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## Binder 108, Heterophyidae P [Trematoda Taxon Notebooks]

Harold W. Manter Laboratory of Parasitology

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"THE GENUS PARASCOCOTYLE STUNKARD AND HAVILAND, 1924, IS REGARDED  
AS A SYNONYM OF PHAGICOLA FAUST, 1920."

MILLER AND HARKEMA, 1963

*Parascocotyle angeloi* (Travassos, 1928)<sup>1</sup>

Синонимы: *Aescotyle angeloi* Travassos, 1928; *Phagicola angeloi*  
(Travassos, 1928) Trav., 1929  
(Pac. 98)

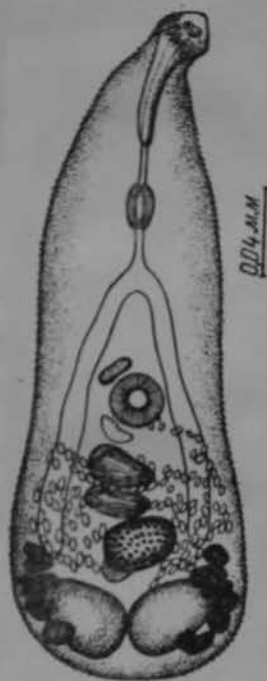
Дефинитивный хозяин: *Ardetta erythromelas*.

Локализация: кишечник.

Место обнаружения: Бразилия.

Описание вида (по Травассосу, 1928). Тело продолговатое, сплюснутое в передней части, 0,69—0,88 мм длины и 0,20—0,25 мм

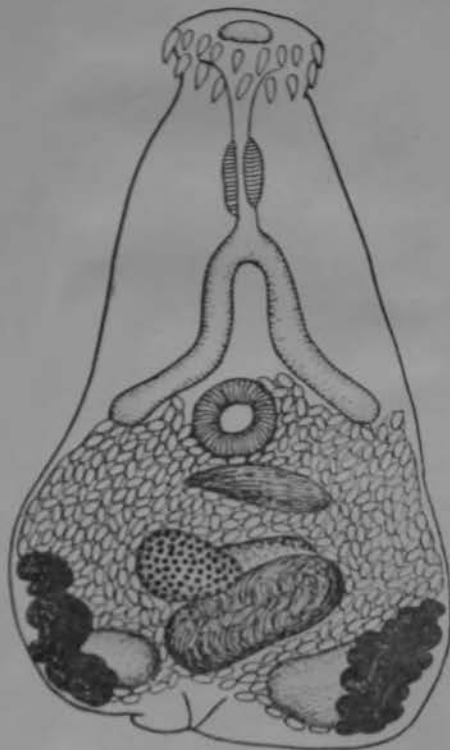
<sup>1</sup> Этот вид мы оставляем в роде *Parascocotyle* условно, так как, по описанию Травассоса, в околоротовой короне его представителей имеется два ряда щипов, а расположении кутикулярных щипов и матки такое же, как у представителей рода *Parascocotyle*.



Parascotyle angrense (Trav., 1916)

Syn: Ascocotyle angrense Travassoe, 1916  
(Fig. 96)

Hosts: Butorides striata, B. virescens,  
Ardetta erythromelas



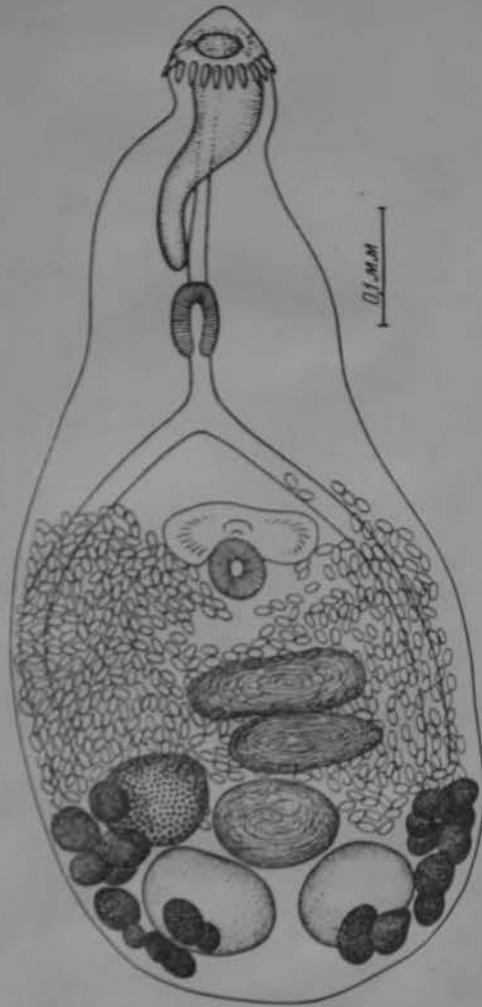
*Parascotyle arnoldi* (Travassos, 1928)

Синоним: *Ascotyle arnoldi* Travassos, 1928  
(Рис. 95)

Дефинитивные хозяева: *Diomedea melanophrys*, *Canis familiaris*, *Mus  
portugiesis* (экспериментально).

Локализация: кишечник.

Место обнаружения: Бразилия.



Дефицитивные хозяева: *Felis catus domesticus*, *Canis familiaris*.

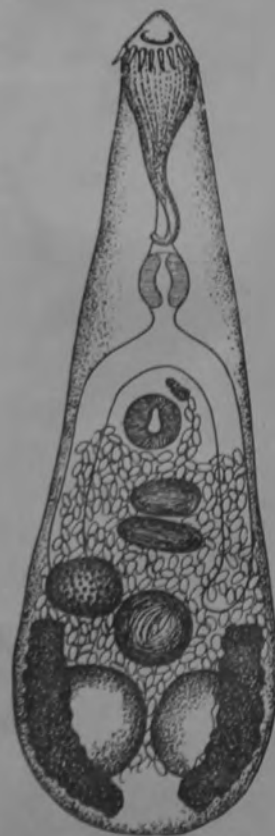
Дополнительные хозяева: *Tilapia simonis*, *T. galilea*.

Локализация: кишечник.

Место обнаружения: Палестина.

Описание вида (По Витебергу, 1929). Тело удлинненное, веретеновидное или грушеобразное, 0,5—0,7 мм длины и 0,1—0,3 мм ширины. Кутикула всего тела, за исключением самой задней части, покрыта мелкими чешуеобразными шипиками. Ротовая присоска кубковидная, 0,04—0,07 мм ширины; вперед от нее отходит дорзальный треугольный сосочек, а назад — длинный конический отросток, достигающий переднего края фаринкса. Ротовое отверстие окружено одним простым рядом (числом 16) больших шипов, достигающих 0,018—0,022 мм длины. Префаринкс 0,04—0,15 мм длины, фаринкс 0,02—0,04 мм в диаметре. Пищевод 0,009—0,018 мм длины. Кишечные ветви тянутся по бокам тела до уровня переднего края семиприемника. Семенники обычно шаровидные, 0,04—0,10 мм в диаметре, лежат один против другого в задней части тела. Большой семиприемник округлой формы лежит впереди семенников на медианной линии. Шаровидный или поперечно-овальный яичник 0,02—0,06 мм длины и 0,06—0,07 мм ширины лежит немного впереди и справа от семиприемника. Желточники представляют собою две продолговатые массы, лежащие по краям тела, недалеко от заднего конца; в передней части они заканчиваются, не доходя до уровня яичника. Семенные протоки впадают в семенной пузырек, расположенный между семиприемником и генитальным синусом. Семяизвергательный проток открывается в терминальную часть матки, как раз перед половым отверстием. Петли матки заполняют пространство между семенниками и половым отверстием. Генитальный синус лежит почти посередине тела, он заполнен брюшной присоской, достигающей 0,04—0,05 мм в диаметре. В левой стороне передней стенки генитального синуса имеется щель, в которую и открывается маленькое половое отверстие. Между ним и наружной генитальной порой помещается маленькая половая присоска овальной формы; она достигает по длинной оси; когда сокращается щель, половая присоска выдвигается наружу. Яйца 0,018 мм длины и 0,009 мм ширины.

Литература: Witeberg, 1929, стр. 194—197, 225.



*Parascocotyle italica* (Alessandrini, 1906)

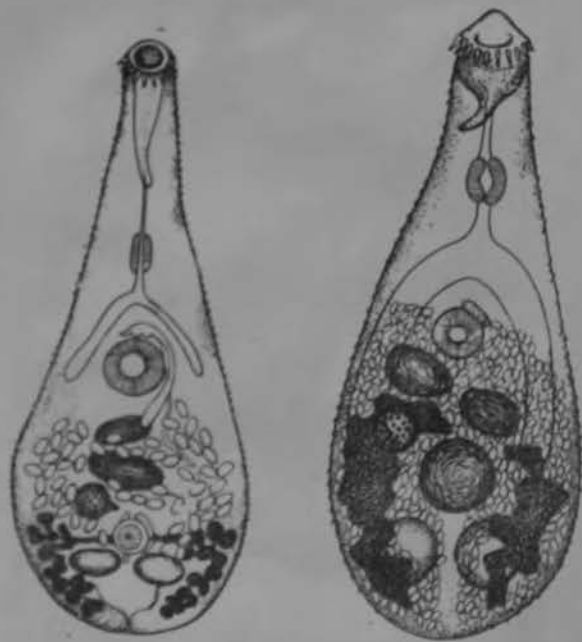
Синонимы: *Acanthocotyle italica* Alessandrini, 1906; *Echinostomum piriforme* Nicoll, 1923; *Phagicola italica* (Alessandrini, 1906) Price, 1932

(Рис. 99)

Дефинитивные хозяева: *Canis familiaris*, *Felis catus domesticus*.

Места обнаружения: Италия, Тунис, Палестина, СССР.

