The main constituent of the oil is oleic acid, which probably occurs as olein, as glycerol was also separated. The oil contains besides the above small quantities of solid acids one of which melts at 68° C. and is probably stearic. Amongst the unsaponifiable constituents of the oil is a phytosterol and a wax-like substance melting, though not sharply, at 45° C.

On the Anatomy of *Monopylidium passerinum* Fuhrmann.

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[With Plate XVIII.]

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During the early part of the present year (1909), I collected a number of small tapeworms from the intestine of the common sparrow, *Passer domesticus*, L., and fixed them in hot corrosive-acetic solution. On examining them, they were seen to possess nearly all the characters which Dr. O. Fuhrmann[1] described as being present in his *Monopylidium passerinum*, a parasite of the sparrow and of *Fringilla ruficeps*. Since the original description is brief and some of the structures are not mentioned, I have thought it advisable to figure and describe the worm more fully, especially as there are several points of difference between the two accounts. These, however, may perhaps be explainable by differences in the state of preservation in each case.

[1] Fuhrmann, Centrb. f. Bact., Orig., I, xlv, 1908, p. 528.

The occurrence of this parasite in New South Wales has already been recorded by me.[1] The length of the cestode is about 30 mm. with a maximal breadth of 0·65 mm. (Fuhrmann, 0·75 mm.)

Scolex.—The scolex is comparatively small and is not well marked off from the rest of strobila. If we exclude the suckers, its breadth is not much more than that of the neck region. If they be included, then the greatest breadth is 0·15 – 0·17 mm. The four suckers are strongly muscular and project slightly. Their openings are antero-laterally. The diameter is about 0·08, the cavity being 0·04 mm. in depth. On the anterior end of the scolex there may be seen a very protractile rostellum. In the example figured (fig. 1), this organ is nearly 0·11 mm. long, its swollen rounded extremity being 0·04 mm. across. The latter part is followed by a neck-like constricted portion (0·02 mm.) which merges into the lower or basal division of the rostellum. This appears as a considerably distended (0·08 mm.) structure containing abundant muscle fibres, transverse and longitudinal, the latter passing backwards through the scolex between the suckers. In the state of rest, the rostellum lies within the rostellar sac surrounded by these protractor and retractor muscles. On the apex there are about twenty small hooks placed in a double series, the two rows not being very readily separable. The hooks are 0·016 mm. and 0·014 mm. long in each row respectively. Each has a long delicate attachment and a short relatively broad free part (fig. 5). Dr. Fuhrmann pointed out that there is a certain similarity in the form and size of the hooks to those of *Taenia parvirostris* as described by Krabbe.[2] They seem to me to be rather more curved than

[1] Johnston, Agric. Gazette, N. S. Wales, xx, 1909, p. 584; Rec. Austr. Mus., vii, No. 4, 1909, p. 344.

[2] Krabbe, Bidrag til Kundskab om Fuglenes Bændelorme, 1869, p. 86, and fig. 267.

those shown in Krabbe's figures, but otherwise the resemblance is close.

Strobila.—The scolex is followed by an unsegmented neck of nearly 0·4 mm. long, the breadth gradually increasing from 0·11 to 0·13 mm. The segments are at first very narrow and though transverse septa are present, the marginal limits are not well marked. Then there follows a comparatively rapid increase in length and a very gradual increase in breadth, the serrated margins now becoming evident. In the greater part of the strobila the proglottids are trapezoid, those with well-developed genitalia being about 0·4 mm., increasing to 0·64 mm. in length with a breadth of about 0·5 mm. in the posterior region. Fully ripe segments were not seen, but some which contained developing oncospheres, were about 0·4 mm. broad by 1·2 mm. long. Fuhrmann mentioned that ripe segments may reach 0·45 mm. in breadth by 1·6 mm. in length. There is thus a considerable lengthening and a slight narrowing as ripening progresses. The overlapping of segments is slight and altogether disappears later. Occasionally the trapezoid form may be replaced by a more rectangular shape even in proglottids with well developed genitalia.

