

***Neolepidapedon (Neolepidapedoides) yamagutii* n. sp.
(Trematoda: Lepocreadiidae): An Intestinal Parasite of a
Mullid Fish (*Mulloidichthys auriflamma*) from the Red Sea***

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ABSTRACT. The genus *Neolepidapedon* is briefly reviewed. *Neolepidapedon (Neolepidapedoides) yamagutii* n. sp. is described from *Mulloidichthys auriflamma* caught from the coastal waters of Al-Ghardaga, Red Sea. The new species differs mainly from the other species of the subgenus by the position of the cirrus pouch, ratio of oral sucker to ventral sucker, extension of vitellaria, and the body shape. The new species represents the first record of the genus *Neolepidapedon* in the Red Sea.

Manter (1954) established the genus *Neolepidapedon* to accommodate those species akin to *Lepidapedon* but in which only the anterior portion of the external seminal vesicle is surrounded by prostate gland cells and a membranous sac is absent. *N. polyprioni* Manter, 1954 from *Polyprion oxygeneios* from New Zealand represents the type species of the genus.

Skrjabin (1964) proposed a key to differentiate between five species of the genus *Neolepidapedon* depending on length of the oesophagus, the presence or absence of dense mass of circular muscle fibres surrounding internal seminal vesicle, the level of the excretory bladder extension, the nature of the ventral sucker, and the topography of the testes according to the body length.

Yamaguti (1971) divided the genus *Neolepidapedon* into two subgenera depending on the level of the excretory vesicle extension as follows:

* This work was undertaken by the author through the period of post doctoral scholarship in Harold W. Manter Laboratory, Division of Parasitology, University of Nebraska State Museum, University of Nebraska, Lincoln, 68508, U.S.A.

1. Excretory vesicle reaching to level of testes or ovary
..... (*Neolepidapedon*) Manter, 1954
 2. Excretory vesicle reaching up to near the intestinal bifurcation
..... (*Neolepidapedoides*) Yamaguti, 1971
- He also listed six species under the subgenus *Neolepidapedoides*. viz: *N. (Neolepidapedoides) trachinoti* Siddiqi and Cable, 1960; *N. (Neolepidapedoides) dollfusi* Durio and Manter, 1968; *N. (Neolepidapedoides) epinepheli* Siddiqi and Cable, 1960; *N. (Neolepidapedoides) equilatum* Siddiqi and Cable, 1960; *N. (Neolepidapedoides) macrum* Overstreet, 1969; and *N. (Neolepidapedoides) mycteropercae* Siddiqi and Cable, 1960.

However, by reviewing the original descriptions of the excretory vesicle for these species Table 1, it is found that in *N. trachinoti* has the excretory vesicle extends only to the posterior margin of the anterior testis. Accordingly, the present author believes that *N. trachinoti* should be transferred to the subgenus *Neolepidapedon*.

The present study was made to elucidate the main taxonomic features of more helminths of Red Sea fishes, in the hope of making a further contribution to information on the world distribution of parasitic helminths and their relationship with the distribution of fish hosts. *Neolepidapedon (Neolepidapedoides) yamagutii* n. sp. from *Mulloidichthys auriflamma*, its morphological features and relationship with other species of the subgenus are described.

Materials and Methods

The identification of the fishes, together with the methods of collection, fixation and staining of trematodes, are described elsewhere (Ramadan 1982). Drawings were made to scale using a camera lucida. Measurements are in millimetres, unless stated otherwise.

Description

During the present investigation, the author examined ten mature specimens (uterus full of normal sized-eggs) collected from twenty *Mulloidichthys auriflamma* (locally called "Ambar baladi") caught from Al-Ghardaga, Red Sea in August, 1981.

