



## ORIGINAL ARTICLE

**Taxonomic Studies on *Proteocephallidean Cestode Genus Gangesia* (Woodland, 1924) from *Wallago attu* (Bleeker, 1851) With Description of a New Species****Vikram Satwarao Deshmukh<sup>1</sup>, Sanjay Shamrao Nanware<sup>2</sup> and Dhanraj Balbhim Bhure<sup>3</sup>**

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Present study deals with description of new *Proteocephallidean Cestode* genus *Gangesia* Woodland, 1924 viz. *Gangesia orientalis* Sp. Nov. collected from intestine of freshwater fish host *Wallago attu* (Bleeker, 1851) at Loha Dist. Nanded (M.S.) India during the period of February, 2011 to January, 2013. *G. orientalis* Sp. Nov. comes closer to all known species of genus *Gangesia* Woodland, 1924 in general topography of organs but differs due to scolex oval, bears four suckers and prominent rostellum, rostellum encircled by a single row of 20-22 hooks, neck short, mature proglottids five times broader than long, testes oval, 20-25 in numbers, Cirrus pouch cylindrical, marginal, Vagina posterior to cirrus pouch, Ovary bilobed, Vitellaria granular, Gravid proglottids five times broader than long and Uterus sacular, filled with numerous eggs.

**Key words:** *Gangesia orientalis* Sp. Nov., *Proteocephallidean Cestode*, Taxonomic Studies, *Wallago attu* (Bleeker, 1851).

**INTRODUCTION**

Southwell (1913 a) described *Ophryocotyle bengalensis* from *Ophiocephalus striatus* and *Labeo rohita*. Woodland (1924) created the genus *Gangesia* for the reception of *G. wallago* and *G. macrons*. It was found by Woodland (1924,1925) and Verma (1928) that the form, described by Woodland as *G. wallago* was identical to the form, *O. bengalensis* described by Southwell. The description given by Southwell was very meagre and Verma (1928) gave a fresh account of the same form. In the same paper Verma also described *G. pseudotropii* from *Silurus garua* and *G. agraensis* from *Wallago attu*. Southwell (1930), however recognized only three valid species of the genus, other being regarded as synonyms. Yamaguti (1934) added *G. parasiluri*, thereby making four species under the genus:-The species under this genus reported till today are as 01} *G. bengalensis*, (Southwell, 1913); Synonyms: (a) *Ophryocotyle bengalensis* Southwell, 1913, (b) *Gangesia wallago*, Woodland, 1924.,(c) *Gangesia agraensis*, Verma, 1928; 02} *G. macrones*, Woodland, 1924; 03} *G. pseudotropii*, Verma, 1928 ; 04} *G. parasiluri*, Yamaguti, 1934. After that, many researchers reported and described some new *Gangesia* species parasitizing freshwater fishes. It indicates that genus *Gangesia* is very abundant and diversified.

Kunwar Suresh Singh, 1948 reported *G. lucknowia* from *Eutropiichthys vacha* (Day), at Lucknow, U.P. India. *G. pseudobagrae* was described by Chenyen Hein, 1962. Roitman and Freze, 1964 reported two species viz. *G. polyonchis* and *G. oligorchis*. *G. sindensis* (Rafiya Rehna and Fatima M. Bilquees, 1971) was reported from freshwater fish *Wallago attu* of Karli Lake, Sind, West Pakistan. Rafiyya Rehna and Fatima M. Bilquees, 1973 described *G. spinocirrosa* from freshwater fish *Wallago attu* of Karli Lake, Sind, West Pakistan. Dhar and Fotedar, 1979 reported *G. jammunensis* from intestine of *Wallago attu*, Jammu, India and *G. kashmirensis* from intestine of *Glyptosternum* sp. at Baramulla. *G. sanehensis*, (Malhotra et al., 1980) was reported from *Cirrhina mrigala* and *Wallao attu* at Saneh Road, Kotdwara (Garhwal), U.P., India. Malhotra, et al., 1981 was described *G.*

