CHAPTER X

MORPHOLOGY AND LIFE HISTORY OF

ECHINOPARYPTUM VITELLOCOMPACTUM N.SP.
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On November 10th, 1969 a lot of 100 Lymanea luteola f australis (Lamarck) was collected from Polsapara tank in Durg. These snails were examined for infection by isolating them individually; 18 snails were found infected with echinostome cercariae possessing 45 collar spines.

MATERIALS AND METHODS

Metacercarial cysts were obtained experimentally by exposing clear laboratory raised snails of the species Lymanea luteola and Indoplanorbis exustus (Deshayes) to cercariae shed by naturally infected snails. In absence of other snails (or other second intermediate hosts) the cercariae encyst in the same snail from which they have been liberated. The cysts were examined under the pressure of cover slip and fixed in 70% alcohol. Cercariae and rediae were studied from natural infection in fresh and living condition stained with neutral red and methylene blue and fixed in 10% hot formalin and 70% alcohol for measurements and permanent preparations. Cysts obtained by teasing the foot, mantle and pericardial sac of 128 snails lodging metacercariae were fed to the
experimental vertebrate hosts, two 10 to 12 days old ducklings in this case. On autopsy 18 days after feeding experiments 75 mature worms were obtained from the proximal part of the small intestine. These worms were identified to belong to the genus *Echinoparyphium* Dietz, 1909. All drawings were made with aid of Camera lucida, and measurements are in millimeters.

**DESCRIPTION OF STAGES IN THE LIFE CYCLE**

**Rediae (Plate XXIII, Fig. 1 & 2)**

Rediae are present in large numbers in the hepatopancreas of the infected snail. Mature rediae contain fully developed cercariae, 0.741 long and 0.049 to 0.072 wide. Pharynx small, 0.062 long and 0.046 wide. Gut 0.261 to 0.281 long and 0.035 wide. Birthpore 0.078 from anterior end; procuscula 0.372 from posterior end.

**Cercaria (Plate XXIII)**

Measurements based on 30 specimens fixed in 10% hot formalin: Body 0.390 to 0.401 long and 0.180 to 0.208 wide. Body spines distributed throughout its length,
becoming sparse in the postacetabular region. Collar well developed, with 45 spines. Five corner spines in each ventral lappet. Nine lateral spines on each side in a single row. Dorsal spines arranged in double uninterrupted rows, 3 oral, smaller than the 9 aboral. Oral sucker subterminal, spherical 0.041 to 0.047 in diameter. Prepharynx 0.036 to 0.042 long. Pharynx ovoid 0.036 to 0.044 long and 0.021 to 0.027 wide. Oesophagus made up of 12 nucleated somewhat rectangular cells, 0.130 to 0.149 long. Caeca extend unto the posterior end of body. Five pairs of penetration glands in lateral oesophageal fields on each side. Their ducts open at the anterior margin of oral sucker. Acetabulum 0.060 to 0.062 in diameter. Genital primordium present in the form of a compact oval mass of cells 0.040 to 0.044 long and 0.046 wide, situated between acetabulum and excretory bladder. Aspinose tail slightly longer than body, 0.418 to 0.426 long and 0.061 wide at proximal end and 0.019 wide at distal end.

Excretory bladder bipartite, 0.040 to 0.045 long and 0.116 wide, opens through an excretory pore situated at the junction of body and tail. Main collecting excretory ducts originate from the upper smaller chamber of excretory bladder, extend anteriad laterally, taking up
a sinuous course. Each duct contains numerous excretory granules in the distended part between acetabulum and pharynx. At prepharyngeal region each duct recurvates forming a triangular loop, and then extends posteriad unto the acetabular level, where it bifurcates into the anterior and posterior collecting tubules. Altogether 22 flame cells could be traced in the body represented by the following formula:

\[
2 \sqrt{(3) + (3+2+3)} = 22
\]

Caudal excretory duct runs one-fifth of the length of tail and bifurcates into 2 lateral branches, opening to the exterior through two minute excretory pores situated on the lateral margins of the tail.

Related species:

This echinostome cercaria resembles *Cercaria Z Rees*, 1932; *Cercaria echinoparyphii recurvati* Mathias (1927) in the number of collar spines, which is 45 in the two latter named species. It, however, differs from these species in the number of flame cells which are 22 in the present form, 42 in *Cercaria Z* and 42 in *C. echinoparyphii*.
The general structure of the body and tail also differ considerably.

