
(Pl. III, figs. 24-26)

Habitat and locality. Large intestine of pig; Macassar abattoir.

Material. Two males and two females.

The measurements made on the present material are compared with those of the original authors in the following table.

Authors	Railliet, Henry & Bauche (1919)	Yamaguti (1935)	Yamaguti (present)
Body { male ... ..	9.3-12.5	8.8-12	8.9-9.7 × 0.42
	× 0.4-0.6	× 0.5-0.65	
Body { female ... ..	11-13.5	9.3-10.1	10.3-10.5
	× 0.5-0.64	× 0.58-0.6	× 0.56-0.61
Cervical papillae from head end ... ..	0.42-0.55	0.42-0.53	0.44-0.48
Excretory pore from head end ... ..	0.28-0.36	0.3-0.35	0.31-0.32
Esophagus ... ..	0.65-0.85	0.7-0.9	0.71-0.77
Spicules ... ..	1.25-1.33	1.1-1.25	1.1-1.2
Gubernaculum ... ..	0.135	0.16	0.13
Tail of female ... ..	0.4-0.425	0.45-0.5	0.29-0.295
Vulva from tail end ... ..	0.95-1.06	0.9-1.0	0.74-0.83
Eggs ... ..	69-77 × 38-42 $\mu$	—	57-69 × 39-48 $\mu$

9. *Stephanurus dentatus* Dies., 1839

Habitat and locality. Biliary ducts of liver and perinephrium of pig; Macassar abattoir.

Material. 9 males and 5 females.

**Male.** Body  $14-26 \times 0.7-1.5$  mm. Nerve ring and excretory pore situated  $0.42-0.46$  mm and  $0.5-0.8$  mm respectively from

head end. Buccal capsule 0.15–0.182×0.19–0.22 mm. Esophagus 0.91–1.26 mm long, 0.14–0.17 mm wide at anterior swelling, 0.25–0.39 mm wide at posterior swelling. Bursa as described in my paper of 1942. Spicules subequal, 0.78–1.0 mm long. Gubernaculum 56–112×84  $\mu$ .

**Female.** Body 15–34×1.5–2.0 mm. Nerve ring and excretory pore 0.47–0.52 mm and 0.58–1.1 mm respectively from head end. Buccal capsule 0.15–0.2×0.19–0.28 mm. Esophagus 1.1–1.5 mm long, 0.17–0.21 mm wide at anterior bulb, 0.25–0.42 mm wide at posterior bulb. Tail 0.49–0.7 mm long. Vulva 0.7–1.05 mm in front of anus. Eggs 90–108×57–63  $\mu$ .

The above account will serve to extend the ranges of variation in the species under consideration.

## TRICHOSTRONGYLIDAE Leiper, 1912

### 10. *Mecistocirrus digitatus* (von Linstow, 1906)

Railliet et Henry, 1912

(Pl. IV, figs. 27–29)

Habitat and locality. Abomasum of buffalo; Macassar abattoir.

Material. 6 males and 4 females, all mature.

Authors	Stephens (1904)	Railliet et Henry (1912)	Cameron (1925)	Yamaguti (1942)	Yamaguti (present)
Body { male ...	21 × 0.4	23–24 × 0.35–0.4	16–23 × 0.45	21–26 × 0.55	18–24 × 0.3–0.43
{ female ...	25 × —	24–29 × 0.5–0.625	19–26 × 0.5	24–31 × 0.65	30–32 × 0.56–0.67
Cervical papillae from head end ...	0.45 (♂)	—	—	0.39–0.59 (♂) 0.47–0.56 (♀)	0.37–0.49 (♂) 0.46–0.48 (♀)
Excretory pore from head end ...	—	—	—	0.38–0.45 (♂) 0.34–0.45 (♀)	0.27–0.38 (♂) 0.34–0.4 (♀)
Esophagus ...	—	1.6–1.84	1.6–1.8	1.5–1.8 (♂) 1.7–2.1 (♀)	1.29–1.65 (♂) 1.7–1.90 (♀)
Spicules ...	7.0	3.8–4.25	5–6	5.6–7.7	3.55–4.0
Tail of female ...	0.2	0.13–0.17	0.2	0.11–0.18	0.14–0.17
Vulva from tail end	0.5	0.475–0.5	0.55	0.32–0.45 (from anus)	0.5–0.7
Vagina ...	—	—	2.9	up to 3.8	1.8–3.5
Eggs ...	110 × 53 $\mu$	97–118 × 46–60 $\mu$	95–110 × 50–55 $\mu$	78–126 × 42–60 $\mu$	78–126 × 42–60 $\mu$

The following table shows the measurements made on the present material along with those of previous writers.