*mehamdabadensis* from *Mystus tengra*, at Mehmdabad. Gupta and Arora, 1982 reported *G. haryanae* from *Wallago attu*. *G. indica* was described by Gupta and Parmar, 1982 from intestine of *Wallagonia attu* (Bloch), Lucknow, India. Seth and Capoor, 1982 reported *G. hanumanthai* from *Wallago attu*, Allahabad, India. *G. paithenesis* (Jadhav *et al.*, 1983) was collected from *Barbus ticto* at Paithan M.S., India. *G. fotedari*, was reported by Dhar and Majdah, 1983 in intestine of *Glyptothorax sp.* at Walur Lake, Kashmir. Deshmukh and Shinde, 1989 reported *G. shindei* from *Glyptothorax*. Shinde and Wankhede, 1990 described *G. aurangabadensis* from *Macrones singhala* and *G. sumani* from intestine of *Mastacembelus armatus*, at Paithan Dist. Aurangabad, M.S. India. *G. margolosi* was reported by Takeshi Shimazu, 1994 from Biwa catfish *Silurus biwaensis* caught in Lake Biwa, Shiga Prefecture, Japan. Hiware and Jadhav, 1995 was described *G. maharashtrii* from *Wallago attu*, Karad, Dist. Satara (M.S.), India. *G. dharurensis*, (Jadhav and Tat, 1997) was reported from *Wallago attu*, Ambachondi River, Dharur, India. Hiware, 1999 described *G. seenghali*, from *Mystus seenghala*, Satara M.S., India. *G. cirrhinae* was recorded by Patel, Shinde and Khan, 1999 in intestine of *Cirrhina mrigala* at Nanded Dist. Jalgaon, M.S., India. *G. rohita* (Shinde, Mahajan and Begum, 1999) was described from *Labeo rohita*, Adan Dam, Akola, M.S. India. Jadhav *et al.*, 2001 was recorded *G. clariusae* from *Clarias batrachus*, at Belgaum, Karnataka. *G. rohita* (*minor*) was reported by Pawar *et al.*, 2004 reported from *Labeo rohita*, at Dhanegaon Dam, Dist. Beed. Hemlata Wankhede, 2004 was described *G. mastacembali* from *Mastacembelus armatus*, in Godavari river at Aurangabad, M.S. India. *G. ambikaei* (Hiware *et al.*, 2004) was reported from *Wallago attu*. Begum, 2007 described *G. batrachusi* from *Clarias batrachus*. *G. pandeyae* was recorded by Kasar *et al.*, 2010 in intestine of *Wallago attu* from Dhamangaon Dist. Amravati (M.S.), India. Pradhan *et al.*, 2010 was reported *G. wallaguae* from intestine of *Wallago attu* in Dudhana Dam, Dist. Jalna M.S., India. *G. marathwadensis* (Bhure *et al.*, 2011) was recovered from intestine of *Wallago attu*, M.S. India. Reddy *et al.*, 2012 was reported by *G. (G.) bendsurensis* from *Wallago attu* at Bendsura dam, Beed district, M.S. India. Bhaware *et al.*, 2012 was described *G. jayakwadensis* in intestine of a freshwater fish *Clarias batrachus* from Jayakwadi project at Paithan, Dist. Aurangabad. *G. (G.) striatusii* was recorded by Bhure and Nanware, 2012 from intestine of *Channa striatus*, Omerga Dist. Osmanabad (M.S.), India. Dhole *et al.*, 2012 described *G. shivajiraoi* from intestine of *Wallago attu* (Bleeker, 1851), M.S. India.

## **MATERIALS AND METHODS**

During collection of Piscean cestode parasites, Forty two cestodes were collected from the Thirty Five infected intestines out of One Hundred Twenty examined freshwater fish host *Wallago attu* (Bleeker, 1851) at Loha Dist. Nanded (M.S.) India during the period of February, 2011 to January, 2013. These cestodes are preserved in hot 4% formalin and Four specimens are stained with Harris haematoxylin and Borax carmine, dehydrated in ascending grades of alcohol, cleared in xylene, mounted in D.P.X. and drawings are made with the aid of camera lucida attachments. Photomicrographs were taken by Trinocular computerized Research microscope. All measurements are recorded in millimeters.

## **RESULTS (Description Based on Four specimens)**

All cestodes are long, consisting of scolex, immature, mature and gravid proglottids. Scolex is oval, narrow anteriorly and broad posteriorly with marked rosetellum, distinctly marked off from segment. It bears four suckers and prominent rosetellum and measures 1.078 (1.056-1.101) in length and 0.617 (0.449-0.786) in width. There are four medium suckers, which are overlapping to each other, almost rounded and measures 0.269 (0.202-0.337) in length and 0.269 (0.202-0.337) in width. Rosetellum is prominently encircled by a single row of hooks and measures 0.236 (0.169-0.303) in length and 0.393 (0.337-0.450) in width. Rostellar hooks are 20-22 in numbers and measures 0.124 (0.112-

0.135) in length and 0.022 (0.011-0.034) in width. Neck is short and measures 0.163 (0.124-0.202) in length and 0.652 (0.620-0.685) in width.

Mature proglottids are five times broader than long and measures 0.326 (0.292-0.360) in length and 1.663 (1.607-1.720) in width. Testes are oval to rounded, scattered throughout the anterior region of the segment, 20-25 in numbers and measures 0.067 in diameter. Cirrus pouch is cylindrical in shape, marginal and measures 0.107 (0.101-0.112) in length and 0.062 (0.045-0.079) in width. Cirrus is thin tube, within the cirrus pouch and measures 0.124 (0.112-0.135) in length and 0.017(0.011-0.022) in width. Vas deferens is short tube and measures 0.067 (0.056-0.079) in length and 0.017(0.011-0.022) in width. Vagina and cirrus pouch open through a common genital pore which is oval in shape, marginally placed and measures 0.028 (0.022-0.034) in length and 0.039 (0.034-0.044) in width. Vagina is a thin tube, slightly curved, arises from the genital pore, posterior to cirrus pouch, forms receptaculum seminis and measures 0.747(0.730-0.764) in length and 0.017(0.011-0.022) in width. Vasicula seminalis is thin tube, joints to the ootype and measures 0.073 (0.056-0.089) in length and 0.017 (0.011-0.022) in width. Ootype is almost rounded and measures 0.045 in diameter. Ovary is bilobed, occupies posterior part of the segment and measures 0.292 (0.281-0.303) in length and 0.067 (0.056-0.079) in width. Excretory canal is long, running across the segment longitudinally on both sides of the segment and measures 0.382 (0.371-0.393) in length and 0.017 (0.011-0.022) in width. Vitellaria are granular on either lateral sides of the segment.

Gravid proglottid are five times broader than long and measures 0.343 (0.315-0.371) in length and 1.769 (1.742-1.798) in width. Uterus Saccular, filled with numerous egg and measures 0.292 (0.270-0.315) in length and 1.461 (1.438-1.483) in width. Eggs are somewhat oval in shape and measured 0.031 (0.028-0.033) in length and 0.019 (0.017-0.022) in width.

## DISCUSSION

Southwell (1913 a) described *Ophryocotyle bengalensis* from *Ophiocephalus striatus* and *Labeo rohita*. Woodland (1924) created the genus *Gangesia* for the reception of *G. wallago* and *G. macrons*.