The above described cercaria resembles the cercariae of Echinoparyphium flexum (Linton, 1892) Najarian, 1954, E.ellisi Johnston and Simpson, 1944 and E.hydromyos Angel, 1967, all of which possess 45 collar spines, but differs from them in a number of important characters; mainly the arrangement of collar spines, number of flame cells and number and distribution of penetration glands.

The cercaria of E.flexum has 40 flame cells and the genital cells are in two masses, whereas, there is a single mass in the present species.

The present species of cercaria differs from the cercaria of E.ellisi in the number of flame cells, nature of penetration glands and general structure of the body.

The cercaria of E.hydromyos has 4 pairs of penetration glands but the number is not known. The flame cells whereas, there are 5 pairs of penetration glands and 22 flame cells in the present form.

**Metacercaria (Plate XXIV, Fig. 2, Plate XXXIV)**

Metacercarial cysts spherical, 0.160 to 0.172 in diameter. Cysts become infective 48 hours post-encystment. The cyst wall is 0.009 to 0.013 thick; double,
layered, outer layer transparent and inner layer opaque. Collar spines, excretory granules, oesophagus and caeca conspicuous. Cysts found in foot, mantle and pericardial sac of snail host.

**Adult** (Plate XXXV, Fig. 2)

Measurements based on 30 specimens fixed in warm Douin's fluid.

**Diagnosis:** Echinostomatidae: *Echinoparyphium* Dietz, 1909 emend. Hendhein, 1943. Small worms 2.650 to 2.880 long and 0.221 to 0.260 wide at level of pharynx; 0.340 to 0.351 wide at level of acetabulum and 0.377 to 0.403 wide at level of the gonads. Body spines 0.030 long and 0.006 wide; extend up to acetabular level. Collar distinct (Plate XXXV Fig. 1) 0.130 to 0.169 long width 0.208 to 0.273. Collar spines 45 arranged in double dorsally uninterrupted rows. Five corner spines in each lappet, 0.113 to 0.120 long and 0.015 to 0.018 wide; one oral, four aboral, lateral spines 0.088 to 0.090 long and 0.009 wide, 6 on each side, arranged in a single row, dorsal spines in double rows, 12 oral, smaller in size, 0.069 to 0.072 long 0.009 wide; 11 aboral spines larger; 0.081 to 0.090 long and 0.012 wide. Oral sucker subterminal,
sub spherical, 0.065 to 0.078 long and 0.042 to 0.065 wide. Propharynx small 0.009 to 0.012 long. Pharynx
pyriform and narrow, 0.064 to 0.075 long and 0.042 wide. Oesophagus elongated 0.325 to 0.45 long and 0.013 wide,
 bifurcating in front of the acetabulum into a pair of intestinal caeca, which extend up to the posterior end
of body. Acetabulum 0.396 to 0.328 long and 0.273 wide to 0.238 wide. Genital pore preacetabular. Cirrus sac
(Plate XXXVI, Fig. 2) anterolateral to acetabulum, 0.208 to 0.312 long by 0.091 to 0.104 wide contains a coiled
vesicula seminalis, and an elongated unarmed cirrus 0.146 to 0.450 long by 0.013 to 0.018 wide. Testes ovoid,
postequatorial, tendem; anterior testis larger than the posterior, 0.286 to 0.338 long and 0.169 to 0.182 wide;
posterior testis, 0.273 to 0.312 long and 0.169 to 0.182 wide. Ovary (Plate XXXVI, Fig. 1) subspherical, submedian
and equatorial, 0.104 to 0.117 long and 0.130 to 0.150 wide. Mollis gland complex post-ovarian, slightly larger
than ovary. It measures 0.107 to 0.130 long and 0.169 to 0.195 wide. Receptaculum seminis absent, instead there
is a receptaculum seminis uterinum which serves its purpose. Laurer's canal observed in living specimens, opens to the
dorsal surface of the worm. Uterus with few coils, extends
between the ovary and acetabulum, contains 8 to 12 operculate eggs which are large and dirty-yellow in colour. They measure 0.053 to 0.059 long and 0.036 to 0.039 wide. Vitelline follicles 0.027 to 0.032 in diameter.
They extend from the level of posterior margin of acetabulum up to the posterior end of body. Follicles become confluent in the post testicular region. At the level of Nclis' gland complex the lateral vitelline ducts give off transverse vitelline ducts which run inwards and open into the vitelline reservoir. Excretory bladder 0.621 to 0.650 long and 0.020 to 0.026 wide; opens through an excretory pore, at the posterior extremity of the body.