### FILARIIDAE Claus, 1885

#### 11. *Setaria labiatopapillosa* (Aless., 1838) (Pl. IV, fig. 30)

Habitat and locality. Peritoneal cavity of buffalo; Macassar abattoir.

Material. 3 males and 5 females, all mature.

**Male.** Body  $49-57 \times 0.4-0.5$  mm. Head  $0.12-0.13$  mm in diameter, with one pair of lateral amphids and four pairs of submedian papillae. Mouth with a crescentic lip laterally and a prominent lip dorsally as well as ventrally. As seen from the side this lip is triangular in outline, but in dorsoventral view it shows a shallow depression on the anterior surface. Nerve ring and cervical papillae situated  $0.27-0.28$  mm and  $0.45-0.67$  mm respectively from head end. Anterior portion of esophagus  $0.66-0.81 \times 0.066-0.08$  mm, posterior portion  $7.8-8.1 \times 0.12-0.14$  mm, total length varying from  $8.5$  mm to  $8.7$  mm. Tail  $0.18-0.35$  mm long. In addition to the four pairs of preanal papillae there is another pair of lateral papillae at about the level of the anteriormost preanal papilla. Of the postanal papillae four are subventral and one or two lie immediately in front of the lateral tail horn, while a minute unpaired one lies in the median line. On each side of the cloacal aperture is an adanal papilla. Spicules unequal and dissimilar; right one  $0.14-0.16$  mm long, left one  $0.38-0.45$  mm long,  $27-33 \mu$  wide at base.

**Female.** Body  $61-94 \times 0.5-0.73$  mm. Head  $0.126-0.144$  mm in diameter. Nerve ring and cervical papillae located  $0.23-0.28$  mm respectively from head end. Anterior portion of esophagus  $0.7-1.0 \times 0.078-0.09$  mm, posterior portion  $8.3-9.8 \times 0.23-0.36$  mm, total length varying from  $9.0$  mm to  $10.8$  mm. Tail  $0.53-0.63$  mm long, with lateral appendages at a distance of  $0.098-0.15$  mm from posterior end. Vulva  $0.56-0.67$  mm from head end. As fixed in alcohol and measured in water the eggs are  $40-47 \times 24-27 \mu$ , and the embryo is up to  $0.25$  mm long.

#### 12. *Setaria Bernardi* Railliet et Henry, 1911 (Pl. IV, figs. 31-32)

Habitat and locality. Peritoneal cavity of pig; Macassar abattoir.

Material. A single broken male.

Body length unknown. Head with one pair of lateral amphids and two pairs of submedian papillae. Peribuccal ring produced anteriorly to form four (two dorsal and two ventral) blunt-pointed horn-like submedian lips; the dorsal and ventral submedian lips,  $66\ \mu$  apart from each other, are connected by a flat lateral lip, which appears in lateral view like a mere shallow notch or depression between the submedian lips. Nerve ring and cervical papillae situated at a distance of 0.21 mm and 0.45 mm respectively from head end. Esophagus 8.4 mm in total length, 0.21 mm in maximum width, its anterior portion 0.7 mm long by  $45\ \mu$  wide. As pointed out by Thwaite, it is certain that Bernard and Bauche mistook the posterior portion of the esophagus for the intestine. Posterior extremity inrolled, tail  $165\ \mu$  long as measured along ventral margin. There are four pairs of preanal and four pairs of postanal papillae. Of the preanal papillae the second and third are wider apart from each other than they are from the first or the fourth respectively. Longer spicule 0.35 mm in length including the slender terminal portion,  $45\ \mu$  wide at base; shorter spicule  $155\ \mu$  long.

### TRICHURIDAE Railliet, 1915

13. *Trichuris trichiura* (Linné, 1771) Stiles, 1901  
(Pl. IV, figs. 33 - 34)

Habitat and locality. Large intestine of monkey; Macassar.

Material. One mature male and three gravid females.