It come closer to all the species of *Gangesia* but differs from *G. bengalensis* Southwell, 1913 in having scolex fusiform, 166-232 × 284-298mm, rostellum distinct, hooks 28-42 in numbers, arranged in single row, suckers 100-125mm in diameter, neck short, strobilia broader than long, testes 100 in numbers, ovary bilobed, uterine diverticula 20-28 in numbers, cirrus sac extends 1/3<sup>rd</sup> across the segment and reported from *Ophiocephalus striatus*. The present form differs from *G. macrones* Woodland, 1924 in having body 110×194mm, rostellum armed with 33 hooks, arranged in one rows, neck absent, strobilia 150-200 in numbers, ovary bilobed, testes 100 in numbers, uterus with 20-30 uterine diverticula, cirrus sac 1/4<sup>th</sup> -1/6<sup>th</sup> across the segment and reported from *Macrones seenghala*. It differs from *G. pseudotropii* Verma, 1928 having Scolex broader at the middle, hooks 17-20 in numbers, arranged in one circle, neck short, testes 100-160 in numbers, arranged in two lateral fields, vas deferens continue inside the cirrus pouch, ovary bilobed, uterus with 30-40 lateral diverticulae and reported from *Pseudotropis garua*, India. The present form differs from *G. parasiluri* Yamaguti, 1934 in having scolex large, rostellum armed with many rostellar hooks, ovary bilobed, testes numerous, 20-24 lateral fold of uterine diverticula on each sides, yolk glands arranged in longitudinal strands and recovered from *Parasilurus asotus*. The present Cestode differs from *G. lucknowia* Singh, 1948 in having body 100 mm, scolex oval, 0.417× 0.365mm, bears armed rostellum, suckers four, rounded, armed with nine rows of spines, 0.18mm in diameter, spine measures 0.009mm, rostellum protrusible, 0.167mm, armed with double rows of hook, hooks 50 in numbers, 0.039mm, neck short, 0.633mm, immature proglottids three and half times broader than long, mature proglottids square, 0.85mm, gravid proglottids one and half times broader than long, genital opening irregularly alternate, marginal, ovary bilobed, vitelline gland small, rounded, lies longitudinal strands, 0.06mm, shell gland lies

just posterior to isthmus, 0.975mm, vagina posterior to cirrus pouch, uterus possessing 15-17 uterine diverticula on either side, eggs 0.043 mm, having small hookless embryo, testes 130-135 in numbers, 0.06-0.062mm, vas deference coiled, cirrus pouch 0.27-0.28mm and reported from *Eutropiichthys vacha* (Day), at Lucknow, U.P. India. It differs from *G. pseudobagrae* Chenyen Hein, 1962 in having suckers 0.13-0.21mm, rostellar hooks 33-38 in numbers, 0.23-0.31mm, rostellum 0.16-0.23mm, testes 80-100 in numbers, cirrus pouch 0.22-0.24mm, uterine diverticula 11-20 in numbers, eggs 0.31-0.33mm. The present form differs from *G. polyonchis*, Roitman and Freze, 1964 in having strobilia 35×2.43mm, scolex 0.2-0.27×0.27-0.34mm, suckers 0.1-0.16×0.09-0.015mm, armed with 4-6 rows of spines, rostellum 0.07-0.14×0.15-0.26mm, rostellar hooks 42-52 in numbers, 0.01-0.018mm, testes 96-166 in numbers, 0.014-0.017×0.045-0.056mm, cirrus pouch 0.25-0.60×0.07-0.22mm, receptaculum seminis 0.05×0.02-0.03mm, uterine diverticula 12-18 in numbers, eggs 0.016-0.024×0.01-0.02mm. It differs from *G. oligorchis* Roitman and Freze, 1964 in having strobilia 45-2.2mm, scolex 0.20-0.24×0.24-0.30mm, suckers 0.1-0.3×0.05-0.1mm, armed with 5-6 rows of spines, rostellum 0.026-0.034×0.034-0.068mm, rostellar hooks 26-30 in numbers, 0.014-0.022mm, testes 88-103 in numbers, 0.046-0.065×0.034-0.041mm, cirrus pouch 0.150-0.232×0.050-0.111mm, Vagina posterior to cirrus pouch, receptaculum seminis 0.017-0.023mm, uterine diverticula 8-12 in numbers, eggs 0.027-0.031×0.025-0.028mm and vitellaria follicular. The present Cestode *G. orientalis* Sp. Nov. differs from *G. sindensis* Rafiya Rehna and Fatima M. Bilquees, 1971 in having body 29-57×1.033-1.362mm, scolex simple with four suckers and rostellum, 0.241-0.396×0.344-0.379mm, suckers 0.132-0.137mm, rostellum 0.138-0.172mm, armed with single crown of 25 hooks, hooks 0.03mm, neck short, 0.172-0.248mm, mature segment broader than long, 0.792-1.033×0.961-1.617mm, testes more than 100 in numbers, arranged in one continuous field, ovary post testicular, bilobed, transversely elongated, 0.207-0.929×0.241-0.757mm, cirrus sac 0.551mm, cirrus very long, 0.73-0.73mm, vagina posterior to cirrus pouch, uterus simple with 8-9 diverticula on each side, genital pore irregularly alternate and reported from freshwater fish *Wallago attu* of Karli Lake, Sind, West Pakistan. It differs from *G. spinocirrosa* Rafiya Rehna and Fatima M. Bilquees, 1973 in having body elongated, containing 35-65 mature and gravid proglottids, 50-95×1.0-1.02mm, scolex 0.44-0.46×0.40-0.41mm, suckers four, cup shaped, 0.11-0.12mm, armed with minute spines, rostellum oval, armed with two rows of hooks, each row containing 22-25 hooks, 0.03-0.04mm, neck short, 0.10-0.13mm, mature proglottids 0.71-2.84×0.77-0.98mm, genital opening irregularly alternate, marginal, ovary bilobed, 0.17-0.29×0.57-0.60mm, vitelline glands follicular, arranged in longitudinal strands, vagina delicate, 0.16-0.50×0.067-0.068mm, cirrus pouch 0.23-0.25×0.05-0.11mm, testes lies between the vitelline glands, arranged in two groups, 6-12 in each group, uterus with 14-20 uterine branches, eggs oval to spherical, embryonated, 0.045-0.050×0.050-0.058mm and reported from freshwater fish *Wallago attu* of Karli Lake, Sind, West Pakistan. The present Cestode *G. orientalis* Sp. Nov. differs from *G. jammuensis* Dhar and Fotedar, 1979 in having body small, 1.0-2.0×0.98mm, scolex rounded, 0.23×0.32mm, bearing prominent rostellum and four suckers, rostellum provided with apical sucker and single cirlet of hooks, hooks rose thorn shaped, more than 30 in numbers, suckers provided with rows of minute spines, 0.4×0.1mm, apical sucker 0.15×0.13mm, neck short, 0.74×0.48mm, mature proglottids broader than long, ovary bilobed, each lobe measuring 0.62×0.73mm, testes 60-80 in numbers, in one continuous field, cirrus sac extends 1/3<sup>rd</sup> distance across the segment, 0.28×0.12mm, genital pore regularly alternate, vitelline glands throughout length of proglottids, shell gland 0.06mm, vagina thin tube, uterus elongated tube and reported from intestine of *Wallago attu*, Jammu, India. The present Cestode *G. orientalis* Sp. Nov. differs from *G. kashmirensis* Dhar and Fotedar, 1979 in having body small, 1.0-2.0×1.1mm, scolex rounded, 0.20×0.28mm, bearing prominent rostellum and four suckers, rostellum 0.52×0.14mm, provided with apical sucker and double rows of hooks, hooks rose thorn shaped, 30 in each rows, 0.26×0.21mm, suckers provided with rows of minute spines, 0.13mm, neck 0.36×0.22mm, mature proglottids broader than long, 0.67