Morphological features

The body is elongated, with round extremities and measures 1.87-6.50 in length and 0.23-0.39 in width. The tegument covering the body is provided to level of the anterior testis with small spines. Eye-spot pigment is present anteriorly,

scattered around the pharynx. The length/breadth ratio is 8.12-16.67: 1. The oral sucker is fairly round, subterminal, measuring 0.08-0.25 long and 0.06-0.20 wide. The ventral sucker is also round but much larger; it measures 0.14-0.32 long and 0.16-0.33 wide. It lies about 0.13-0.35 from the anterior end of the body. The ratio of the oral sucker to the ventral sucker is 0.50-0.78: 1. The pharynx is well developed and round in shape; it measures 0.13-0.15 long and 0.14-0.16 wide. A prepharynx is absent. The intestinal caeca diverge and extend laterally to end very close to the posterior extremity of the body, passing dorsal to the genital organs.

The two testes are in tandem, with or without an intertesticular space, oval to round in shape, smooth in outline and post-equatorial. The anterior testis measures 0.09-0.48 long and 0.10-0.27 wide; the posterior testis measures 0.14-0.45 long and 0.08-0.26 wide. The cirrus sac is elongate-ovate to pyriform in shape, extending almost anterior to ventral sucker and measures 0.10-0.15 long and 0.04-0.05 wide. The cirrus sac contains a tubular internal seminal vesicle, prostatic cells, a small prostatic vesicle and cirrus. The external seminal vesicle is a long, coiled tubular structure surrounded by prostate cells. The genital pore lies toward the left side, anterior to the ventral sucker and near to the level of the oesophagus. The metraterm is about the same length as the cirrus sac.

The ovary is ovoid in shape, equatorial in position, and measures 0.05-0.26 long and 0.08-0.18 wide. The receptaculum seminis is oval in shape, lies dorsal to the ovary and measures 0.03-0.20 long and 0.04-0.09 wide. The vitelline glands extend from the posterior portion of the ventral sucker to the posterior end of the body. They are confluent posterior to the testes and may or not be present between the gonads, partially overlap the gonads and excretory vesicle dorsally. The uterus folds are few, occupying only the enclosed region between the ventral sucker and ovary. The uterine coils are full of a moderate number of eggs that are relatively large in size, measuring 69-73 μm long and 34-39 μm wide.

The excretory pore is subterminal and the excretory vesicle tubular and ends near the intestinal bifurcation.

Discussion

The consensus of opinion amongst investigators working on the genus *Neolepidapedon* (Manter 1954, Skrjabin 1964 and Yamaguti 1971) is that the following criteria are important in the differentiation of the various species: position, size and shape of cirrus pouch, position of the genital pore, shape and position of testes and ovary, extent and distribution of vitellaria, relative size of oral and ventral suckers, length of prepharynx and oesophagus, shape and location of diverticula at intestinal bifurcation, measurements of eggs and level of the

Table 1. A Comparison between different species of the Subgenus *Neolepidapedoides yamaguti*, 1971.

Character	<i>N. macrum</i> Overstreet, 1969	<i>N. trachinoti</i> Siddiqi & Cable 1960	<i>N. dollfusi</i> Durio & Manter 1968	<i>N. epinepheli</i> Siddiqi & Cable 1960
Body shape	Elongate	Tapering anteriorly rounded posteriorly	Tapering anteriorly	Elongate, hind body leaf-like
Length	4.7	1.49	1.37 - 1.86	1.65 - 3.89
Width	0.42	0.37	0.57 - 0.76	0.68 - 0.78
Tegument	Entire spinose	Thick spinose	Spinose	Spinose
Eye-Spot pigment	Present	Present	Present	Present
Length/Width	11.19:1	4.03	2.40-2.45:1	2.43-4.99:1
Oral sucker	Slightly subter- minal, 0.11×0.12	Subterminal, 0.09×0.09	0.14×0.16	0.10-0.14 × 0.15-0.19
Acetabulum	0.11×0.12	0.09×0.09	0.13×0.14	0.13-0.18 in diameter
Oral sucker/ ventral sucker	1: 1.1	1: 1	1: 0.8-0.9	1.1
Prepharynx	0.10 long	0.07 long	0.10-0.77	Very short
Pharynx	0.06×0.06	0.06×0.06	0.64-0.80 × 0.51-0.61	0.09-0.12 × 0.08-0.11
Esophagus	0.30 long	0.14 long	0.14-0.18	Fairly long
Intestinal caeca	Extending almost to posterior end of body	Extending almost to posterior end of body	Bifurcate anterior to acetabulum, about 1/3 distance between suckers, extending some distance far from body end	Bifurcate midway between pharynx & acetabulum, ex- tending almost to posterior body end
Testes	Tandem, separated, smooth, measuring 0.30×0.20× 0.35×0.25	More nearly tan- dem than diagonal smooth, contiguous within posterior 2/5 of body	Smooth to slightly crenated wider than long, diagonal or tandem, close to- gether	0.18-0.28 in diamter, smooth, diagonal in pos- terior third to quarter of body