**Male.** Body  $30 \times 0.6$  mm. Nerve ring  $90\ \mu$  from head end. Bacillary band beginning at a distance of 0.16 mm from head end, up to  $100\ \mu$  wide, terminating at about junction of two body regions. Longitudinal rows of cuticular bosses 1.68 mm long, commencing 0.56 mm from anterior extremity. Esophagus 20 mm long, anterior part 0.87 mm long; posterior part 19.13 mm long, with 115 parasophageal cells. Ratio of fore- to hindbody 2:1. Vesicula seminalis  $4.3 \times 0.35$  mm, ductus ejaculatorius attenuated at its anterior end, 2.3 mm long. Cloacal tube paved inside densely with cuticular tubercles which appear rhomboid in surface view, measuring 1.4 mm from its anterior end to its junction with spicular tube. Latter

1.45 mm long from its junction with cloacal tube to its external aperture. Spicule 2 mm long, 70  $\mu$  wide at base; spicular sheath beset with conical denticular spines at its distal portion 0.9 mm long.

**Female.** Body 28 - 43.5  $\times$  0.55 - 0.65 mm. Nerve ring 70 - 80  $\mu$  from head end. Bacillary band commencing behind nerve ring, 90 - 95  $\mu$  from head end, up to 120 - 150  $\mu$  wide, terminating at junction of esophagus with intestine. Cuticular bosses extending backward from a point 0.32 - 0.6 mm from head end for a distance of 1.4 - 1.57 mm. Esophagus 18.6 - 22.6 mm long, anterior portion 0.75 - 0.77 mm long; posterior portion 17.8 - 21.9 mm long, consisting of 110 - 115 para-esophageal cells. Anus terminal. Vulva 9.38 - 10.88 mm from posterior extremity, dividing body length in ratio of 2 : 1. Eggs 48 - 54  $\times$  24 - 27  $\mu$  as measured on lactophenol mounts.

The present worms bears a close resemblance to *Trichuris trichiura* on the one hand and to *T. suis* on the other, but on the basis of the taxonomically important characters such as the number of the para-esophageal cells I would rather assign it to the human whipworm.

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## Explanation of Plates

### Plate I

- Fig. 1. Anterior extremity of female of *Arduenna strongylina*.
- Fig. 2. Posterior extremity of male of *Arduenna strongylina*.
- Fig. 3. Anterior extremity of male of *Physaloptera tumefaciens macaci*.
- Fig. 4. Head of female of *Physaloptera tumefaciens macaci*, end-on view.
- Fig. 5. Diagram of female genitalia of *Physaloptera tumefaciens macaci*.
- Fig. 6. Diagram of male genitalia of *Physaloptera tumefaciens macaci*.
- Fig. 7. Posterior extremity of male of *Physaloptera tumefaciens macaci*.
- Fig. 8. Anterior extremity of female of *Oesophagostomum maurum*.
- Fig. 9. Posterior extremity of male of *Oesophagostomum maurum*.

### Plate II

- Fig. 10. Head of female of *Oesophagostomum maurum*, end-on view.
- Fig. 11. Posterior extremity of female of *Oesophagostomum maurum*.
- Fig. 12. Anterior extremity of male of *Oesophagostomum dentatum*.
- Fig. 13. Posterior extremity of male of *Oesophagostomum dentatum*.
- Fig. 14. Posterior extremity of female of *Oesophagostomum dentatum*.
- Fig. 15. Anterior extremity of male of *Ternidens simiae*.
- Fig. 16. Head of female of *Ternidens simiae*, end-on view.
- Fig. 17. Posterior extremity of female of *Ternidens simiae*.
- Fig. 18. Posterior extremity of male of *Ternidens simiae*.

### Plate III

- Fig. 19. Transverse section through pharyngeal teeth of *Ternidens simiae*.
- Fig. 20. Anterior extremity of male of *Globocephalus simiae*.
- Fig. 21. Head of *Globocephalus simiae*.
- Fig. 22. Posterior extremity of male of *Globocephalus simiae*.
- Fig. 23. Posterior extremity of female of *Globocephalus simiae*.
- Fig. 24. Head of male of *Bourgelatia diducta*.

- Fig. 25. Posterior extremity of female of *Bourgelatia diducta*.  
Fig. 26. Posterior extremity of male of *Bourgelatia diducta*.