×0.85mm, ovary bilobed, each lobe measuring 0.31×0.15mm, testes 148 in numbers, cirrus sac extends 1/3<sup>rd</sup> distance across the segment, 0.36×0.12mm, genital pore irregularly alternate, vitelline glands throughout length of proglottids, shell gland 0.07mm, uterus with 9-14 uterine diverticula and reported from intestine of *Glyptosternum sp.* at Baramulla. *G. orientalis* Sp.Nov. differs from *G.sanehensis* Malhotra et. al., 1980 in having body medium, 17.25 × 2.915mm, scolex 0.475×0.512mm, suckers spherical to oval, armed with 4-5 rows of spines, 0.193×0.164mm, rostellum oval, protrusible, armed with single circle of hooks, 0.172-0.226mm, rostellar hooks 22-28 in numbers, 0.027-0.046mm, neck distinct, 0.685×0.432mm, mature proglottids broader than long, 0.437-0.787mm, testes oval to spherical, 112-184 in numbers, 0.024×0.031mm, vas deferens 0.019mm, cirrus pouch elongated, 0.423×0.098mm, cirrus spinose, 0.045-0.221mm, genital pore alternate irregularly, ovary follicular, 0.203×0.772mm, vagina posterior to cirrus pouch, 0.009×0.023mm, vitelline gland follicular, 2.774×0.174mm, ootype 0.080×0.054mm, uterus branched with 10-24 lateral fingerlike uterine diverticula, 2.226×1.207mm, eggs numerous, round to oval, 0.041×0.045mm and reported from *Cirrhina mrigala* and *Wallao attu* at Saneh Road, Kotdwara (Garhwal), U.P., India. It differs from *G. mahamdabadensis* Malhotra et al., 1981 in having scolex small, rostellar hooks 66 in numbers, neck absent, vas deferens coiled, ovary bilobed, vagina thick tube, uterus tubular, vitellaria follicular and reported from *Mystus tengra*, at Mehmdabad. It differs from *G.haryanae* Gupta and Arora, 1982 in having suckers covered with 4-5 rows of spine, hooks 20 in numbers, neck short, testes 200 in numbers, vas deferens coiled, ovary bilobed, vagina anterior to cirrus pouch, uterus with 20 lateral diverticulae on each side, vitellaria follicular and collected from *Wallago attu*. The present form differs from *G.indica* Gupta and Parmar, 1982 in having body 70-90×0.85-0.90 mm, scolex spherical, 0.27-0.30×0.25-0.29mm, suckers four, muscular, 0.12-0.14 mm, rostellum slightly protrusible, 0.11-0.13×0.19-0.21mm, with two rows of unequal hooks arranged in a chain, hooks 24-26 in numbers, 0.010-0.025mm, neck short, mature proglottids longer than wide, 1.00-1.20×0.88-0.92mm, genital opening irregularly alternating, 0.38-0.42 from anterior extremity, uterine pore absent, testes rounded, 100-110 in numbers, 0.03-0.05mm, vas deferens coiled tube, cirrus pouch 0.28-0.30×0.12-0.14mm, cirrus unarmed, 0.14-0.16×0.05-0.07mm, ovary bilobed, 0.34-0.36×0.22-0.25mm, vitellaria follicular, arranged in longitudinal strands, vagina posterior to cirrus pouch, uterus elongated sac, giving 18-20 diverticula on each side, eggs 0.01-0.02mm and reported from intestine of *Wallagonia attu* (Bloch), Lucknow, India. It differs from *G. hanumanthai* Seth and Capoor, 1982 in having scolex Oval, rostellar hooks 24-26 in numbers, neck present, testes 45-75 in numbers, ovary bilobed, Vagina anterior or posterior to cirrus pouch, uterus with 10-16 uterine diverticula, vitellaria follicular and collected from *Wallago attu*, Allahabad, India. It differs from *G.paithanensis* Jadhav et. al., 1983 in having scolex triangular, hooks 11 in numbers, neck absent, testes 280-300 in numbers, vas deferens short, ovary bilobed with few blunt acini, vagina anterior to cirrus pouch, uterus with 16-18 lateral diverticula, vitellaria follicular, arranged in two rows and collected from *Barbus ticto* at Paithan M.S., India. It differs from *G. fotedari* Dhar and Majdah, 1983 in having body 9.54-14.28×0.62-0.77mm, scolex visible from strobilia, 0.16-0.32×0.26-0.37mm, suckers four, spherical to oval, 0.07-0.10mm, rostellum oval, protrusible, armed with hooks, 0.089-0.10×0.10-0.14mm, hooks 30-48 in numbers, rose thorn shaped, 0.016-0.024mm, neck distinct, 0.357-0.714mm, testes oval to spherical, 120-134 in numbers, 0.032-0.036×0.04mm, genital pore alternate irregularly, ovary follicular, each lobe measure 0.179-0.321mm, vagina posterior to cirrus pouch, vitelline gland follicular, forming two lateral bands, uterus persistent, 0.232-0.285×0.017-0.035mm, 9-5 uterine diverticula, eggs oval to rounded and reported from *Glyptothorax sp.* at Walur Lake, Kashmir. The present form differs from *G.shindei* Deshmukh and Shinde, 1989 in having scolex distinct, somewhat triangular, rostellar hooks 28 in numbers, triangular, in single circle, neck present, testes 180-190 in numbers, pre ovarian, small, evenly distributed, ovary bilobed, almost quadrangular, each lobe with finger shaped with 5-6 acini, vagina Thick tube, postero