Описание (по Исачикову, 1925 и Витенбергу, 1929). Тело грушевидной формы, 0,7—1,23 мм длины и 0,2—0,4 мм ширины. Кутикула почти до заднего конца тела покрыта мелкими чешуеобразными шипиками, наиболее густо сидящими в передней части паразита. Ротовая присоска кубическая или слабо поперечно-овальная, 0,054—0,072 мм в поперечнике, снабжена направленным вперед сосочковидным треугольным дорзальным отростком. Задний конический отросток ротовой присоски короткий и заканчивается приблизительно на середине длины префаринкса. Передний край ротовой присоски снабжен одним простым венком прямых шипов. Префаринкс тонкий и довольно длинный. Фаринкс овальной формы, около 0,05—0,06 мм в диаметре. Пищевод короткий, 0,03—0,04 мм длины. Кишечные ветви широкие, тянутся по бокам тела за брюшную присоску до уровня переднего края семяприемника. Брюшная присоска шаровидная, 0,05—0,07 мм в диаметре. Семенники округлые или поперечно-овальные, расположены в задней части тела, один против другого, 0,072—0,135 мм в диаметре. Яичник шарообразный, 0,05—0,09 мм в диаметре, лежит впереди правого семенника. Семяприемник округлой формы и располагается на медианной линии немного позади яичника. Семенной пузырек большой, лежит между семяприемником и половым отверстием, которое открывается в дорзальной стенке генитального синуса в основании брюшной присоски и маленькой овальной



*Parascocotyle longa* (Ransom, 1920)

Синонимы: *Asocotyle longa* Ransom, 1920; *Metascocotyle witenbergi* Cuvier, 1933; *Phagicola longa* (Ransom, 1920), Price, 1932

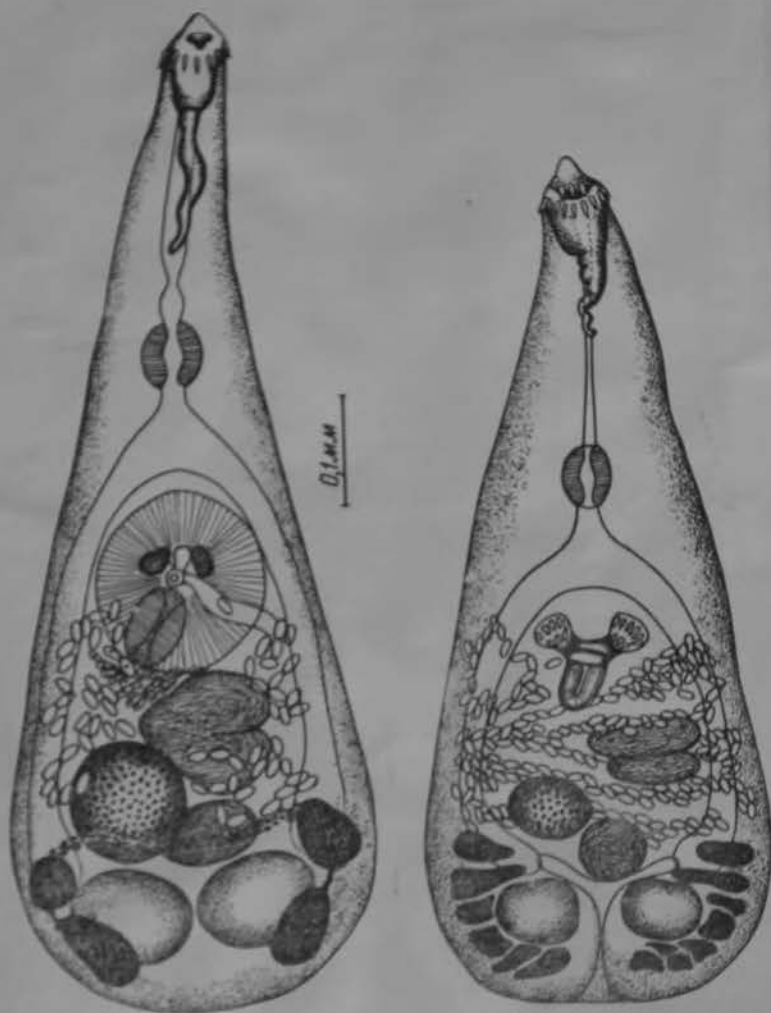
(Рис. 101)

Дефинитивные хозяева: кошка (*Felis catus domesticus*), собака (*Canis familiaris*), волк (*Canis lupus*), песец (*Vulpes lagopus*), коршун (*Milvus sp.*).

Дополнительные хозяева: рыбы — *Mugil cephalus*, *M. capito*, *Lichia sinia*, *Barbus canis*.

Локализация: взрослые — в тонких кишках окончательного хозяина; метацикории — в тканях рыб.

Места обнаружения: Северная Америка, Палестина, Румыния, СССР (Грузия).





Family HETEROPHYIDAE Odhner, 1914  
2. *Phagicola longa* (Ransom, 1920) Price, 1932

Fig. 1b

HOSTS: *Pelecanus occidentalis carolinensis* Gmelin, brown pelican; *Caumerodius albus egretta* (Gmelin), American egret, new host record; *Mugil cephalus* L., striped or black mullet, second intermediate host; *M. curema* Valenciennes, white or silver mullet, new second intermediate host record; *M. trichodon* Poey, fantail mullet, new second intermediate host record.

INCIDENCE OF INFECTIONS: Pelican 1 of 4; egret 8 of 12.

NUMBERS: Pelican 13; egret 1, 1, 1, 2, 4, 5, 5, 7.

LOCATION: Mostly in anterior 1/3 intestine.

LOCALITIES: Pelican — Gasparilla Sound, Charlotte Harbor, Florida, new locality record; egret — Boca Ciega Bay, Florida, new locality record.

DATES: Pelican — June 19, 1958; egret — April 29, May 8, 9, 19, 19, 21, 26, June 3, 1958.

U. S. NAT. MUS. HELM. COLL. NO.: 39004.

*Discussion.* Ransom (1920) described *Ascocotyle longa* from the Alaskan fox, *Vulpes lagopus*. Witenberg (1929) raised the subgenus *Parascocotyle* Stunkard and Haviland, 1924, to generic rank and included *Ascocotyle longa* in this genus. Price (1932) regarded *Phagicola* Faust, 1920, and *Parascocotyle* synonymous. Hutton and Sogandares (1958) considered *Ascocotyle* Looss, 1899, *Parascocotyle* Stunkard and Haviland, 1924, and *Phagicola* Faust, 1920, as valid genera and presented a key for separating them. The species reported here was retained in the genus *Phagicola*. Witenberg (1929) recorded *Parascocotyle longa* from Palestinian dogs and cats and in a jar labelled "*Cotylogonimus persicus* from the Persian wolf (No. 3935)." *Mugil cephalus*, *M. capito*, *Lichia amia*, and *Barbus canis* were listed as secondary hosts in Palestine by Witenberg (*loc. cit.*). Price (1935) states: "... the writer regards the forms described by Ransom from the United States, by Witenberg from Palestine, and by Ciurea from Roumania as representing a single species." Dawes (1956) lists the dog, cat, fox and black kite as hosts for *Phagicola longa*. Hutton (1957) identified *P. longa* from white rats, opossums, cats and raccoons which had been fed mullet (*Mugil cephalus* and *M. curema*) from Florida waters. Metacercariae of *P. longa* were found in the fish hearts. The specimen shown in Figure 1b was from a naturally infected American egret. The following measurements were made from living specimen taken from the intestine of a opossum and placed under slight cover glass pressure; body length 630-720, maximum body width 252-270, diameter of oral sucker 40-44, pharynx width 42-50, diameter of ventral sucker 52, ovum 18 x 10. Figure 1b does not show the cuticular spines. These spines cover the body with the exception of a narrow postoral zone and the extreme posterior end of the body.



FROM HUTTON + SOGANDARES-  
BERNAL, 1960

*Parascotyle minuta* (Looss, 1899).

Синоним: *Ascotyle minuta* Looss, 1899; *Parascotyle diminuta* Stankard et Haviland, 1924

(Par. 94)

Дефинитивные хозяева: *Canis familiaris*, *Felis catus domesticus*, *Ardea cinerea*, *Milvax migrax*, *Rattus norvegicus*.

Дополнительные хозяева: рыбы.

Места обнаружения: Египет (Каир), Александрия, Аляска.

Описание вида (по Рansomу, 1920). Тело грушевидное, около 0,5 мм длины и 0,022 мм ширины. Ротовая присоска около 0,040 мм в диаметре. Около рта имеется один ряд шипов; количество их 18—20; дорзальные шипы достигают 0,013 мм длины, вентральные — 0,012 мм. Задний конический отросток ротовой присоски слегка извитой и достигает 0,050—0,060 мм длины. Рот открывается субтерминально. Префаринкс 0,05—0,06 мм длины. Фаринкс цилиндрический, 0,041 мм длины и 0,021 мм ширины, лежит в задней части шейки, неподалеку от бифуркации кишечника. Пищевод очень короткий (0,020—0,025 мм). Кишечные ветви короткие, но заходят за задний край брюшной присоски. Брюшная присоска лежит медианно в пределах второй трети длины тела от переднего конца и достигает 0,038—0,049 мм в диаметре. Генитальное отверстие расположено впереди брюшной присоски. Генитальный синус небольшой, поперечно-продолговатый. Семенники поперечно-овальные, лежат в задней части тела и достигают 0,020—0,030 мм ширины и 0,019—0,024 мм длины. Яичник округлый или овальный, приблизительно таких же размеров, как и семенники, и располагается впереди последних. Семяприемник довольно крупный, лежит в медианном поле немного позади яичника и впереди семенников. Желточники состоят из немногих фолликулов и расположены в латеральных полях на уровне семенников. Матка образует поперечные петли, пересекающие тело 4—5 раз, и не заходит вперед брюшной присоски.

Яйца с толстой оболочкой, желтовато-коричневого цвета, 0,023—0,024 мм длины и 0,012—0,014 мм ширины. Экскреторный пузырь большой; его медианный ствол проходит между семенниками и впереди них делится на две собирающие ветви.

Литература: Looss, 1899, стр. 585, 698—699, 700, 701; Looss, 1901, стр. 205; Faria, 1910, стр. 287; Railliet and Henry, 1913, стр. 930; Travassos, 1916, стр. 4; Hall and Wigdor, 1918, стр. 273; Ransom, 1920, стр. 532, 538; Nicoll, 1923, стр. 150—252; Сербин К. В., 1923, стр. 4; Viana, 1924, стр. 134, 157; Ciurea, 1924, стр. 14, 17; Stankard and Haviland, 1924, стр. 3, 4—5; Dollfus, 1925, стр. 192—194; Исачинков, 1925; Witenberg, 1929, стр. 188—189, 225; Ciurea, 1933; Sprehn, 1932, стр. 251; Neveu-Lemaire, 1936.



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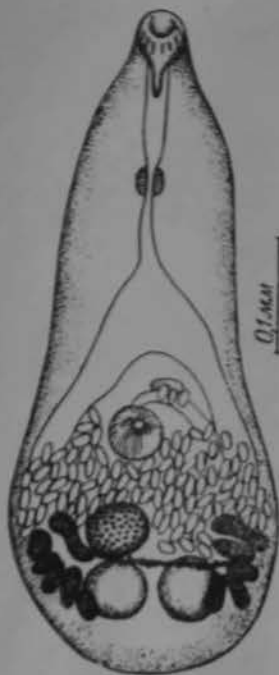
*Parascotyle minuta* Loos  
after Looss  
Сам. Прев., 1922.

*Paraxocotyle nana* (Ransom, 1920)

Синоним: *Axocotyle nana* Ransom, 1920

(Рис. 100)

Дефинитивный хозяин: *Vulpes lagopus*.  
Локализация: кишечник.  
Место обнаружения: Аляска.



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*Parascotyle pithecofagicola* (Faust, 1920)

Синонимы: *Phagicola pithecofagicola* Faust, 1920; *Ascocotyle pithecofagicola* (Faust, 1920); Faust et Nishigori, 1926; *Ascocotyle (Phagicola) pithecofagicola* (Faust, 1920) Travassos, 1930

(Рис. 103)

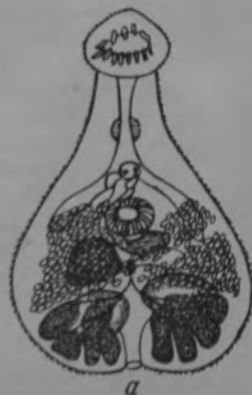
Дефинитивный хозяин: *Pithecofaga jefferyi*.

Локализация: кишечник.