#### Plate IV

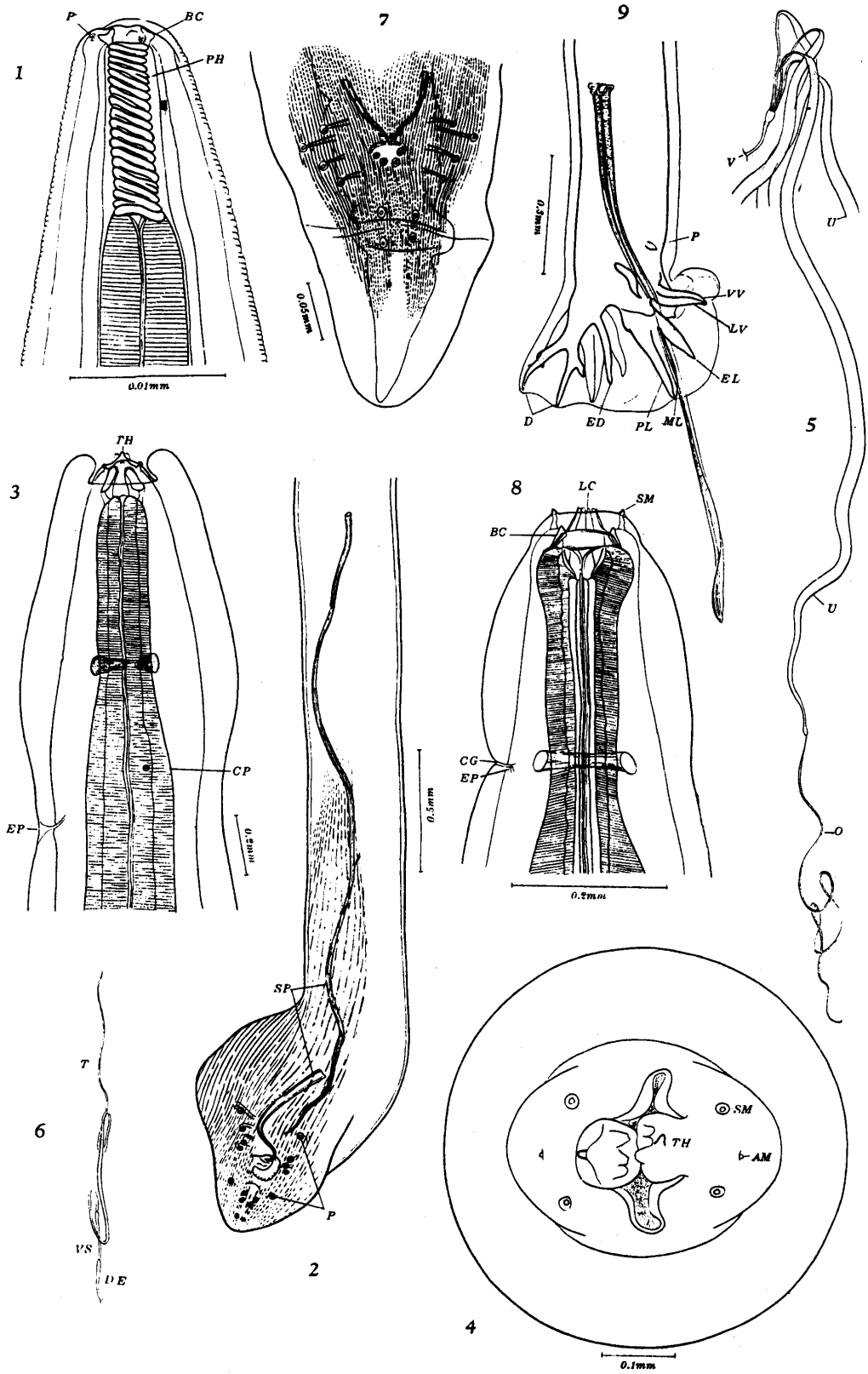
- Fig. 27. Anterior extremity of male of *Mecistocirrus digitatus*.  
Fig. 28. Posterior extremity of female of *Mecistocirrus digitatus*,  
Fig. 29. Posterior extremity of male of *Mecistocirrus digitatus*.  
Fig. 30. Posterior extremity of *Setaria labiatopapillosa*.  
Fig. 31. Head of female of *Setaria bernardi*.  
Fig. 32. Posterior extremity of male of *Setaria bernardi*.  
Fig. 33. Posterior extremity of female of *Trichuris trichiura*.  
Fig. 34. Posterior extremity of male of *Trichuris trichiura*.