ventral to cirrus pouch, uterus Tubular, cylindrical, vitellaria granular and reported from *Glyptothorax*. It differs from *G. aurangabadensis* Shinde and Wankhede, 1990 in having Scolex oval, broader in middle and tapering at both ends, 0.854×0.582 mm, rostellum oval, armed with two circle of hooks, 0.220×0.270mm, rostellar hooks 48 in numbers, 0.035-0.046×0.003-0.037 mm, suckers four, with thin musculature, rounded, 0.039-0.250×0.350-0.700 mm, mature proglottids broader than long, 0.922×1.54mm, testes 350-360 in numbers, rounded, scattered in single field, 0.043-0.082×0.033-0.067 mm, cirrus pouch oval, 0.145×0.072-0.111 mm, cirrus coiled, genital opening marginal, 0.082×0.019 mm, ovary bilobed, 0.970×0.169 mm, vagina posterior to cirrus pouch, uterus tube like, 0.572×0.121-0.431mm and reported from *Macrones singhala*, at Paithan, Dist. Aurangabad (M.S.), India. The *G. orientalis* Sp. Nov. differs from *G. sumani* Shinde and Wankhede, 1990 in having scolex well marked with rostellum and suckers, 0.161×0.284mm, rostellum triangular, 0.083×0.171mm, hooks 0.013-0.085×0.004-0.040 mm, suckers four, oval, 0.051×0.046 mm, neck absent, mature proglottids longer than broad, 5.63×0.499-0.984 mm, testes 103 in numbers, in two fields, 0.120-0.187×0.051mm, cirrus pouch elongated, submarginal, 0.227×0.028 mm, ovary bilobed, each lobe kidney shaped, 0.456×0.158 mm, vagina posterior to cirrus pouch, 2.90×0.60 mm, uterus tubular and collected from intestine of *Mastacembelus armatus*, at Paithan Dist. Aurangabad, M.S. India. It differs from *G. margolisi* Takeshi Shimazu, 1994 in having scolex simple, oval, rostellum biconvex lens, hooks 31-41 arranged in single circle, suckers cup shaped, neck long, 2.24-3.20 mm, proglottids acraspedote, longer than broad, testes 135-203 in numbers, globular, cirrus pouch claviform, cirrus unarmed, vas deferens Ventral to testes, genital pore irregularly alternate, Posterior to cirrus pouch ovary Bilobed, uterus 'I' shaped, vitellaria follicular, arranged in bands and reported from Biwa catfish *Silurus biwaensis* caught in Lake Biwa, Shiga Prefecture, Japan. The present form differs from *G. maharashtrii* Hiware and Jadhav, 1995 in having scolex triangular, muscular, 0.330-0.350×0.364-0.519mm, suckers four, oval, muscular, overlapping to each other, 0.170-0.180mm, rostellum oval, armed with single circle of hooks, 0.083-0.121×0.156-0.214mm, rostellar hooks 40-50 in numbers, 0.040-0.046 ×0.008-0.013 mm, neck absent, mature segment broader than long, squarish, 0.776-0.854×0.801-1.068mm, testes small, oval, 170-185 in numbers, 0.039-0.043×0.025-0.029mm, cirrus pouch elongated, fusiform, 0.592×0.078-0.150mm, cirrus thin, curved, 0.601×0.010-0.015mm, ovary butterfly shaped, ovarian lobe 0.776-0.780×0.146-0.194mm, vagina posterior to cirrus pouch, 0.689×0.010-0.019mm, ootype rounded, genital pore irregularly alternate, marginal, 0.039-0.043mm, uterus sac like, 0.689-0.699×0.146-0.242 mm, vitellaria granular and collected from *Wallago attu*, Karad, Dist. Satara (M.S.), India. It differs from *G. dharurensis* Jadhav and Tat, 1997 in having scolex globular, 0.350-0.591× 0.255-0.530 mm, suckers four, large, 0.196-0.210×0.180-0.210mm, rostellum rounded, encircled by two opposite rows of hooks, 0.122-0.135×0.214-0.270 mm, hooks 35-40 in numbers, 0.033-0.040×0.003-0.014mm, neck long, 0.225-0.390×0.115-0.580 mm, mature proglottids broader than long, 0.902-1.832×1.802-1.891mm, testes 60-70 in numbers, 0.490-0.556×0.484-0.498mm, cirrus pouch large, conical, ovary bilobed, lobe fingerlike, 1.090-1.098×0.120-0.145mm, vagina 1.192-1.198×0.026-0.049mm, genital pore marginal, regularly alternate, 0.172-0.177×0.046-0.049mm, uterus sac like, 0.572-0.582×0.117-0.140mm, vitellaria granular and reported from *Wallago attu*, Ambachondi River, Dharur, India. It differs from *G. seenghali* Hiware, 1999 in having scolex globular, muscular, 0.388-0.398×0.252-0.543mm, rostellum big, oval, armed with single circle of hooks, 0.160 ×0.194-0.233mm, hooks 36-38 in numbers, 0.030-0.043×0.004-0.018mm, suckers oval, rounded, 0.146-0.150mm, neck absent, mature segment longer than broad, 1.698-2.007×0.621-0.894mm, testes small, oval to elongated, 220-230 in numbers, 0.053×0.030-0.038mm, cirrus pouch oval, 0.242-0.258×0.060-0.144mm, ovary bilobed, 'H' shaped, 0.606×0.280-0.576 mm, vagina funnel shaped, posterior to cirrus pouch, 0.849×0.015-0.053 mm, genital pore marginal, slit like, uterus tubular, with 18-19 blunt, small diverticula, vitellaria granular and reported from *Mystus seenghala*, Satara M.S., India. It