Sex openings:—These alternate irregularly. There may be a slight genital papilla present. The cloaca is situated on the edge near the junction of the anterior fourth, and the posterior three-fourths. It is very small and shallow, being only 0·025 mm. in depth.

Muscles, etc.—The cuticle is fairly thick. Below it is a very well marked subcuticular layer. The muscles are rather poorly developed. The longitudinal bundles are in thin strands arranged in two concentric series, the greater number being situated in the outer one. Transverse fibres are very weak, whilst the dorso-ventral fibres were not recognised.

The cortical portion of the parenchyma is comparatively small, the greater part of a transverse section being occupied by the medulla and the subcuticular layer.

Excretory System.—This system consists, on each side, of a very well marked ventral vessel with a lumen of about 0·011 mm., whose course is roughly parallel to the margin of the segment, and of a very small dorsal vessel with a diameter of only 0·004 mm. The ventral vessel lies almost in the middle of the lateral part of the medulla, but in the region of the genital pore it becomes displaced ventrally by the genital ducts which pass between it and the dorsal vessel. It may be easily traced forwards through the neck to near the level of the middle of the suckers. In younger segments, its course may be bow-like or even sinuous. The dorsal trunk is situated almost directly above the larger vessel and lies near the cortex. It is not displaced by the genital ducts. At the posterior end of each proglottid the ventral stem gives off a wide transverse or commissural vessel which does not pass straight across from side to side but forms a distinct arch with the convexity facing dorsally.

Nerves:—The longitudinal nerves are readily seen in stained preparations. They lie ventro-laterally from the ventral vessel, close to the cortex.

Male genitalia.—There are in each proglottis between 25 and 30 testes, each of about 0·05 mm. in diameter. They all lie behind the ovary and occupy the posterior half of the segment, extending from the female glands to the transverse excretory vessel, and from the ventral vessel of one side to that of the other. In transverse section, they are seen to fill nearly all the medulla, but they approach rather more to the dorsal side of it. The vas deferens passes forwards as a strong tube, lying in the median line close to the dorsal boundary of the medulla. It lies well above the vitelline gland, shell gland and other

female parts. Its course here may be straight or somewhat zigzag. In the region of the receptaculum seminis it becomes very considerably coiled, and on passing further forwards the loops become larger while the walls become strongly muscular. The tube now appears as a large twisted mass stretching from the inner end of the vagina or even further back, to the anterior border of the segment. In section this deeply staining structure is seen to occupy the whole of the mid-region of the medulla in the dorso-ventral plane. In all segments examined the windings were much larger and more extensive in their distribution than is shown in Fuhrmann's figure, this being, no doubt, due to the quantity of contained spermatozoa. The vas deferens ultimately passes postero-laterally to enter the cirrus sac.

The cirrus sac is an elongate spindle-shaped organ, or it may even be roughly tubular. Its length is from 0·17 to 0·20 mm., with a maximum width of 0·04 mm. In segments where the cirrus appears everted, the sac assumes an almost spherical form of 0·05 mm. diameter. The male aperture is situated just in front of the female opening, the cirrus sac passing inwards, forwards and somewhat ventrally and lying at about the same dorso-ventral level as the vagina, both being situated just above the displaced ventral excretory vessel and lateral nerve. Near the middle of the anterior part of the segment, it takes up the vas deferens. The muscular walls of the sac enclose a coiled cirrus which is capable of considerable eversion, in some cases measuring at least 0·126 mm. with a breadth of 0·04 mm. As Fuhrmann has already pointed out, the cirrus is covered with a very delicate bristling.

Female genitalia.—The female complex as a whole, occupies a rounded zone near the centre of the segment. The ovary is distinctly two-winged, each part forming a somewhat rounded mass. The "wings" are connected by

a comparatively long narrow "ovarian bridge," from the middle of which there passes off dorso-posteriorly a fairly wide but very short oviduct to the fertilising duct. The total width of the gland is from 0·18 to 0·22 mm. Each wing or lobe is made up of a number of branches or ovarian tubes, the lumen of each being easily traced.