Место обнаружения: Филиппинские острова.

Описание вида (по Прайсу, 1935). Тело грушевидное, 0,340—0,578 мм длиной и 0,212—0,252 мм ширины. Передний конец снабжен треугольным дорзальным сосочком, направленным вперед. Кутикула покрыта мелкими шипиками от переднего до заднего конца тела (задний край свободен от шипов). Ротовая присоска коническая, задняя вершина ее лежит в передней части фаринкса. Рот окружен одним рядом шипов в количестве 12 штук; каждый шип достигает 0,020 мм длины. Префаринкс тонкий и довольно длинный. Фаринкс 0,040 мм длины и 0,024 мм ширины. Пищевод очень короткий. Кишечные ветви тянутся до уровня заднего края брюшной присоски. Экскреторное отверстие терминальное; экскреторный пузырь — как у всех гетерофинд. Половое отверстие медианное, открывается впереди брюшной присоски; имеется генитальный синус, содержащий два овальных половых сосочка (гонотила). Семенной пузырек S-образный, тянется назад по медианной линии до уровня переднего края яичника. Семенники овальные, 0,040—0,050 мм длины и 0,064—0,068 мм ширины, лежат в задней части тела, неподалеку от заднего края. Яичник шаровидный или овальный, 0,024—0,040 мм длины и 0,040—0,060 мм ширины, расположен впереди правого семенника. Семяприемник шаровидный, лежит медианно от яичника. Желточники лежат латерально в зоне семенников, каждый состоит из шести крупных овальных фолликулов. Матка впереди семенников, состоит из шести поперечных петель. Яйца 0,020 мм длины и 0,010 мм ширины.

Литература: Faust, 1920, стр. 630—631; Faust, 1926, стр. 83, 123; Faust and Nishigori, 1926, стр. 92, 93; Poche, 1925, стр. 153; Witenberg, 1929, стр. 226; Price, 1932, стр. 88; Price, 1935, стр. 70—73.



*Parascocotyle sinocicum* Ciurea, 1933

(Рис. 104)

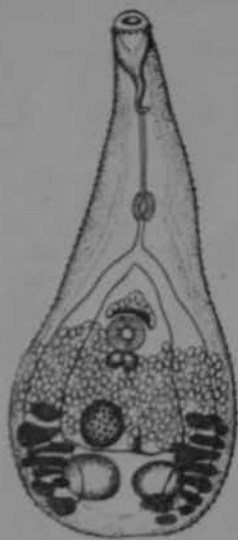
Дефинитивный хозяин: собака (*Canis familiaris*).

Дополнительные хозяева: *Mugil cephalus*, *M. capito*.

Локализация: кишечник.

Место обнаружения: Румыния.

Описание вида (по Циуреа, 1933). Тело грушевидное, 0,58—0,98 мм длины и 0,25—0,36 мм ширины. Кутикула покрыта мелкими шипами, которые особенно многочисленны в передней части до уровня брюшной присоски и все более редки в задней половине тела. Ротовая присоска вытянута вперед, 0,066—0,088 мм длины и 0,044—0,077 мм ширины; от нее отходит мускулистый отросток, 0,090—0,121 мм длины и 0,022—0,044 мм ширины. Около переднего края этой присоски имеется одна корона окolorотовых шипов в количестве 19—22. Длина шипов 0,019 мм и ширина 0,004 мм; на брюшной стороне посередине — три шипа меньше (0,017 × 0,004 мм). Из 27 экземпляров 16 имели по 19 околоротовых шипов, 6 экземпляров — 20 шипов, 4 экземпляра — по 21 шипу и 1 экземпляр —



## Fam. Heterophyidae Odhner, 1914

*Parnascyle* sp. — metacercariae (Fig. 3h) MORAVEC et BARUS, 1970

Host: *Gambusia pinnatus* Poey, *Giardinia metallica* Poey, *Cichlasoma* sp.  
Location: encysted in body cavity.

Locality: Laguna del Torero — Zapata (provincia Las Villas).

Out of 15 *G. pinnatus* found in 2 (intensity of infection 1 and 2 cysts), of 30 *metallica* in 1 (intensity of infection 2 cysts), and of 3 *Cichlasoma* sp. in 1 (2 cysts).

Description: Globular, transparent cysts measuring 0.313–0.372 × 0.272–0.286 mm, wall thickness 0.046 mm. Body of liberated metacercaria 0.276–0.282 mm long, maximum width 0.150 mm. Funnel-shaped oral sucker measuring 0.039 × 0.030 mm, provided with a row of about 5 spines. Acetabulum, measuring 0.048 × 0.039–0.042 mm, situated post-equatorially. Short prepharynx, oval pharynx (0.042 × 0.021 mm) and esophagus present. Caeca extending somewhat over the posterior edge of acetabulum. Testes (0.060–0.066 × 0.030 mm) situated symmetrically at the end of body, ovary (0.051 × 0.036 mm) medially just anterior to testes, anal gonotyl anterior to acetabulum.

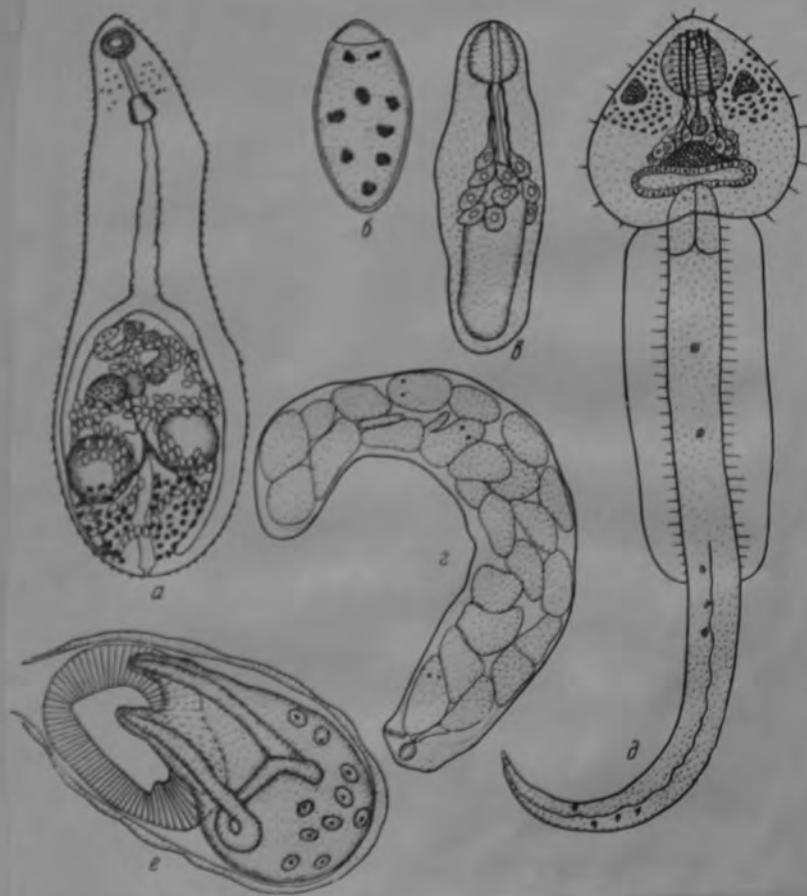


PARASCOOTYLE

Хозяин: *Gallus gallus domesticus* (экспериментально).

Место обнаружения: США (Южная Калифорния).

Описание вида (по Мартину, 1950). Тело удлиненой формы, длиной 0,48—0,868 мм при максимальной ширине 0,149—0,298 мм на уровне гонад. У экземпляра длиной 0,48 мм уже началось продуцирование яиц. Между ротовой присоской и уровнем фаринкса могут существовать остатки глазков. Ротовая присоска круглая, субтерминальная, диаметром в среднем около 0,039 мм. Префаринкс узкий, трубчатый, длиной 0,021—0,099 мм. Фаринкс цилиндрический или шаровидный, длиной 0,032—0,035 мм при ширине 0,021—0,032 мм. Пищевод очень длинный (в 2—5 раз длиннее префаринкса), достигающий 0,113—0,230 мм, слегка расширяющийся сзади. Брюшная присоска размером 0,031—0,033 × 0,023—0,026 мм лежит медианно относительно гонотили. Гонотиль грушевидный, со слабо развитыми мышцами, достигающий 0,046—0,059 × 0,028—0,038 мм, с неглубоким склеротизированным образованием в форме V без какого-либо иного вооружения. Вентро-генитальный синус принимает в себя короткий половой атриум, образующийся от соединения семизвергательного канала и терминальной части матки с противоположной от гонотили стороны. Правый семенник несколько позади левого и заметно крупнее его, достигая 0,053—0,124 × 0,064—0,124 мм, тогда как размер левого равен лишь 0,050—0,099 × 0,056—0,113 мм. *Vasa efferentia* соединяются в коротком *vas deferens*, который входит в большой, тонкостенный, состоящий из двух отделов, семенной пузырек, обычно согнутый пополам. Терминальная часть мужского протока со слегка вздутой простатической частью. Яичник гладкий, овальной формы, размером 0,036—0,064 × 0,041—0,085 мм; он расположен приблизительно на середине расстояния между правым семенником и гонотилем. Яйцевод





*Stictodora magnispina* sp. nov.

(рис. 4, а, б)

Belopolskaya, 1968

Хозяин: булчи-фифи — *Tringa glareola* L.

Локализация: тонкая кишка.



Рис. 4. *Stictodora magnispina* sp. nov. на кулика-фифи

а — типовой экземпляр; б — генитальный синус с шипами

позади половых желез и частично прикрывает их. Яйца очень многочисленны, размером  $0,022-0,024 \times 0,013-0,014$  мм.

Размеры паратизов. Длина тела  $0,459-0,504$  мм, ширина  $0,199-0,210$  мм, ротовая присоска  $0,037-0,045 \times 0,043-0,045$  мм, предглотка  $0,054-0,059$  мм, глотка  $0,021 \times 0,027$  мм, пищевод  $0,037-0,038$  мм.

Дифференциальный диагноз. Внешне описываемый вид *S. magnispina* отличается от всех известных до настоящего времени видов этого рода вооружением половой присоски, состоящим из 8 крупных шипов.

Тип вида хранится в Зоологическом институте АН СССР.

Место и время обнаружения: поселок Рыбачий, Куршская коса, Калининградской обл., 28.V 1958.

Частота встречаемости: у одного взрослого на 29 вскрытых, найдено 5 экз.

Описание вида (типовой экземпляр). Тело грушевидной формы, заострено к переднему концу, сплошь покрыто мелкими шипиками. Длина тела  $0,449$  мм, ширина на уровне яичника  $0,183$  мм. Ротовая присоска субтерминальна, ее размер  $0,033 \times 0,039$  мм, длинная предглотка  $0,054$  мм, глотка  $0,018 \times 0,025$  мм, пищевод короткий,  $0,029$  мм длины, ветви кишечника идут до заднего края тела и заворачиваются к медианной линии. Брюшную присоску обнаружить не удалось. Семенники лежат наискось, они едва заметны, семенной пузырек находится перед яичником, подразделен ли он на части, не видно. Из полового отверстия высовываются крупные шипы,  $0,029$  мм длины, четыре из них лежат розеткой, а другие четыре сложены вместе (рис. 1, б).