differs from *G.cirrhinae* Patel, Shinde and Khan,1999 in having scolex large, square, rostellum armed with hooks, arranged in five rows, rostellar hooks triangular, 27 in numbers, suckers four, large, oval, neck short, mature segment longer than broad, testes medium, 100-110 in numbers, cirrus pouch pear shaped, cirrus coiled, vas deferens coiled, ovary bilobed, 'U' shaped, vagina anterior to cirrus pouch, genital pore medium, vitellaria granular, uterus with central stem and numerous branches, eggs oval and reported from *Cirrhina mrigala* at Nanded Dist. Jalgaon, M.S.,India. The present form differs from *G. rohita* Shinde, Mahajan and Begum,1999 in having scolex large, globular, 0.398×0.403mm, suckers large, oval, 0.150×0.155mm, rostellum large, oval, 0.150×0.160mm, rostellar hooks triangular, 60 in numbers, 0.010×0.003mm, neck short, mature segment squarish, 0.437×0.660mm, testes medium, 140-150 in numbers, cirrus pouch medium, tubular, 0.78×0.010mm, ovary bilobed, 0.471×0.112mm, vagina posterior to cirrus pouch, 0.393×0.019mm, genital pore irregularly alternate, vitellaria follicular, arranged in 5-6 rows and collected from *Labeo rohita*, Adan Dam, Akola, M.S.India. It differs from *G.clariusae* Jadhav *et al.*, 2001 in having scolex triangular, distinctly marked off with four large suckers and prominent rostellum, suckers large, round to oval, arranged in pairs, rostellum rounded to oval, rostellar hooks 17-20 in numbers, long nail like, neck long, mature segment broader than long, testes 85-90 in numbers, rounded to oval, cirrus pouch small, vas deferens short, straight, ovary bilobed, long finger like lobe, vagina thin, vitellaria granular, genital pore marginal, irregularly alternate, uterus sec like and reported from *Clarias batrachus*, at Belgaum, Karnataka. The present form differs from *G.rohita* (*minor*) Pawar *et al.*, 2004 in having scolex medium, oval with four suckers and rostellum, rostellum large, oval at anterior tip of scolex, rostellar hooks 30-32 in numbers, single pronged, almost triangular, suckers medium, oval, arranged in two pairs, overlapping to each other, neck short, broader than long, mature segment broader than long, testes 145-155 in numbers, oval, medium, cirrus pouch marginal, medium, vas deferens thin, short, curved, ovary large, bilobed, lobes with 6-7 short, blunt round acini, vagina thin, posterior to cirrus pouch, ootype medium, oval, vitellaria follicular, arranged in 3-6 rows on each side, genital pore small, oval, irregularly alternate, and reported from *Labeo rohita*, at Dhanegaon Dam, Dist. Beed. It differs from *G.mastacembali* Wankhede, 2004 in having scolex triangular with rostellum, four big, oval suckers, rostellar hooks 18, Broader at the base and tapering at the end, neck absent, testes 170-190 in numbers, oval, vas deferens long, coiled, ovary bilobed,with 4-6 acini, vagina posterior to cirrus pouch, uterus tubular, long and collected from *Mastacemelus armatus*, in Godavari river at Aurangabad, M.S. India. It differs from *G. ambikaei* Hiware *et al.*, 2004 in having scolex triangular, rostellar hooks 36-37 in numbers, lancet shaped, neck very short, testes 388 - 400 in numbers, rounded in shape, vas deferens thin tube, ovary bilobed, butterfly shaped, vagina thin, curve tube, uterus sac like, vitellaria granular and reported from *Wallago attu*. It differs from *G. batrachusi* Begum, 2007 in having scolex quadrangular, 0.291-0.388× 0.194-0.379mm, rostellum oval, large, armed with double rows of hooks, 0.049-0.112×0.112-0.189mm, rostellar hooks arranged in two circles,nail like, 0.013-0.025×0.012-0.014mm, suckers large, oval, 0.150-0.170×0.126-0.141mm, neck medium, 0.539-0.737×0.320-0.388mm, mature proglottids squarish, 0.568-0.669×0.388-0.737mm, testes medium, 105-115 in numbers, 0.029-0.063×0.019-0.039mm, cirrus pouch cylindrical, 0.238-0.252 × 0.019-0.039mm, vas deferens coiled, thin, 0.534×0.005mm, ovary bilobed, butterfly shaped, 0.388-0.509× 0.083-0.194mm, vagina posterior to cirrus pouch, 0.572×0.005-0.010mm, uterus tubular, 0.451-0.476× 0.010-0.029mm, vitellaria follicular, arranged in 6-8 rows on each side, 0.005 mm and collected from *Clarias batrachus* at Godavari River at Gangapur Dist. Aurangabad M.S.India. The present form differs from *G.pandeyae* Kasar *et.al.*,2010 in having scolex triangular, rounded anteriorly, broader in middle, muscular, 0.351× 0.371mm, suckers four, medium, rounded to oval, muscular, two on either side, 0.150×0.121mm, rostellum oval to rounded, armed with single row of hooks, 0.099×0.131mm, rostellar hooks 24-25 in numbers, triangular, 0.070×0.016mm, neck absent, mature proglottids broader than long, squarish,