<i>N. equilatum</i> Siddiqi & Cable 1960	<i>N. hypoplectri</i> Nahhas & Cable 1964	<i>N. mycteropercae</i> Siddiqi & Cable 1960	<i>N. belizense</i> Fischthal, 1977	<i>N. yamagutii</i> n.sp.
Cylindrical, ends rounded	—	Rounded ends	Elongate, narrow, extremities rounded	Elongate, round extremities
2.21	1.35 - 2.02	3.25	3.66	1.87 - 6.50
0.44	0.28 - 0.38	0.32	0.41	0.23 - 0.39
Spinose	Spinose	Spinose	Spined to acetabulum level	Spined to testes level
Present	Present	Present	Present	Present
5.02:1	4.82-5.32	10.16	8.93	8.12-16.67:1
0.07×0.08	0.09-0.11 in diameter	0.05×0.06	0.22×0.21	Subterminal, 0.08-0.25 × 0.06-0.20
0.11×0.11	0.06-0.08 in diameter	0.08×0.09	0.20×0.19	0.14-0.32 × 0.16-0.33
1: 1.37	1: 0.70-0.76	1: 1.4	1: 0.91	1: 1.50-1.78
Absent	Very short	0.02 long	0.12 long	Absent
0.03×0.04	0.03-0.05 in diameter	0.03×0.04	0.11×0.10	0.13-0.15× 0.14-0.16
—	2-3 times length of pharynx	—	0.77 long	0.16-0.20 long.
Bifurcate near mid body length extending almost to posterior body end	Bifurcate midway between suckers, extending to near posterior body end	Bifurcate distinctly nearer oral than ventral sucker, extending to almost posterior body end	Extending to posterior extremity	Bifurcate midway between suckers, extend close to posterior body end.
Smooth, tandem, separated by a few vitelline follicles, 0.17-0.16×0.19	Entire, tandem not close together 0.07-0.14× 0.09-0.15	Tandem, separated by vitelline glands, 0.17-0.21× 0.11-0.15	Smooth, elongate, tandem, measures 0.32×0.18 and 0.39×0.18	Tandem, with or without intertesticular space, measures 0.09-0.48×0.10-0.27 and 0.14-0.45×0.08-0.26

Table 1. Contd.