Яичник находится справа, позади генитального синуса, семенеприемник имеется, желточники расположены типично для рода *Stictodora*, помещаются вентрально позади семенников. Матка занимает все пространство

прикрывает их. Яйца очень многочисленны, размером  $0,022-0,024 \times 0,013-0,014$  мм.

Размеры паратизов. Длина тела  $0,459-0,504$  мм, ширина  $0,199-0,210$  мм, ротовая присоска  $0,037-0,045 \times 0,043-0,045$  мм, предглотка  $0,054-0,059$  мм, глотка  $0,021 \times 0,027$  мм, пищевод  $0,037-0,038$  мм.

Дифференциальный диагноз. Внешне описываемый вид *S. magnispina* отличается от всех известных до настоящего времени видов этого рода вооружением половой присоски, состоящим из 8 крупных шипов.

Тип вида хранится в Зоологическом институте АН СССР.

PARASTICTODORA

*Phagicola* Faust, 1920

Syn. *Parascocotyle* Stunkard et Haviland, 1924

Generic diagnosis. — Heterophyidae, Ascocotylinae: Body small, pyriform, spinose, with dorsal lip extending anterior to oral sucker. Oral sucker subterminal, with a single crown of spines, produced backward into a cone. Prepharynx long, pharynx well developed, esophagus short, ceca short or half-long, may or may not surpass acetabulum. Acetabulum rather small, included in genital atrium, in middle third of body. Testes symmetrical or nearly so at posterior extremity. Seminal vesicle bipartite, post-acetabular. Genital atrium may contain gonotyls, opening immediately in front of acetabulum. Ovary round, anterior to right testis. Receptaculum seminis globular, median, posteromedial to ovary. Laurer's canal? Uterus coiled between testes or posterior extremity and genital atrium, not extending further ahead; eggs very small. Vitellaria consisting of small number of large follicles confined to lateral area in ovario-testicular zone or mainly in posttesticular zone. Excretory vesicle Y- or T-shaped. Intestinal parasites of mammals and birds. *Metascocotyle* Ciurea, 1933, is regarded as a subgenus of this genus.

Genotype: *P. pithecophagica* Faust, 1920 (Pl. 90, Fig. 1086), in *Pithecophaga jefferyi*, Philippines.

Representatives from avian hosts.

- P. angeloi* Travassos, 1929, in *Ardetta erythromelas*; Brazil.  
*P. angrensis* Trav., 1916, in *Butorides striata*, *B. virescens*, *Ardetta erythromelas*, *Phalacrocorax caudimaculatus*; Brazil.  
*P. arnoldoi* Trav., 1928, in *Diomedea melanophrys*, *Canis familiaris* and *Mus norvegicus*; Brazil.  
*P. diminutus* (Stunkard et Haviland, 1924) in *Butorides* sp.; Puerto Rico — Price (1932).  
*P. intermedius* Srivastava, 1935, in *Haliaeetus leucoryphus*; India.  
*P. longus* (Ransom, 1920) in pelican; Nat. Zoo, Wash. D. C.; *Milvus migrans*; Egypt. Also in *Vulpes*, *Lutra*, cat, dog; metacercaria in *Mugil*, *Lichia* and *Barbus* — Witenberg (1929).  
*P. minutus* (Looss, 1899), syn. *Parascocotyle m.* (Looss) Stunkard et Haviland, 1924, in dogs and cats; Cairo, and *Ardea cinerea*; Damietta.  
*P. byrdi* Robinson, 1956, in *Cathartes aura*; Georgia.  
*P. macrostomus* Robinson, 1956, in *Cathartes aura*; Georgia.

*Phagicola* Faust, 1920

Generic diagnosis. — See p. 704.

Representatives from mammals:

- P. (P.) arnoldi* Travassos, 1929, in *Canis familiaris*, *Mus norvegicus*, Brazil. Also in *Diomedea melanophrys* (Aves).
- P. (P.) ascologus* (Witenberg, 1929) Travassos, 1930, in *Canis familiaris*, *Felis catus dom.*; *Tilapia simonis*, *T. galilea*; Egypt, Palestine.  
Metacercaria in *Tilapia simonis* and *T. galilea*; Jerusalem.
- P. (P.) diminutus* (Stunkard et Haviland, 1924), regarded by Witenberg as a synonym of *Ascocotyle minuta* (Looss, 1899), in *Rattus norvegicus*; U.S.A.  
Metacercaria encysted in *Fundulus heteroclitus*, fed to rats, mice, hamsters, *Larus argentatus* and *Nycticorax nycticorax* with positive results — Stunkard and Uzmann (1955).
- P. (P.) italicus* (Alessandrini, 1906) Travassos, 1930 in *Canis familiaris*; Italy, Jerusalem, Egypt. Occasionally in cat.
- P. (P.) lageniformis* Chandler, 1941, in muskrat; U.S.A. Natural infections of metacercariae were found in gills of *Fundulus pallidus*; Texas. Experimental feedings of infected gills to hatchery-raised chicks yielded egg-producing adults after 48 hours — Martin (1953).
- P. (P.) longicollis* Kunz et Chandler, 1956, in domestic cat; Egypt.
- P. (P.) minutus* (Looss, 1899), syn. *Parascocotyle m.* (Looss), Stunkard et Haviland (1924), in dog and cat; Egypt. Also in *Ardea cinerea*, *Milvus migrans aegyptius*; Damietta.
- P. (P.) nanus* Ransom, 1920, in *Vulpes lagopus* and *Sula bassana*; National Zoological Park, Washington. Also in *Ondatra rasilata*; U.S.A.
- P. (Metascocotyle) longus* Ransom, 1920, in *Vulpes lagopus*; National

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## SYSTEMA HELMINTHUM

- Zoological Park, Washington. Also in *Vulpes fulva*, Canada; *Lutra ripanda* in N. America and Panama; in cats and dogs, Egypt, Palestine; *Milvus migrans*, Egypt. *Mugil*, *Lichia* and *Barbus* as vectors — Witenberg (1929).
- P. (M.) piriiformis* (Blanc et Hedin, 1913), syn. *Echinostoma p. B. et H.*; syn. of *italica* (Aless.) — Morosov (1952), in dog; Montpellier.
- P. (M.) sinodcum* (Ciurea, 1933) in dog fed with *Mugil* spp.; Rumania.
- P. (M.) witenbergi* Ciurea, 1933 (Pl. 92, Fig. 1110), for *Parascocotyle longa* (Ransom) of Witenberg, 1929, syn. of *longa* (Ransom) — Morosov (1952), in dog fed with *Mugil capito*; Rumania.  
Metacercaria in *Mugil cephalus*, *M. capito*, *Lichia amia* and *Barbus canis*; Palestine — Witenberg (1929).

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VARIATION IN THE NUMBER OF ORAL SPINES OF *PHAGICOLA LONGICOLLIS* KUNTZ AND CHANDLER, 1956, AND THE DESCRIPTION OF *P. INGLEI* N. SP. (TREMATODA: HETEROPHYIDAE)\*

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During the course of investigations on a species of *Phagicola* from *Mugil cephalus* L., the Striped Mullet, and *M. curema* Cuvier & Valenciennes, the White Mullet, we have had the opportunity to examine numerous specimens of *Phagicola longicollis*. Through the courtesy of Allen McIntosh, Parasitologist, Animal Disease and Parasite Research Branch, U. S. Department of Agriculture, the type slide, U. S. National Museum Helminthological Collection No. 38169, was obtained. This slide contains a number of specimens of *P. longicollis* (Fig. 1), two *P. ascolonga* (Witenberg, 1929) Price, 1932, and several *Heterophyes heterophyes* (Siebold, 1852) Stiles & Hassall, 1900. *Phagicola longicollis* can be readily separated from the 2 specimens of *P. ascolonga* by the fact that in the former the uterus never extends posteriorly beyond the testes while in the latter the uterus always extends beyond the testes. Other differences include shape of body, structure of gonotyl, and posterior extent of the oral appendage.

We observed, on the type slide, some specimens (syntypes) of *P. longicollis* with 14, others with 15, and three with 16 oral spines in a single row. Some damaged specimens had less than 14 oral spines. The original description of this species by Kuntz and Chandler (1956) states: "... Mouth surrounded by single circle of 14, sometimes 15, spines, ..." The late Dr. A. C. Chandler, in a personal communication (1957), stated: "... I counted the oral spines on several dozen specimens of *Phagicola longicollis* and found 14 in most, 15 in some, and thought I counted 16 in a few, but decided I had made an error. However, it is quite possible that there is a variation from 14 to 16 in this species, so some of the specimens on which you found 16 spines may belong to this species. ..."

Dr. Chandler kindly sent us most of his specimens of *P. longicollis* and *P. ascolonga* for examination. Included in this material were specimens of a species of *Phagicola* that were obviously not *P. ascolonga*. Except for 1 specimen (Fig. 3) having a coronet of 17 oral spines in a single row and others having 16 oral spines they conform with the original description of *P. longicollis*.

We feel, therefore, from the observations stated above, the description of *P. longicollis* should be expanded to include a variation of from 14 to 17 oral spines.

Stunkard and Urmann (1955) discuss the *Ascocotyle-Phagicola* complex. They conclude, "Decision on the taxonomic status of *Phagicola* should await more complete information, especially on the developmental stages of its members." Additional information may show that *Phagicola* is not a valid genus. However, it has

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\*\* Contribution No. 13.

been the practice of some workers (Chandler, 1941; Kuntz and Chandler, 1956; Robinson, 1956) to describe several species under the generic name of *Phagicola*. They evidently separated *Phagicola* from *Ascocotyle* because the former had a single row or an incomplete second row of oral spines, body incompletely spined and vitellaria not extending forward beyond the level of the ovary, while the latter has 2 complete rows of oral spines, body completely spined and vitellaria extending forward anterior to the level of the ovary. We choose to follow the above practice of separating *Phagicola* from *Ascocotyle*, at least until the taxonomic status of *Phagicola* is accurately determined.

While examining the slides sent to us by Dr. Chandler one of us (RFH) observed 1 specimen of a species of *Phagicola* very closely related to *P. longa* (Fig. 2) and *P. longicollis*. It differs in a number of characteristics from either *P. longa* or *P. longicollis*. Because of this we considered it an undescribed species for which we propose the name of *P. inglei*. The name *inglei* is in honor of R. M. Ingle, Director of Research, Florida State Board of Conservation, in recognition of his foresight in establishing a marine parasite and disease program at our Laboratory.

*Phagicola inglei* n. sp.

(Figs. 4-10)

(All measurements in microns)

*Host*: Domestic dog.

*Location*: Small intestine.

*Locality*: Streets of Cairo, Egypt.

*Date of Collection*: December 8, 1953.

*Holotype*: U. S. Nat. Mus. Helm. Coll. No. 38390.