1.791×2.606mm, testes 180-200 in numbers, oval, small, 0.041×0.024mm, cirrus pouch rounded to oval, 0.584×0.167mm, cirrus long, tubular, straight, 0.371×0.016mm, vas deferens long tube, slightly coiled, 0.560×0.012mm, ovary bilobed, right lobe 1.014×0.162mm, left lobe 0.864mm, vagina thick tube, posterior to cirrus pouch, 0.774×0.033mm, receptaculum seminis long, 1.123×0.043mm, genital pore marginal, unilateral, 0.048×0.026mm, gravid proglottids longer than broad, 1.449×1.201mm, uterus Saccular, 1.308×1.058mm, eggs non operculated, vitellaria follicular, arranged in two rows and collected from intestine of *Wallago attu* from Dhamangaon Dist. Amravati (M.S.), India. It differs from *G. wallaguae* Pradhan *et al.*, 2010 in having scolex triangular, with four suckers and rostellum, suckers four, arranged in two groups, overlapping to each other, rostellum round, encircled by single row of 17-20 hooks, mature segment longer than broad, testes rounded, 70-75 in numbers, cirrus pouch large, oval, cirrus coiled, vas deferens coiled, vagina posterior to cirrus pouch, genital pore oval, unilateral, ovary bilobed, uterus Saccular, vitellaria granular and collected from intestine of *Wallago attu* in Dudhana Dam, Dist. Jalna M.S., India. The *Gangesia orientalis* Sp.Nov. differs from *Gangesia marathwadensis* Bhure *et al.*, 2011 in having scolex triangular with marked rostellum, hooks 18 in numbers, neck absent, testes 103 in numbers, oval to rounded, vas deferens coiled, genital pore marginal, situated on anterior side of segment, ovary distinctly bilobed, lobes with 5-6 acini, vagina thin tube, posterior to cirrus pouch, enlarge at genital pores, uterus tubular, long extends up to the anterior ends, vitellaria follicular, arranged in single row and recovered from intestine of *Wallago attu*, M.S. India. It differs from *Gangesia (Gangesia) bendsurensis* Reddy *et al.*, 2011 in having body 76mm, scolex globular, suckers four, muscular, Rostellum with a double row of stout hooks, rostellar hooks rose thorn shaped, 35-47 in number, neck absent, mature segment broader than long, testes 170-190 in number, cirrus pouch fusiform, vagina posterior to cirrus pouch, ovary butterfly shaped, genital pore irregularly alternate, vitellaria follicular and uterus Saccular and reported from *Wallago attu* at Bendsura dam, Beed district, M.S.India. It differs from *G.jayakwadensis* Bhavare *et al.*, 2012 in having scolex large, quadrangular, rostellum armed with a double circle of hooks, one circle with 25 hooks, second circle with 29 hooks, mature proglottids squarish in shape, broader than long, testes 300 to 310 in numbers, ovary is large in size, distinctly bilobed, vitellaria are follicular, uterus tubular and reported from intestine of a freshwater fish *Clarias batrachus* from Jayakwadi project at Paithan, Dist. Aurangabad. *Gangesia orientalis* Sp.Nov. differs from *G. (G.) striatusii* Bhure and Nanware, 2012 in having scolex rounded, broader in middle and distinctly marked off towards posterior side, muscular, 0.528-0.655×0.107-0.466mm, suckers four, big, rounded, muscular, placed at corners, 0.136-0.160×0.126-0.141mm, rostellum oval to rounded, armed with three rows of stout hooks, 120-130 in numbers, 0.024-0.067mm, neck absent, mature proglottids slightly broader than long, 0.640-0.650×0.820-0.854mm, testes 70-80 in numbers, oval, small, 0.039-0.043×0.025-0.029mm, cirrus pouch elongated, rounded to oval, obliquely placed, 0.087-0.107×0.015-0.043mm, cirrus thin, slightly curved, vagina anterior to cirrus pouch, 0.002-0.481mm, ovary bilobed, butterfly shaped, right lobe 0.277-0.379×0.034-0.199mm, left lobe 0.160-0.301×0.053-0.194mm, uterus sac like, 0.277-0.325×0.014-0.072mm, vitellaria granular and recovered from intestine of *Channa striatus*, Omerga Dist. Osmanabad (M.S.), India. It differs from *G. shivajiraoi* Dhole *et al.*, 2012 in having Scolex distinct, almost oval, globular, Consist of four big suckers, round to oval, muscular, overlapping on each other, rostellum with single row of stout hooks, rostellar hooks 19 in number, arranged irregularly on rostellum, rose thorn shaped, Neck short, Mature segment squarish, slightly acraspedote, longer than broad, testes 218 - 232 in numbers, globular, small, cirrus pouch large, elongated, fusiform, Cirrus thin, curved, Vas deferens short, curved, tubular, Genital pore irregularly alternate, small, oval, marginal, Ovary bilobed, vagina thin tube, posterior to cirrus pouch, gravid segment two times longer than broad, uterus with 10- 11 diverticula, eggs oval to elongated, vitellaria follicular, 1 -2 rows.