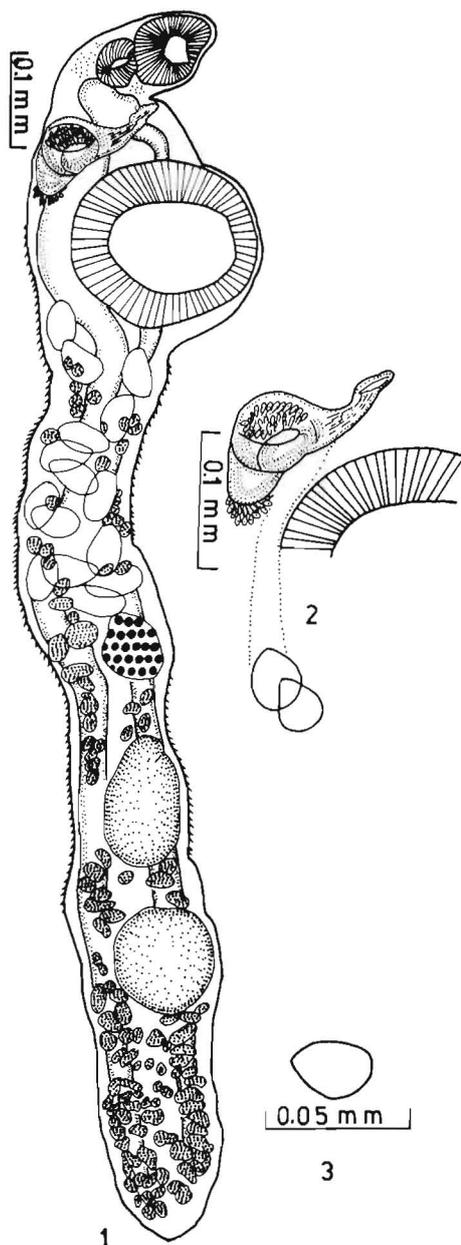
Cirrus sac.	Extending well posterior to acetabulum, containing small oval, internal seminal vesicle large conspicuous prostatic vesicle and cirrus. External seminal vesicle tubular, sinuous, about twice length of cirrus sac. Prostatic cells few, free in parenchyma, mostly surrounding anterior portion of external seminal vesicle	Club-shaped, ending a little short of midway between acetabulum and ovary, internal seminal vesicle short, concave anteriorly to receive posterior end of conspicuous oval to pyriform pars prostatica, ejaculatory duct long, cirrus simple. External seminal vesicle small & curved & posterior end of cirrus pouch surrounded by prostate cells	Elongate, containing short cirrus, small prostatic vesicle, tubular internal seminal vesicle, and prostatic cells; External seminal vesicle a short broad anterior tube surrounded by few gland cells & a narrow posterior tube surrounded by a compact mass of prostatic cells	With prominent, pars prostatica at left of acetabulum and sac-like internal seminal vesicle. Cirrus small external seminal vesicle a curved, elongated sac, surrounded by prostate cells with ducts entering cirrus sac
Genital pore	Sinistral, near anterolateral border of acetabulum	To left, anterior to acetabulum	Close to left edge of acetabulum, slightly anterior to midacetabular level	To left, on level with anterior margin to acetabulum
Ovary	Entire, smooth, submedian, anterior to testis by about length of testis, 0.19×0.17	0.11×0.10 irregular, to right of midline, close to anterior testis	Smooth, wider than long	Smooth to somewhat irregular, median, 0.11-0.13×0.13-0.17
Seminal receptacle	Postovarian	Left of ovary	Postovarian, flask-shaped	Postovarian, sac like
Uterus	Descending slightly posterior to ovary before extending anteriorly	With relatively few eggs, not posterior to ovary	Preovarian	Intercaecal, from ovarian level to acetabulum
Metraterm	Not as long as cirrus sac	Well developed, tubular	About same length as cirrus sac	Slender, tubular paralleling cirrus sac

Sinuous, extending posterior to ventral sucker, internal seminal vesicle small, pars prostatica elongated, followed by narrow ejaculatory duct & short cirrus external seminal vesicle long, tubular, coiled, surrounded by prostatic cells	Extending well posterior to ventral sucker, containing small spherical internal seminal vesicle, large conspicuous pars prostatica & cirrus. External seminal vesicle tubular, sinuous, surrounded by prostatic cells along most of its length & extending about halfway from acetabulum to ovary	Sigmoid, ending a little less than halfway between acetabulum and ovary, internal seminal vesicle small pars prostatica elongated, external seminal vesicle long, tubular coiled, its distal end surrounded by prostatic cells	Sigmoid, thick-walled, postacetabular, external seminal vesicle saccular, internal seminal vesicle bipartite, succular, cirrus long	Elongate, ovate to pyriform, extending almost anterior to acetabulum containing a tubular internal seminal vesicle, prostatic cells, prostatic vesicle & cirrus. External seminal vesicle long, coiled tubular and surrounded by prostatic cells
On left, near anterior margin of ventral sucker	Sinistral, at about midlevel of acetabulum	To left, posterolateral to ventral sucker	Sinistral to anterolateral margin of acetabulum	Toward left side, near to oesophagus level
Smooth, median, 0.11×0.13	Entire, smooth, pretesticular, 0.06-0.10×0.08-0.11	Smooth, 0.13×0.11	Dextral, smooth, 0.14×0.15	Ovoid, equatorial 0.05-0.26×0.08-0.18
Postovarian	Postovarian	Postovarian	Dorsal to ovary	Oval, dorsal to ovary
With moderate number of eggs, Preovarian	Preovarian	Preovarian	Preovarian and postacetabular, coils few	Between acetabulum & ovary, with moderate number of eggs
Tubular	About same length as cirrus sac	Tubular, wide	Comma-shaped, thick-walled, muscular, passing ventral to cirrus sac	About same length as cirrus sac

Table 1. Contd.