*Diagnosis* (Based on a single specimen): *Phagicola sensu stricto*: Body shaped like elongated sack, tapering gradually towards anterior end. Cuticle spiny, except for narrow band immediately posterior to oral sucker and extreme posterior part of body. Length 1132; maximum width 373. Anterior end of oral sucker with rounded lip. Single row of 19 spines surrounding mouth; spines approximately 17 to 22 long with oval bases and curved tips. Oral sucker 68 in diameter with elongated oral appendage about 227 long, extending 282 from anterior end of body or approximately 7/8 distance to pharynx. Pharynx 64 long by 55 wide, located approximately 1/3 distance from anterior end of body. Esophagus about 126 long. Ceca about twice diameter of esophagus, extending posteriorly beyond level of acetabulum where they are no longer visible (possibly the result of overclearing of specimen and occlusion by eggs and other internal structures). Acetabulum rounded, about 68 long by 72 wide; located about 2/3 distance from anterior end of body. Genital pore a transverse slit-like opening immediately anterior and median to acetabulum. Lobes of gonotyl not visible. Testes 108 to 120 long by 79 to 82 wide; side by side near posterior end of body. Ovary about 105 long by 88 wide; anterior to dextral testis. Seminal vesicle large, median, posterior to acetabulum. Seminal receptacle indistinct, anterior to testes and sinistral to ovary. Vitellaria follicular, 6 to 8 follicles on each side of body, lateral around outer border of testes; extending from behind testes to anterior border of ovary. Uterus occupying area from anterior border of testes and vitellaria to immediately behind acetabulum in 3 to 4 transverse loops. Eggs 25 to 28 long by 12 to 14 wide. Excretory vesicle not observed.

DISCUSSION

Stunkard and Uzmann (1955) have questioned the validity of the genus *Phagicola* Faust, 1920, and have discussed their view in detail. Price (1932, 1935) has retained *Phagicola* Faust, 1920, and maintains that this genus differs from *Ascocotyle* Looss, 1899 by possessing a single crown of oral spines as compared with 2 complete rows of oral spines in *Ascocotyle*. Stunkard and Uzmann (1955) have rightly questioned Price's (1935) reasoning. *Phagicola angrense* (Travassos, 1916) Price, 1932; *P. diminuta* (Stunkard and Haviland, 1924) Price, 1932; and *P. lageniformis* Chandler, 1941, all possess, in addition to a complete anterior row of crown spines, 2 accessory spines which are dorsally located behind the first row of

spines, and which definitely form an incomplete partial row. *P. nama* (Ransom, 1920) Price, 1932 also possesses an incomplete posterior dorsal row of crown spines, but instead of 2 there are 3 to 4 accessory spines. Stunkard and Haviland (1924) named the sub-genus *Parascocotyle* for *Ascocotyle* (*Parascocotyle*) *diminuta*. These authors were apparently unaware of Faust's (1920) genus *Phagicola*. The original description of *P. diminuta* made no mention of 2 accessory spines in the posterior crown. Stunkard and Urmann (1955) later corrected this *lapsus*. Witenberg (1929) elevated *Parascocotyle* to generic status on the basis of the vitellaria extending anterior to the ovary in *Ascocotyle* species, and restricted behind the ovary in the former genus. Price (1932) clarified the error in the original description of the gonotyl of *P. pithecofagica* and considered *Ascocotyle* (*Parascocotyle*) *diminuta* in the genus *Phagicola*. He not only synonymized *Parascocotyle* with *Phagicola*, but in 1935 considered *Metascocotyle witenbergi* Ciurea, 1933, type species, a synonym of *Phagicola longa* (Ransom, 1920) Price, 1932. *Metascocotyle* Ciurea, 1933, is definitely a synonym of *Phagicola* Faust, 1920. Ciurea (1933) was misled by Ransom's (1920) description of the gonotyl in *Ascocotyle longa* Ransom, 1920. Until life cycle studies prove differently, we prefer to retain the genera *Ascocotyle* Looss, 1899, *Phagicola* Faust, 1920, and *Parascocotyle* Stunkard and Haviland, 1924.

The following key will serve to separate these genera.

1. Vitellaria extending as far forward as acetabulum; with two complete rows of oral spines ..... *Ascocotyle*, sensu stricto
- 1.—Vitellaria extending forward only to ovary, never beyond; never with two complete rows of oral spines ..... 2
2. With a single complete row of oral spines ..... *Phagicola*, sensu stricto
- 2.—With a single complete row of oral spines and an incomplete second row of from 2 to 4 accessory spines ..... *Parascocotyle*, sensu stricto

The name *Parascocotyle* Stunkard and Haviland, 1924 is available with *P. diminuta* Stunkard and Haviland, 1924 as type species, in spite of the fact that the authors' definition of the sub-genus was different from our views as presented in the key above. Since Stunkard and Urmann (1955) have indicated the presence of accessory spines in the oral crown of *P. diminuta*, and we wish to group together the species with accessory spines and vitellaria not extending anteriorly past the ovary, the name *Parascocotyle* must be used by reason of priority. We have obtained specimens of *P. diminuta* by feeding the gills of naturally infected Floridian *Fundulus similis* to hamsters.

According to the systematic scheme presented above, the following species would be included in the genus *Ascocotyle* Looss, 1899: *A. angeloi* Travassos, 1928, *A. coleostoma* (Looss, 1896) Looss, 1899 (type species); *A. filippei* Travassos, 1928; *A. intermedius* Srivastava, 1935; *A. leighi* Burton, 1956; *A. mcintoshii* Price, 1936; *A. megaloccephala* Price, 1932; *A. puertoricensis* Price, 1932; and *A. tennicollis* Price, 1935.

Under our system the following species would be included in the genus *Phagicola* Faust, 1920: *P. arnaldi* (Travassos, 1929) Price, 1932; *P. azcolonga* (Witenberg, 1929) Price, 1932; *P. byrdi* Robinson, 1956; *P. italica* (Alessandrini, 1906) Price, 1932; *P. longa* (Ransom, 1920) Price, 1932; *P. longicollis* Kuntz and Chandler, 1956; *P. macrostomum* Robinson, 1956; *P. minuta* (Looss, 1899) Price, 1932; *P. piriforme* (Blanc and Hedin, 1913) Price, 1932; and *P. pithecofagica* Faust, 1920 (type species).

The following species would be included in this system under the genus *Parascotyle* Stunkard and Haviland, 1924: *P. angrense* (Travassos, 1916); *P. diminuta* Stunkard and Haviland, 1924 (type species); *P. lageniformis* (Chandler, 1941); and *P. nama* (Ransom, 1920).

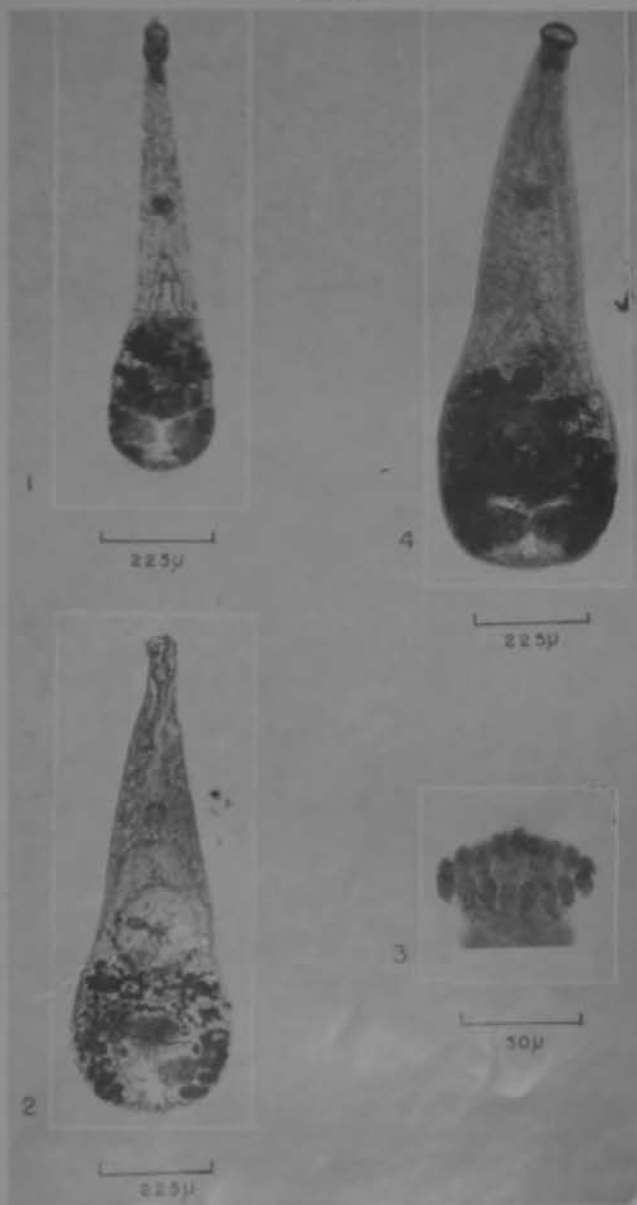
*Phagicola inglei* appears to be most closely related with *Phagicola longa* (Ransom, 1920) Price, 1932. Witenberg (1929) and Martin (1953) have indicated that the oral appendage of *Phagicola ascolonga* and *Parascotyle lageniformis* respectively, may extend to anterior margin of the pharynx or beyond. Although the significance of the relationship of the oral appendage with the pharynx is questionable, we would like to indicate that in the holotype of *P. inglei* and the syntypes of *P. longa*, of which the anterior end of the body appears to be equally relaxed, the oral appendage almost comes into contact with the pharynx in *P. inglei* as compared with oral appendage almost halfway to pharynx in the other species. The pharynx of *P. inglei* is located less than one-third of the body length from the anterior end while that of *P. longa* approaches the midbody. The vitellaria of *P. inglei* extend to the anterior border of the ovary while they are restricted behind the ovary of *P. longa*. *P. inglei* possesses 19 very heavy crown spines which are hooked at the tips as compared with 15-18 lighter, straight spines in the syntypes of *P. longa*. The esophagus of *P. inglei* is proportionately about 3 times longer, the eggs (Fig. 7) twice the length and diameter of those (Fig. 10) of the syntypes of *P. longa*. One of us (Hutton, 1957) reported *P. longa* from the mullet (*Mugil cephalus* and *M. curema*). Adult worms were obtained from laboratory-raised white rats fed on mullet. Since that time we have been able to obtain a species of *Phagicola* by feeding naturally infected mullet to hamsters, pelicans, chickens, mink, kittens, herons, and opossums reared in the laboratory. We consider these worms sufficiently similar to *P. longa* so as to be regarded as the same species. Although we have examined several thousand specimens of this species we have not observed a single specimen which could be confused with the holotype of *P. inglei*.

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## PLATE I

EXPLANATION OF PLATE I  
(All Photomicrographs)

- FIGURE 1. Adult, *Phagicola spiralis* Kuntz and Chandler, 1956, ventral view.  
 FIGURE 2. Adult, *P. longi* (Ransom, 1930) Price, 1952, ventral view of syntype.  
 FIGURE 3. Mouth of *P. longi* surrounded by a coronet of seventeen spines, ventral view.  
 FIGURE 4. Adult, *P. moldanii* sp. n., ventral view of holotype.

## PLATE II



(All figures drawn with aid of camera lucida.)