Natural host: Unknown, possible birds.
Experimental host: Ducklings.
Location: Proximal part of small intestine.
Locality: Bung (M.P.) India.

DISCUSSION

Although many distinguishing characters have been given for the genera Echinostoma, Rudolphi, 1809 and Echinocarychiunm Dietz, 1909; the two are separated mainly on the unequal size of the dorsal collar spines. Angel (1967), however, distinguishes these two genera mainly on the body size and on the number of eggs, which are few
in the genus *Echinoparynhium* and numerous in the genus *Echinostoma*.

Of the species described in the genus *Echinoparynhium*, the present form resembles most closely *E. recurvatum* von Linstow, 1873; *E. mordwilkoi* Skr-jabin, 1915; *E. nordiana* Baschkirov, 1915; *E. koidzumii* Tsuchimochi, 1924; *E. recurvatum indiana* Verma, 1936; *E. recurvatum vanelli* Yamaguti, 1939; *E. baculoides* Dollfus, 1951, *E. flexum* (Linton, 1892) Najarian, 1954; *E. ellisi* Johnston and Simpson, 1944 and *E. hydronyos*. Angel, 1967, in the number of collar spines, which are 45 in all the above mentioned forms. It, however, differs from these in a number of important characters, mainly in the arrangement of the collar spines and in general disposition of the body organs.

The present form differs from *E. recurvatum* in the size of cirrus sac, distribution of the vitellaria, the arrangement of the collar spines. The corner spines are 4 on each side in *E. recurvatum* and 5 on each side in the present form.

The present form differs from *E. mordwilkoi* and *E. nordiana* in size. Both the above mentioned species are large sized and they do not possess elongated cirrus.
Yamaguti (1939) regarded *E. koidzumii* as synonymous with *E. recurvatum* v. Linstow, 1873. Tsuchimochi (1924) established the species *E. koidzumii* and regarded it as new on the basis of the number of corner spines, which he observed to be six in most cases and sometimes five or seven. Yamaguti (1939) has pointed out that Tsuchimochi's (1924) figure and description of *E. koidzumii* correspond to those given by Luhe and Dietz for *E. recurvatum* and states that Tsuchimochi possibly erred as to the number of the corner spines.

Present form differs from *E. recurvatum indiana* in the distribution of the vitellaria which are confluent in the preovarian field in the latter named species while it is not so in the present form. There are 6 corner spines in *E. recurvatum indiana* while in the present form these are five. The two species further differ in the general body size and the position of the pharynx.

The present form differs from *E. recurvatum vanelli* in the arrangement of corner spines. There are 4 corner spines in *E. recurvatum vanelli* and 5 in the present form. The ovary is equatorial in the present form, while it is postequatorial in *E. recurvatum vanelli*. The distribution of the vitellaria also differs in both the forms.
The present form resembles *E. baculoides* in the possession of 45 collar spines and the confluent nature of vitellaria in the post testicular region. It, however, differs from it in a number of important features. The cirrus sac in *E. baculoides* is antero-dorsal, and the uterus of a mature worm contains 25-30 eggs at a time, while the number of eggs is much less in the present form. *E. baculoides* and the present form further differ on the basis of the arrangement of collar spines and the position of ovary, which lies very close to the anterior margin of the anterior testis in *E. baculoides*.

The species under study differs from *E. flexum* in the arrangement of collar spines. There are 6 lateral spines on each side in the present form, while there are 11 in *E. flexum*. The vitelline follicles are not confluent in *E. flexum* while this condition is observed in the present form. Small seminal receptacle has been described for *E. flexum* by Najarian (1954) whereas, this structure is absent in the present form.

The present form differs from *E. ellisi* in the arrangement of the collar spines. There are 4 corner spines in *E. ellisi* and the adults are smaller in size. The posterior testis is smaller than the anterior, this
condition is also recorded in the present species.

The present form differs from *E. hydromyos* in the confluent nature of vitellaria in the post-testicular region and the distribution of the vitelline follicles. They extend from the level of the posterior margin of acetabulum unto the posterior end of body in the present form, while in *E. hydromyos*, the vitelline follicles commence from a little in front of the ovary and extend upto the anterior two-third part of the post-testicular region. The cirrus sac of *E. hydromyos* is comparatively large and situated antero-dorsal to the acetabulum. The cirrus in this form is short and stout, while that of the present form is narrow and elongated.

On the basis of the above differences the present form can be readily distinguished from other species of *Echinoparyphium* having 45 collar spines and is, therefore, considered as a new species and named *Echinoparyphium vitellocompactum* n. sp.