#### Abbreviations used in Figures

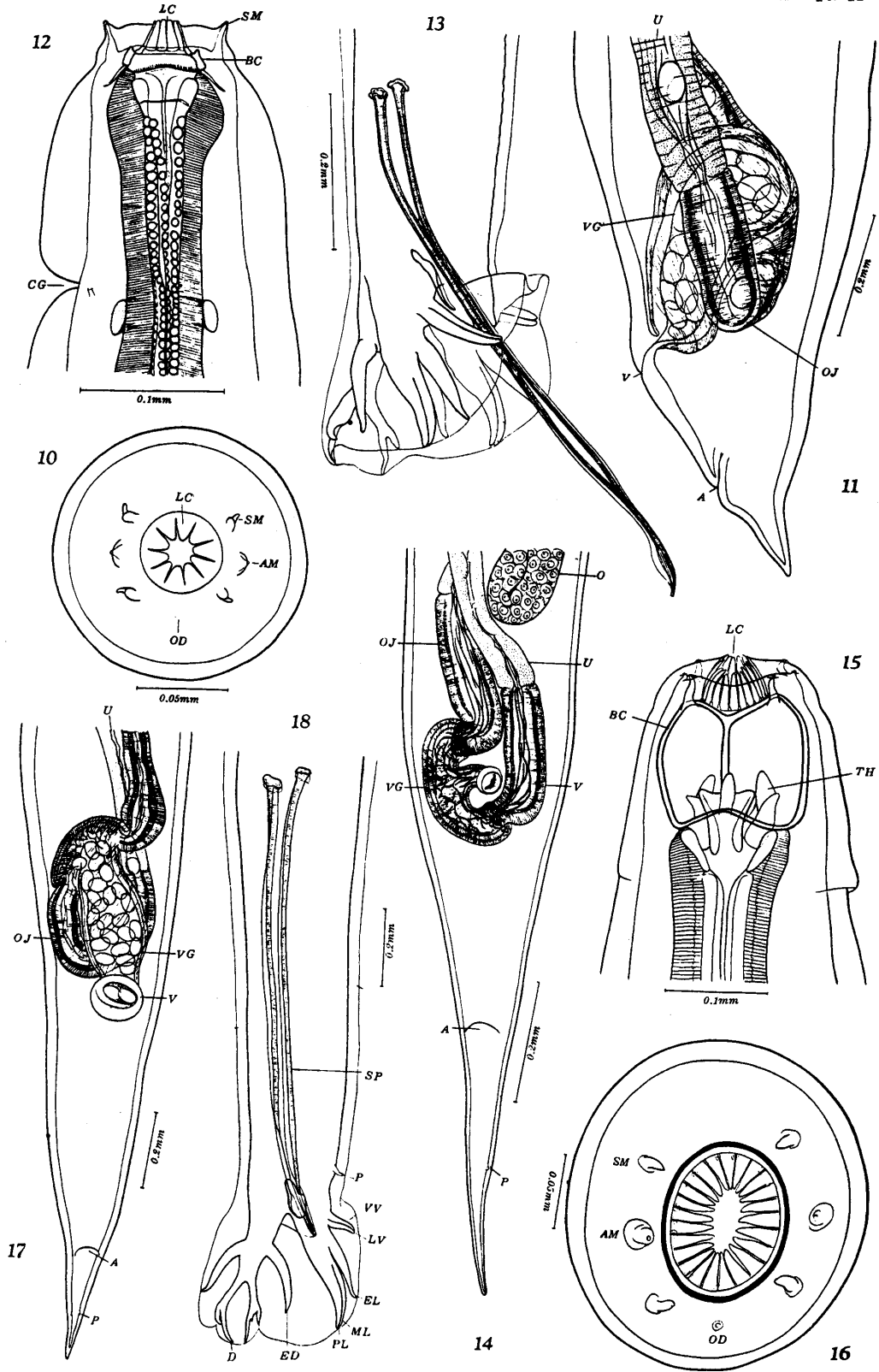
A = anus, AM = amphid, BC = buccal capsule, CG = cervical groove, CP = cervical papilla, D = dorsal ray, DE = ductus ejaculatorius, ED = externodorsal ray, EL = externolateral ray, EP = excretory pore, G = gubernaculum, I = intestine, LC = leaf-crown, LV = lateroventral ray, ML = mediolateral ray, NR = nerve ring, O = ovary, OD = opening of esophageal duct, OJ = ovijector, P = papilla, PH = pharynx, PL = posterolateral ray, SH = spicular sheath, SM = submedian papilla, SP = spicule, T = testis, TH = tooth, U = uterus, V = vulva, VG = vagina, VS = vesicula seminalis, VV = ventroventral ray

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YAMAGUTI: PARASITIC WORMS MAINLY FROM CELEBES—NEMATODES OF BIRDS AND MAMMALS Pl. I



YAMAGUTI: PARASITIC WORMS MAINLY FROM CELEBES—NEMATODES OF BIRDS AND MAMMALS Pl. II



YAMAGUTI: PARASITIC WORMS MAINLY FROM CELEBES—NEMATODES OF BIRDS AND MAMMALS Pl. III