- FIGURE 5. *P. inglei* n. sp., showing coronet of nineteen oral spines, ventral view of holotype.  
 FIGURE 6. Adult, *P. inglei* n. sp., ventral view of holotype.  
 FIGURE 7. Eggs of *P. inglei* n. sp. from holotype.  
 FIGURE 8. *P. longa* showing coronet of sixteen oral spines, ventral view of syntype.  
 FIGURE 9. Adult, *P. longa*, ventral view of syntype.  
 FIGURE 10. Eggs of *P. longa* from syntype.

2. PHAGOCOLA NANA (Ransom, 1921)  
(Fig. 2)

*Specific diagnosis:* Body small, flask-shaped, with slender neck region and broad, paddle-like posterior region, 480  $\mu$  long by 250  $\mu$  wide in region between acetabulum and ovary. Cuticula smooth, devoid of spines. Oral sucker terminal, with forward lip, 67  $\mu$  long by 50  $\mu$  wide, with finger-like oral diverticulum at posterior margin, 34  $\mu$  long by 21  $\mu$  wide at base, ending 34  $\mu$  in advance of pharynx. Sucker bearing 12 circum-oral spines, about 10  $\mu$  in length, arranged in a single row around sucker. Prepharynx 80  $\mu$  long. Pharynx muscular, 38  $\mu$  in diameter. Esophagus short, not quite as long as pharynx. Ceca diverge around acetabulum to become lost in folds of uterus, probably ending shortly after reaching level of acetabulum. Acetabulum weakly muscular, 46  $\mu$  in diameter, lying 212  $\mu$  from anterior end and 222  $\mu$  in advance of posterior margin of body, mostly obscured from view by eggs in uterus. Ovary transversely oval, 38  $\mu$  long by 55  $\mu$  wide, lying on midline 102  $\mu$  behind acetabulum and 82  $\mu$  in advance of caudal margin of body. Shell gland as large as ovary, just caudal to and slightly to left of ovary. Small seminal receptacle and yolk reservoir distinguishable in shell gland mass. Uterus greatly convoluted, greatly packed with ova, forming transverse loops in body between ovary and acetabulum, entering genital pore from right side after passing over dorsal surface of acetabulum. Ova numerous, small, 18 to 21  $\mu$  long by 10 to 12  $\mu$  wide. Vitellaria composed of six large follicles on either side of body in front of and dorsal to testes but not extending anteriorly to cephalic margin of ovary; follicles arranged as three smaller follicles in a transverse row on either side anterior to a testis, one large follicle at the antero-lateral margin of each testis and two

smaller follicles in a diagonal row just dorsal to the postero-lateral margin of each testis. Testes opposite or slightly oblique in position, in posterior end of body, one to either side of midline behind ovary and shell gland; right testis slightly more anterior than left, 52  $\mu$  long by 84  $\mu$  wide, separated from left testis by about 20  $\mu$ ; left testis slightly smaller, 45  $\mu$  long by 78  $\mu$  wide. Genital pore to left of midline, immediately preacetabular; acetabulum not obviously sunk in genital sinus. Seminal vesicle traceable to slightly below level of acetabulum. Excretory pore and bladder as in other members of the genus.

*Host:* *Ondatra riculicia* Bangs.

*Habitat:* Small intestine.

*Locality:* New Orleans, Louisiana.

*Remarks:* Among many small flukes recovered from the muskrat a single specimen of the present species appeared. Most of these small flukes were mounted and only a few were sectioned and none of these proved to be useful in a study of the species; the solitary specimen described above appears to be in a sufficiently good state of preservation to warrant its inclusion in the present paper. Due, however, to the circumstances under which it was secured, and the advanced state of necrotic condition in which the other small flukes were found, we have some reluctance in ascribing it to any known species. However, the marked similarity it bears to *Phagocola nana* as described by Ransom (1921) from the Alaskan fox (*Vulpes lagopus*) suggests too strongly its affinities with that species for us to ignore the specimen.

The specimen bears a marked similarity to *Phagocola lageniformis* as described by Chandler (1941) from the muskrat in Texas. It differs markedly from that species in regards to two important characters: the circum-oral spines are fewer in number (18 in Chandler's material ranging from 18 to 20  $\mu$  in length), only 12 spines with a length of 10  $\mu$  in our specimen, and in the number and arrangement of the vitelline follicles. Chandler states that there are 7 follicles in the vitellaria on either side of the body and his illustration shows a double row of follicles on each side from the anterior margin of the ovary to the posterior margin of the testes. There are only 6 follicles on either side of the body in our specimen and these do not reach so far anteriorly as the cephalic margin of the ovary, neither do they form a row of glands along the sides of the body within their limits. The oral diverticulum in our specimen is only about one-third the length of that structure in *P. lageniformis*. In respects to all of these points our specimen very closely agrees with *P. nana*.

Byrd & Reicher, 1942  
J. Tenn. Acad. Sci.



*Phagicola longa*<sup>40</sup> (Ransom, 1920) Price, 1933.<sup>2</sup>

La descripción de esta especie de heterófito ha sido realizada con cuatro ejemplares de seis colectados el 13 de septiembre de 1956 y que fueron arreglados en preparaciones totales. Son tremátodos muy pequeños pues miden de 0,685 a 0,740 mm. de largo por 0,253 a 0,268 mm. de ancho, a nivel de su porción más amplia; el cuerpo es piriforme, muy ancho y redondeado en el extremo posterior y casi triangular en el anterior, el angostamiento se inicia a nivel de la bifurcación intestinal hacia adelante; alrededor de la ventosa oral existe una sola hilera de espinas, semejantes en forma y tamaño, en número de 16 y que miden de 0,017 a 0,021 mm. de largo por 0,006 a 0,008 mm. de ancho; la cutícula lleva también, pequeñas espinas que se extienden desde la porción cefálica hasta por delante del nivel de los testículos.

La ventosa oral es más grande que el acetábulo, alargada en el sentido anteroposterior y tendiendo a ser cilíndrica, débilmente musculosa, subterminal y mide de 0,066 a 0,108 mm. de largo por 0,046 a 0,066 mm. de ancho; por delante de la ventosa oral existe una prolongación a manera de papila que es la que da la forma triangular al extremo cefálico. El acetábulo es pequeño, de contorno circular, se halla situado por detrás del poro reproductor y del gonotilo y mide 0,042 mm. de largo por 0,042 a 0,046 mm. de ancho; la relación entre el tamaño de las dos ventosas es, 1:1,5 x 1:1 a 1:2,5 x 1:1,5. La boca es amplia; el apéndice oral, en forma de una lengüeta, cuya base o porción ancha se encuentra a nivel del borde bucal, se extien-



Faam McIntosh, 1960  
J.P. 26: 219-222  
INT. OTOR, LUTRA ALPANDA  
Goldman, 194; Panama



Figura N° 2.

Dibujo de una preparación total de *Phagicola longa* (Ransom, 1920) Price, 1933.  
Región ventral.

The specimens described as *Phagicola longa* (Ransom, 1920) Price, 1937 have been considered to belong in this genus because they possess a single row of peribuccal spines, pretesticular cuticular spines, vitelline glands confined to the caudal extremity and because the uterus does not extend beyond the level of the genital pore. Specific determination is based on the following: 1., presence of 16 peribuccal spines; 2., similarity of the gonotyle; 3., similar topography of the reproductive organs; 4., similar extension and amplitude of the uterus; 5., pretesticular extension of the intestinal ceca; and, 6., similar disposition of vitelline follicles. There are some minor differences, however, such as body size, egg size, and the fact that the examples used by Prof. Ransom for his description were collected from an Alaskan carnivore, *Vulpes lagopus* (= *Alepex lagopus innultus*) (Merriam), which died at the National Zoological Park in Washington, D.C., while our specimens were collected from a marine aquatic bird, *Pelecanus occidentalis californicus* Ridgway, from Panama.

It is considered that these distinct facts are not to be taken as differential characters since measurable data are known to be highly variable even within the same species; and concerning the hosts, it is well known that, in the present as well as in other heterophyids, parasitic specificity is nonexistent and that the adult trematodes can parasitize ichthyophagous birds as well as mammals, as in the present case of pelicans. Witenberg, in 1929, reported the dog, cat and wolf as hosts for this same species, and Price collected specimens from the intestine of an unidentified species of pelican which died at the National Zoological Park in Washington in 1927, these having been classified also as the same species of Prof. Ransom; this last fact clearly confirms that our examples, undoubtedly belong to *Phagi-*

*Phagicola micrucantha*, n. sp. (Figures 2 and 3) <sup>u5</sup> ~~Coil~~ <sup>uKuntz, 1960</sup>

**DIAGNOSIS:** with characters of genus. Very small, elongate, pyriform-shaped distomes. Cuticle covered with scale-like spines arranged in quinque-fashion; extending about to level of testes. Spines reduced in size progressively toward posterior. Body 0.73-0.83 long and 0.18-0.31 wide at greatest width (posterior quarter). Oral sucker 0.040-0.042 wide, located terminally in excellently preserved specimens (i.e., with cuticular spines intact). Anterior end armed with single row of 20 comma-shaped spines, 0.0104-0.0112 long. Oral sucker with elongate, slender appendage 0.084-0.095 long, curved or S-shaped at distal end. Prepharynx 0.16-0.20 long. Pharynx 0.034-0.045 wide. Moderate esophagus present. Ceca extend to posterior region, walls not especially thick. Genital pore adjacent, anterior, and slightly lateral to acetabulum. Genital sac in region of gonotylis appears muscular. Gonotyls with 5 or 6 "chitinous bars" or "gland cells," not apparent in all specimens. Acetabulum 0.44-0.54 wide. Testes oval or ellipsoidal, 0.053-0.061 in greatest dimension, symmetrically situated almost at posterior end of body. Seminal receptacle centrally located, posterior to acetabulum, apparently consisting of at least two large compartments. Vagina not apparent. Uterus with many eggs, several transverse slings between ovary and acetabulum. Ovary oval, located just anterior to testis, smaller than testes, not always visible in our specimens. Vitelline follicles of moderate size, located along lateral edges of testes. Eggs 0.0209-0.0226 x 0.0130-0.0136, with prominent operculum.

**HOSS:** Turtle (*Clemmys carolina virgulata*), Kite (*Milvus migrans*).

**SITE OF INFECTION:** Small intestine.

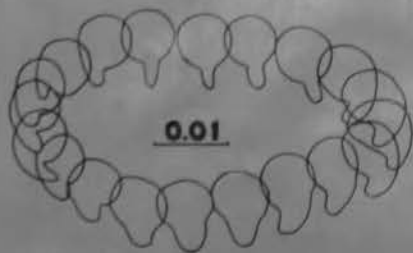
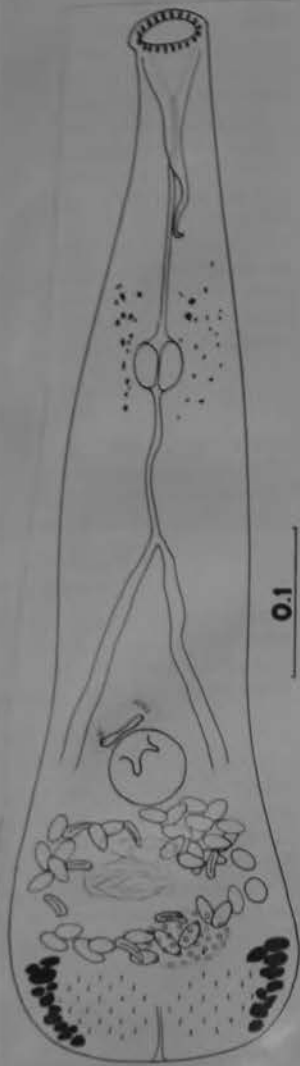
**LOCALITY:** Istanbul, Turkey.