Vitellaria	Extending from posterior portion of cirrus pouch to posterior body end confluent posterior to testes and between gonads, partially overlap gonads & excretory vesicle dorsally	In lateral fields, from level of intestinal bifurcation to posterior end of body	Large follicles, extending from level of midoesophagus to near posterior body end, dorsal ventral & lateral to caeca	In lateral fields, from base of external seminal vesicle to ends of caeca
Eggs	63-66×35-44 μm	39-50×25-35 μm	62-64×32-38 μm	Moderate to numerous 57-65×35-41 μm
Excretory vesicle	Tubular ending nearer intestinal bifurcation than acetabulum, sphincter well developed, pore terminal	Sac-shaped, extending to posterior margin of anterior testes, excretory pore subterminal, dorsal, with sphincter	Excretory pore terminal, excretory vesicle with gland cells near pore, extending between or dorsal to testes to right of ovary, ending near acetabulum level or slightly anterior to it.	Tubular, extending to anterior margin of acetabulum, excretory pore subterminal, with sphincter
Hosts	<i>Mycteroperca microlepis</i>	<i>Trachinotus sp.</i>	<i>Epinephelus sp.</i> (red-cod) & <i>Epinephelus sp.</i> (spotted grouper)	<i>Epinephelus striatus</i> , <i>E. adscensionis</i>
Locality	Florida	Puerto Rico	New Caledonia	Puerto Rico

From base of cirrus sac to posterior end of body, confluent posterior to testes	In lateral fields, from about ends of cirrus sac to posterior end of body, usually between tests, rarely between ovary & anterior testes	From base of external seminal vesicle to posterior ends of caeca, confluent posterior to testes	Extending from postacetabular to posterior extremity, confluent between testes & post-testicular	Extend from posterior portion of ventral sucker to posterior body end, confluent posterior to testes & may or not be present between gonads, partially overlap gonads & excretory vesicle.
57-60×30-33 μm	45-60×28-33 μm	Few, 48-57×35-38	Few, operculate, 73-92×50-60	Moderate numbers, 69-73×34-39 μm
Sac-shaped, extending to level of ovary. Excretory pore dorsal near posterior end, with sphincter	Tubular, extending to intestinal bifurcation sphincter well developed, pore terminal	I-shaped, reaching almost to intestinal bifurcation, excretory pore dorsal, near posterior end, with sphincter	Extending to caecal bifurcation, por terminal	Tubular, ends near intestinal bifurcation
<i>Cephalopholis fulvus</i>	<i>Hypoplectrus unicolor</i>	<i>Mycteroperca</i> sp.	<i>Sphyaena barracuda</i>	<i>Mulloidichthys auriflamma</i>
Puerto Rico	Jamaica	Puerto Rico	Long Cay, Belize	Al-Ghardaga, Red Sea



Neolepidapedon (Neolepidapedoides) yamaguttii n. sp.

1. Ventral view.
2. Terminal genitalia.
3. Egg.

excretory vesicle extension, a character which distinguished the genus into its two subgenera (Yamaguti 1971). Table 1 includes a comparison between different species of the subgenus *Neolepidapedoides* as well as *N. (Neolepidapedon) trachinoti* Siddiqi and Cable, 1960, n. comb.

Accordingly, the new species differs from all other species in the subgenus (*Neolepidapedoides*) by the distinctive position of the cirrus sac, the ratio of oral sucker to ventral sucker and the body shape.