From above discussion it is clear that, species under discussion is new to science and differs from known valid species of genus *Gangesia* in respect to taxonomic characters. Hence it is desirable to erect a new species and named it as *Gangesia orientalis* Sp.Nov.

### TAXONOMIC SUMMARY

**Genus** : *Gangesia* Woodland, 1924  
**Species** : *Gangesia orientalis* Sp.Nov.  
**Type host** : *Wallago attu* (Bleeker, 1851)  
**Habitat (Site)** : Intestine  
**Type locality** : Loha Dist. Nanded, M.S., India.  
**Prevalence** : 42 mature tapeworms collected from 35 infected hosts out of 120 examined.  
**Period of collection**: February, 2011 to January, 2013.  
**No. of Specimen** : 42  
**Accession number**: PGDZ/YMN/1-04/ February, 2011 to January, 2013  
**Deposition** : Department of Zoology, Yeshwant Mahavidyalaya, Nanded.

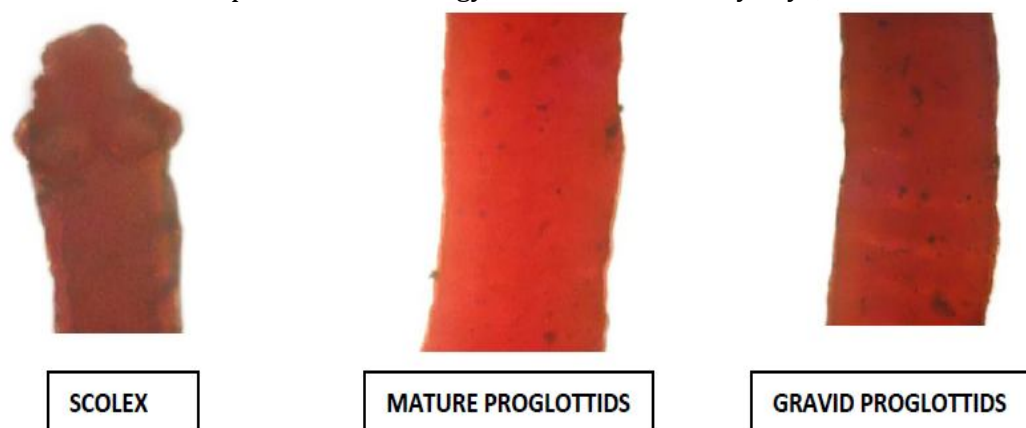


Figure 1 –Microphotoplate of *Gangesia orientalis* Sp.Nov.

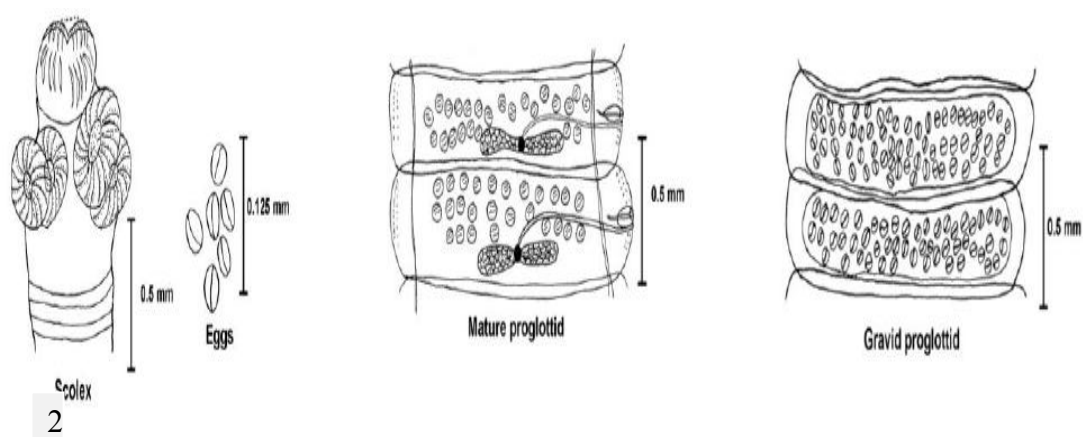


Figure 1 –Cameralucida Diagram of *Gangesia orientalis* Sp.Nov.

### ACKNOWLEDGEMENT

Authors express sincere thanks to Principal, Yeshwant Mahavidyalaya Nanded for facilities provided. VSD and DBB are indebted to SERB, New Delhi for sanctioning Fast Track Research Project No. SR/FT/LS-19/2010 Dt. 2nd May, 2012.

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