**HOLOTYPE:** U.S.N.M. Helminthological Collection, No. 39148.

*Phagicola micrucantha* resembles both *P. longicollis* Kuntz and Chandler, 1956 and *P. inglei* Hutton and Sogandares-Bernal, 1958. These three species have in common the oral or cephalic spines which are oval with a narrow rounded tip. Comparisons of some of the important features of these species can be made from the following chart:

	<sup>u5</sup> <i>micrucantha</i>	<i>longicollis</i>	<i>inglei</i>
Cephalic spines number	20	14-15	19
size	0.0104-0.0112	0.017-0.018	0.017-0.022
Body length	0.78-0.83	0.61-1.0	1.1
Width of oral sucker	0.041-0.042	0.040-0.050	0.068
Width of acetabulum	0.044-0.054	0.030-0.048	0.072
Width of pharynx	0.034-0.045	0.032-0.053	0.055

It can be seen that the dimensions of the soft parts are close or overlapping, but the spines, which are not so sensitive to the techniques of preparation, are clearly different in both size and numbers in the three species. Kuntz et al, 1956 and Hutton et al, 1958 considered the species they described to be close to *P. longa* (Ransom, 1920) Pries, 1932, a species which possesses cephalic spines of a slightly different shape.



FAMILY HETEROPHYIDAE Odhner, 1914

*Phagicola longicollis* Kuntz and Chandler, 1956

HOSTS: Kite (*Milvus migrans*) and domestic cat.

SITE OF INFECTION: Small intestine.

LOCALITY: Istanbul, Turkey.

SPECIMENS: Helminthological Collection of the U.S.N.M., No. 39146.

Coil & Kuntz  
1960

row of from two to four accessory spines." Burton (1958) pointed out the close similarity of the genera *Phagicola* and *Ascocotyle* and gave an excellent review of the problem. He demonstrated that *Phagicola* can be separated from *Ascocotyle* only on the basis of the distribution of the vitellaria. Yamaguti (1958) also used this criterion. We concur with Price, Burton, and Yamaguti in accepting *Phagicola* and *Ascocotyle* as distinct genera.

→ *Phagicola diminuta* (Stunkard and Haviland, 1924) Price, 1932

Synonyms: *Ascocotyle (Parascocotyle) diminuta* Stunkard and Haviland, 1924. *Parascocotyle diminuta* (Stunkard and Haviland) Witenberg, 1929. *Phagicola lageniformis* Chandler, 1941. *Ascocotyle (Phagicola) diminuta* (Stunkard and Haviland, 1924) Stunkard and Uzmann, 1955.

*P. diminuta* was described by Stunkard and Haviland (1924) from *Rattus norvegicus*, collected on the waterfront in New York City. Apparently the specimens were not too good as they reported that the oral spines were missing in all the stained specimens. A single row of 16 oral spines was included in their description on the basis of observations on living specimens. They missed the two additional dorsal spines in the second row. This lapse was corrected by Stunkard and Uzmann (1955) with a complete redescription of this form.

In the light of recent studies it now appears evident that *Phagicola lageniformis* is a synonym of *P. diminuta*. Chandler (1941) described *P. lageniformis* from specimens found "in moderate numbers only in one rat (muskrat), from Chambers County, Texas." Since *P. diminuta* was inadequately described at that time, Chandler was justified in describing a new species. Since then, however, Stunkard and Uzmann (1955) redescribed *P. diminuta* and Martin (1953) redescribed *P. lageniformis*. Both of the latter papers also gave clues to the life cycle. The information can best be summarized in tabular form as presented in table I. Variations in size and descriptions may be attributed to different degrees of worm maturity and to the various definitive hosts. A salient feature is the presence of 16 oral spines arranged in a single row with an additional two dorsal spines in a "second row."

In addition to the material shown in table I, there are other minor similarities which further substantiate the synonymy of *P. lageniformis* with *P. diminuta*. These are the cuticular spination, the diffuse eye spot pigment persistent in the adult, and the size of the oral spines. Also the arrangement of the seminal vesicle and seminal receptacle is practically identical. The available evidence on the life history is similar as shown in table I. In addition to the distribution shown in table I, *P. diminuta* has also been recorded from *Butorides* sp. from Puerto Rico (Price 1932b) and probably from the muskrat in Louisiana (Byrd and Reiber, 1942) although Byrd and Reiber identified it as *Phagicola nana* (Ransom, 1920). Holton and Sogandares-Bernal (1960) recorded *P. diminuta* from the Florida cormorant and Louisiana heron as well as a new intermediate host, the Gulf killifish, *Fundulus similis*. Sogandares-Bernal and Bridgman (1960) record new definitive hosts as *Nycticorax nycticorax*, black-crowned night heron, from Florida and *Procyon lotor*, the raccoon, from Florida and Louisiana. Additional intermediate hosts are also given.

FROM MILLER + HARKEMA, 1963



Table 1: Summary of Data Presented for *Phagocion diantata* (Measurements in Microns)

	<i>Acanthocephalus diantata</i> Mackay, Hertland, 1924	<i>Acanthocephalus diantata</i> Mackay, Uvaxek, 1952	<i>Phagocion isopneumone</i> Chandler, 1941	<i>Phagocion isopneumone</i> Merrin, 1953	<i>Phagocion diantata</i> (this paper)
Length	250-300	500-440	430-630	250-560	425-638
Width (max.)	86-160	110-240	230-260	200-310	163-318
Oral sucker	37-45	25-42	44-55	27-65	46-66
Length with oral sucker	80-100	—	90-140	70-140	99-129
Length with oral sucker and esophagus	24.32 x 21-24	19 to 25	23.38 x 20-33	28.46 x 19-34	26.46 x 26.43
Esophagus	20 to 25	—	very short	usually shorter than pharynx	13-23
Oesophagus	to posterior level of acetabulum	to posterior level of acetabulum	not transcribable beyond acetabulum	to posterior level of acetabulum	to posterior level of acetabulum
Acetabulum	38 to 43	30 to 40	40 to 50	28.46 x 37.56	40.46 x 50.52
Rt. Testis	19-24 x 20-33	30.30 x 40-70	35.60 x 70-90	37.62 x 65.99	46.59 x 53.72
Lt. Testis	same	same	same	31.62 x 62.99	36.53 x 53.56
Ovary	22 to 32	30.35 x 40-56	slightly smaller than testes	31.62 x 55-110	40.46 x 40.46
Eggs	20 x 12	16.20 x 10-11	20.21 x 10-12	16.17 x 8.11	17.20 x 10.13
Oral Sphincter	16-single row (error-corrected, 1953)	16 + 2 dorsal	16 + 2	16 + 2	16 + 2
Gonostyl	(?) genital pores preacetabular, sinus elongate transversely	variable, protrusible, with small spines	—	thick walled, folded	thick walled sinus, elongate transversely
Vitellaria	few large follicles front of and lateral to testes	illustrated as lateral to testes and slightly anterior to testes	two groups, usually 7 follicles each	irregular follicles lateral to testes	irregular follicles lateral to testes reaching to ovary
Definitive Hosts	<i>Rattus norvegicus</i>	Bats, mice, hamsters, gulls, herons	muskrat	chicks	Bacerosus, gulls
Intermediate Hosts	—	<i>Fundulus heteroclitus</i>	—	<i>Fundulus pallidus</i>	—
Location	New York City	Milford, Conn.	Southeast Tex.	Brownsville, Tex.	Coastal North and South Carolina

FROM MILLER & HARKEMA, 1963

These worms were very active when first removed from the intestine of the host. Normally the body is pyriform in outline but in an extended condition the sides may become almost parallel, and the lateral edges, especially in the posterior region, are curved ventrally. In a contracted condition the worm may be almost as wide as long and here also there is a tendency for the lateral edges to turn ventrally. The dorsal lip may be prolonged anteriorly in the form of a triangular process or retracted into a short rounded lobe, so the form of this structure can not be used as a specific feature.

The oral sucker is surrounded by a crown of spines, about sixteen in number, arranged in a single row. The spines are quickly shed when the worms are placed in either normal saline or tap water and while examining a living specimen in the mucosal secretions one observes the spines become detached and frequently several may be seen floating away. The worms lose their spines on killing and we have been unable to secure a fixed specimen with all the spines intact. In fact, it is difficult to be sure of their number in living worms as certain of the spines may have been lost. The spines measure 0.043 mm. in length and 0.0033 mm. in greatest width. In the anterior portion of the body the cuticula bears small spiracles but they are reduced in size and disappear posteriorly.

The specimen shown in the figure is one of the largest and as mounted measured 0.35 mm. in length and 0.077 mm. in width. Observed in the living condition this worm extended to a length of 0.46 mm. and it measured then 0.06 mm. in width. Contracted to a length of 0.154 mm. it measured 0.12 mm. in width. The average length of preserved specimens is between 0.25 and 0.3 mm. and the corresponding width is from 0.08 to 0.1 mm. One specimen cut in cross-section measures 0.084 mm. in greatest width and 0.05 mm. in thickness. Another is 0.082 mm. in width and 0.06 mm. thickness.

TL: oral sucker measures from 0.04 to 0.05 mm. in length and from 0.037 to 0.043 mm. in width. The oral esophagus arises from the dorsal posterior part of the sucker and extends posteriorly about half the distance to the pharynx. It is usually slightly curved and varies from 0.04 to 0.06 mm. in length. The mouth opening is subterminal. The esopharynx varies in length with the extension of the anterior part of the body and in fixed specimens measures from 0.05 to 0.06 mm. The pharynx is oval, 0.021 to 0.024 mm. in width and 0.024 to 0.032 mm. in length. The esophagus measures 0.02 to 0.025 mm. in length. The intestinal ceca diverge in a wide bend encircling the acetabulum and terminate near its posterior level.

The acetabulum lies in the interrenal area. It measures 0.038 to 0.043 mm. in diameter, is median in position, and situated about two-fifths of the body length from the posterior end. The ventral wall is continuous and the cavity opens anteriorly through the genital sinus. When the body is extended the acetabulum tends to become elongate in the long axis of the worm. The genital pore is situated immediately in front of the acetabulum and the genital sinus is small, and elongate transversely.

The testes are ventral in position, symmetrically arranged, one on either side of the body near the posterior end. They are oval in shape, longer in the transverse axis of the body, and measure from 0.02 to 0.033 mm. in width by 0.019 to 0.024 mm. in length. Sections show their thickness to be approximately equal to their length. Vasa efferentia pass forward and open into the posterior end of the seminal vesicle. As in other species this structure is U- or V-shaped with the closed end of the loop on the right side of the body. The posterior limb is shorter and smaller. Its caudal end is situated on the left side of the median plane a short distance anterior to the seminal receptacle and near the level of the anterior margin of the ovary. It expands extending dorsally, anteriorly, and toward the right. Near the apex of the loop it contracts slightly and from this point, a short distance behind the end of the right caecum, the anterior limb of the vesicle extends almost transversely across the body approaching the caecum of the left side. The ejaculatory duct arises from the anterior face of the proximal portion of this limb and passes forward and medial, opening into the genital sinus. It is surrounded by prostate cells but the gland is not large. Cirrus and cirrus are absent.