N. (Neolepidapedoides) yamagutii n. sp. can be differentiated from the other related species, *N. (Neolepidapedoides) mycterpercae*, *N. (Neolepidapedoides) equilatatum* and *N. (Neolepidapedoides) epinepheli* by the extension of vitellaria, prepharynx and oesophagus length and position of the genital pore. Also from *N. (Neolepidapedoides) hypoplectri* by the extension of cirrus pouch and distribution of vitellaria. Also from *N. (Neolepidapedoides) macrum* by the extension of the excretory vesicle, prepharynx and oesophagus length, shape of intestinal bifurcation and extension of cirrus sac. Also from *N. (Neolepidapedoides) dollfusi* by the shape of testes and ovary, the extension of vitellaria and the ratio of body length to body width.

Finally, the new species can be distinguished also from *Neolepidapedon belizense* Fischthal, 1977 (with an excretory vesicle extending to caecal bifurcation) by the shape of the intestinal bifurcation, distribution of vitellaria, extension of cirrus sac and position of genital pore.

The present author believes that all the above differences are sufficient to designate *Neolepidapedon (Neolepidapedoides) yamagutii* as a new species.

The present description of the new species represents the first record of the genus *Neolepidapedon* in Red Sea fish.

Host : *Mulloidichthys auriflamma*.
Location : Intestine.
Locality : Al-Ghardaga, Red Sea.
Types : Deposited in the Helminthological Collection, Department of Zoology, Faculty of Science, Ain Shams University, No. 321 (Type) and 3 2 2 (Paratype).

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References

- Durio, W.O., and Manter, H.W.** (1968) Some digenetic trematodes of marine fishes of New Caledonia. Part II. Opecoelidae and Lepocreadiidae, *J. Parasit.* **54**(4): 747-756.
- Fischthal, J.H.** (1977) Some digenetic trematodes of marine fishes from the barrier reef and reef Lagoon of Belize, *Zoologica Scripta* **6**(2): 81-88.
- Manter, H.W.** (1954) Some digenetic trematodes from fishes of New Zealand, *Trans. Roy. Soc. N.Z.* **82**(2): 475-568.
- Nahhas, F.M. and Cable, R.M.** (1964) Digenetic and aspidogastrid trematodes from marine fishes of Curacao and Jamaica, *Tulane Stud. Zool.* **11**(5): 169-228.
- Overstreet, R.H.** (1969) Digenetic trematodes of marine teleost fishes from Biscayne Bay, Florida, *Tulane studies in Zoology and Botany*, **15**(4): 119-176.
- Ramadan, M.M.** (1982) A review of the trematode genus *Rhagorthis* Manter, 1931 (Lepocreadiidae), with a description of *Rhagorthis manteri* sp. n., an intestinal parasite of a scarid fish from the Red Sea, *Z. Parasitenkd.* **67**: 273-277.
- Siddiqi, A. and Cable, R.M.** (1960) Digenetic trematodes of marine fishes of Puerto Rico, *New York Acad. Sci.* **17**(3): 257-368.
- Skrjabin, K.J.** (1964) *Keys to the Trematodes of Animals and Man*. University of Illinois Press, Urbana, U.S.A., p. 351.
- Yamaguti, S.** (1971) *Synopsis of Digenetic Trematodes of Vertebrates* Vol. I and II., Keigaku Publication Co., Tokyo, p. 1074.

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نيوليبيدا بيدون (نيوليبيدا بيدويدوس) ياموجوتي ، نوع جديد من ديدان التريماتودا التابعة لعائلة الليبوكريدي ، من أمعاء إحدى أسماك المليلدي بالبحر الأحمر

مصطفى محمود رمضان

قسم البيولوجي - كلية التربية - جامعة عين شمس - مصر

يتضمن هذا البحث دراسة نوع جديد من ديدان جنس نيوليبيدا بيدون من الأسماك التي تم اصطيادها من منطقة الغردقة بالبحر الأحمر. حيث اشتمل البحث على استعراض لتاريخ دراسة هذا الجنس منذ إكتشافه عام ١٩٥٤ ، ووصف تفصيلي للخصائص المورفولوجية والتشريحية للنوع الجديد. كما حددت العناصر التي تميز النوع الجديد من الأنواع الأخرى المشابهة من نفس الجنس. ويعد إكتشاف هذا النوع أول تسجيل للديدان من جنس نيوليبيدا بيدون من أسماك البحر الأحمر.