The vagina opens on the same level as, and just posteriorly to, the cirrus sac. It courses inwards and somewhat ventrally, as a very distinct wide tube with rather strong walls, but after passing between the excretory trunk-vessels, the walls become thinner. When it reaches almost to the middle of the segment, it becomes considerably narrowed, and after extending backwards for a very short distance undergoes enlargement to form the spacious thin-walled receptaculum seminis. This structure varies in shape, being usually roughly spherical, though it may be pyriform or spindle-shaped. Its position is between the ovarian lobes, filling this space, and frequently extending posteriorly above and behind the ovarian "bridge." Here it passes into the narrow fertilising duct, a slightly convoluted tube which, after taking up the short oviduct, enters the shell-gland complex.

The vitelline gland appears as a compact rounded organ placed in the midline just behind the ovary and shell-gland. It is from 0·05 to 0·08 mm. broad and from 0·04 to 0·06 mm. long. The vitelline duct passes forwards from its anterior part as a comparatively long, thick tube, to enter the fertilising duct in the region of the shell-gland. The vitelline gland is situated on the same dorso-ventral plane as the lobes of the ovary, but slightly ventrally to the level of the shell-gland. The latter organ is a fairly conspicuous rounded structure lying between the ovarian bridge and the vitelline gland, and dorso-posteriorly to the inner end of the receptaculum seminis. Its diameter is about 0·036 mm.

The fertilised eggs come to lie in the parenchyma behind the female complex in the region formerly occupied by the testes. There are two shells present, the outer being about 0·05 mm. and the inner 0·04 mm. in diameter. The oncospheres are approximately 0·024 mm. long, the embryonal hooklets being 0·012 mm. in length. The polar thickenings mentioned by Prof. Fuhrmann as being present on the embryonic membrane, were seen quite distinctly as deeply staining elliptical structures.

From the foregoing description, it will be noticed that the main differences from Fuhrmann's account are in regard to the female complex.

The genus *Monopylidium*, Fuhrm., was erected in 1899[1] for the reception of *Davainea ? musculosa*, Fuhrm. In 1908[2] a diagnosis of the genus was given, stating that there is a simple circlet of hooks. In *M. passerinum*, Fuhrm., there is a double row, and since this species has been placed by Fuhrmann in his genus, the generic diagnosis will need to be modified in regard to the rostellar armature. The members of the genus may thus possess a single or a double series of hooks.

Explanation of Plate XVIII.

Fig. 1. Scolex with rostellum protracted
„ 2. Segment, showing genitalia, etc. (dorsal view).
„ 3. Female genitalia seen from the dorsal side.
„ 4. Transverse section of midregion of segment.
„ 5. Hook.

Explanation of lettering:—*c.*, cirrus; *c.s.*, cirrus sac; *cu.*, cuticle; *c.p.*, cortical parenchyma; *d.e.v.*, dorsal excretory vessel: *f.d.*, fertilising duct; *g.c.*, genital cloaca; *h.*, hook; *l.m.*, longitudinal muscle; *m.*, medulla; *n.*, longitudinal nerve; *o.d.*, oviduct; *ov*, ovary; *ov. br.*, ovarian bridge; *r*, rostellum; *r.m.*, rostellar muscles; *r.s.*, receptaculum seminis; *s.*, sucker; *s.c.c.*, subcuticular cells; *s.g.*, shell-gland; *t.*, testis; *tr. e.v.*, transverse excretory vessel; *v.*, vitelline duct; *va.*, vagina; *v.d.*, vas deferens; *v.e.v.*, ventral excretory vessel; *v.g.*, vitelline gland.

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[1] Fuhrmann, Centrb. Bact. Orig. I, xxvi, 1899, p. 622–7.

[2] Fuhrmann, Zool. Jahrb., Supp. Bd. x, i. 1908, p. 65.