The ovary is almost spherical, 0.022 to 0.032 mm. in diameter, situated on the ventral side of the body, a short distance in front of the right testis. The oviduct arises at the median posterior margin and leads posteriorly to the oötype. Here Laurer's canal is given off and passes dorsally, opening to the surface near the midline of the body. A large seminal receptacle, about the size of the ovary, is situated near the median plane slightly posterior to the level of the ovary. It is on the dorsal side of the body. We were unable from our sections to determine whether the seminal receptacle opens into the oötype directly or into the proximal end of Laurer's canal near its origin from the oötype. Shortly after the emergence of Laurer's canal the oötype receives the duct from the vitelline receptacle. Mehlis' gland was not observed. The uterus is arranged in transverse loops, crossing the body four or five times, and the metratermal portion parallels the ejaculatory duct, opening into the genital sinus. The uterus does not cross the body anterior to the acetabulum. Lenticular muscular bodies were not found on either side of the genital sinus. The vitellaria consist of a few large follicles situated near the lateral margins of the body.



salivary and internal to the testes. They are almost entirely postovarian. They form the vitelline mass behind and under to form a large eosinophilic mass which discharges into the oocyte. The eggs are numerous; they average 0.02 to 0.022 mm. and have thick, yellowish to brownish shells.

The dorsal commissure of the nervous system is situated a short distance anterior to the pharynx but the diminutive size of the specimens makes it impossible to trace the nerves without special technique.

The excretory pore is terminal and opens from a relatively large vesicle. This vesicle extends forward between the testes, and immediately posterior to the oocyte it divides to form two lateral collecting ducts which pass forward. When the second infestation was found the attempt was made to work out the pattern of the entire system. The flame cells were observed but the material did not last long enough for a complete analysis and reconstruction of the excretory system and so far no additional specimens have been secured.

**I. *Parascotyle diminuta***  
Stunkard and Haviland, 1924  
(Figure 1).

**Second intermediate hosts in Louisiana.**—*Cyprinodon variegatus* Lacépède, broad killifish; *Fundulus grandis* (Baird and Girard), chub; *Fundulus jenkinsi* (Evermann), chub; *Lucania parva* (Baird and Girard), rain water fish (family Cyprinodontidae); and *Mollisnesia latipinna* LeSueur, sailfin molly (family Poeciliidae); all new host records.

**Location.**—Gill filaments of all hosts.

**Locality.**—West end of U. S. Highway 11 Causeway, south shore of Lake Pontchartrain, Louisiana; new locality record.

**Discussion.**—*P. diminuta* reported here appears to be the same species reported by Stunkard and Uzzmann (1955).

Stunkard and Haviland (1924) named and described *Parascotyle diminuta* from rats collected at Clason Point, New York. Their specimens had lost some of the oral spines. Later Stunkard and Uzzmann (1955) studied the partial life history of a trematode that they believed to be *Parascotyle diminuta*. The metacercariae were found in naturally infected *Fundulus heteroclitus* (Linn.) and *Fundulus majalis* (Walbaum) collected on the northeastern coast of the United States. Specimens of *F. heteroclitus* from the *P. diminuta* type locality were examined by these authors and were found infected with metacercariae that were identified as *P. diminuta*. Stunkard and Uzzmann (1955) did not mention the establishment of experimental infections of definitive hosts with *P. diminuta* metacercariae collected at the type locality. We assume that the metacercarial cysts studied by these authors were at least dissected, and oral spination and other morphological details observed. The occurrence of intermediate hosts infected with *Parascotyle* metacercariae at the type locality lend support to the hypothesis that the species which Stunkard and Uzzmann (1955) reported is *Parascotyle diminuta* on epizootiological grounds. Hutton and Sogandares (1958) followed the description of Stunkard and Uzzmann (1955) when they identified egg-producing adult specimens of *P. diminuta* obtained from a hamster experimentally exposed to metacercariae from the gills of *Fundulus similis* (Baird and Girard) collected in the vicinity of St. Petersburg, Florida. On physiological and morphological bases, the identification of *P. diminuta* by Hutton and Sogandares (1958) is in accordance with evidence presented by

Stunkard and Uzzmann (1955). These latter authors were able to obtain gravid adults of *P. diminuta* from rats and hamsters though not from mice or chicks. Chicks proved to be refractory to infection. Specimens of *P. diminuta* from *Mollisnesia latipinna* in Louisiana produced eggs in a mouse but not a hamster. Martin (1953) studied the partial life-history of a trematode that he believed was identical with *Parascotyle lageniformis* (Chandler, 1941).

host-specificity of the two species reported by these authors. Chandler (1941) and Martin (1953) could not have known the details of the oral spination of *P. diminuta* since it was not until 1955 that Stunkard and Uzzmann redescribed the species. On morphological grounds there is little doubt that *P. diminuta* Stunkard and Haviland, 1924, and *P. lageniformis* (Chandler, 1941) are identical. All meristic and morphological characters of the two species appear to overlap. The possibility of morphologically identical physiological strains or species precludes a definite stand regarding the synonymy at this time. We are in agreement with Martin (1953) that *Phagicola nana* (Ransom, 1921) of Byrd and Reiber (1942) from a Louisiana muskrat is probably *P. lageniformis*, and thus is possibly conspecific with *P. diminuta*. Poeciliid and cyprinodont fishes are frequently found living in the same brackish marshes with muskrats in the New Orleans area. Another view is that *P. diminuta* of Stunkard and Uzzmann, 1955, is in reality *Parascotyle lageniformis* (Chandler, 1941) and that the taxon *Parascotyle diminuta* Stunkard and Haviland, 1924, is a different species. This last possibility is cautiously not subscribed to here. This doubt will always remain because the type material of *P. diminuta* lacks a complete set of oral spines.

Stunkard and Uzzmann (1955) reported experimental infections of laboratory-raised *Larus argentatus* (Linn.) and *Nycticorax nycticorax* (Linn.). These authors did not state whether their *Larus* specimen was hatched in the laboratory. One of us (F.S.) found a large percentage of several species of coastal birds with estimated ages of one to four days, infected with trematodes due to feeding of infected food material by their mothers. The *Nycticorax* apparently infected by Stunkard and Uzzmann was a young female captured in Bronx Park, New York. Thus, we do not know if Stunkard and Uzzmann actually infected their birds experimentally. The fact remains that these

hosts were found infected with *P. diminuta*. Price (1933) reported *P. diminuta* from *Butorides*. Hutton and Sogandares (1960) reported *P. diminuta* from naturally infected *Phalacrocorax auritus floridanus* (Audubon) and *Hydranassa tricolor ruficollis* (Gosse) in Florida. To this list we now add *Nycticorax nycticorax boacilis* (Gmelin) and *Procyon lotor* (Linn.) from the west coast of Florida. Mr. Larry Ash, Department of Parasitology, Tulane University, has also given us some specimens of *P. diminuta* collected from a racoon in Louisiana. Thus *P. diminuta* appears to be a polyxenous parasite known to occur naturally in at least two or possibly three unrelated mammals and five or possibly six birds. *P. diminuta* populations from different localities may prove to have developed into "strains" which are identifiable only on a physiological basis. The possibly many faceted physiological host-specificity of *P. diminuta* metacercariae from different intermediate hosts and localities is being investigated further in this laboratory.

Metacercariae of *P. diminuta* collected by us were observed alive under slight cover-slip pressure. Cysts in the gill filaments of *Fundulus jenkinsi* (fig. 1) were 0.136 to 0.200 long and were oval in shape. Cysts from the gills of *Mollisnesia latipinna* were 0.200 to 0.201 long by 0.119 to 0.144 wide. The surrounding cyst membranes, gonotyl spination, and flame cell pattern (2 [(2+2) + (2+2)]) are as reported by Stunkard and Uzzmann (1955). Mechanically excysted metacercariae have respectively 16 and 2 oral spines in one complete and an incomplete dorsal accessory row. Metacercariae of *P. diminuta* from different intermediate hosts in Louisiana possessed a constant number and arrangement of oral spines. He collected metacercariae from the gills of *Fundulus pallidus* Evermann in Texas, and obtained gravid adults from experimental infection of chicks. Although Stunkard and Uzzmann (1955) reported chicks refractory to infection with *P. diminuta*, they did not state the age or food of the chicks. As is well known new-born chicks are sometimes more susceptible to trematode infections than are older ones. Furthermore, experimental infections of older chicks are sometimes dependent upon diet. Thus, at present we cannot evaluate the physiological



FROM SOGANDARES-BERNAL AND BRIDGMAN, 1960

*PHAGICOLA DIMINUTA* (STUNKARD + HAVILAND, 1924) PRICE, 1932

SYN. 3. *Parascocotyle diminuta* (Stunkard and Haviland, 1924)

Hutton and Sogandares-Bernal, 1958

Fig. 2c

**HOSTS:** *Phalacrocorax auritus floridanus* (Audub.), Florida cormorant, new host record; *Hydranassa tricolor ruficollis* (Gosse), Louisiana heron, (immature), new host record; *Fundulus similis* (Baird and Girard), Gulf killifish, second intermediate host, new host record.

**INCIDENCE OF INFECTIONS:** Cormorant 1 of 6; heron 1 of 2.

**NUMBERS:** Hundreds.

**LOCATIONS:** Mostly in anterior 2/3 of intestine.

**LOCALITIES:** Cormorant—Bayboro Harbor, Tampa Bay, Florida, new locality record; heron—Tarpon Key, Boca Ciega Bay, Florida, new locality record.

**DATES:** Cormorant—April 6, 1958; heron, May 23, 1958.

**Discussion.** *Ascocotyle* (*Parascocotyle*) *diminuta* was described by Stunkard and Haviland (1924) from the rat. Stunkard and Uzman (1955) redescribed the species under the name *Ascocotyle* (*Phagicola*) *diminuta*. They reported the common killifish, *Fundulus heteroclitus*, and the striped killifish, *F. majalis*, as second intermediate hosts. We found the larva of this species in the gills of *F. similis* (Baird and Girard) from Tampa Bay, Florida. Specimens of *Parascocotyle diminuta* were obtained from the intestine of laboratory-raised hamsters after feeding them the gills of *F. similis*. The following measurements were made from a specimen of *P. diminuta* taken from the cormorant, killed in hot water and mounted in Canada balsam: body length 418, maximum body width 172, diameter of oral sucker 38, pharynx diameter 26, diameter of ventral sucker 40, ovum 18 x 10. As in the case of *Phagicola longa* the cuticula of *Parascocotyle diminuta* is covered with spines except for a narrow postoral zone and the extreme posterior end of the body. Figure 7 does not show these spines.



*PHAGICOLA DIMINUTA* (STUNKARD AND HAVILAND, 1924) PRICE, 1932

SYN: *Parascocotyle longeniformes* (Chandler, 1941)

Синоним: *Phagicola longeniformes* Chandler, 1941

(Рис. 102)

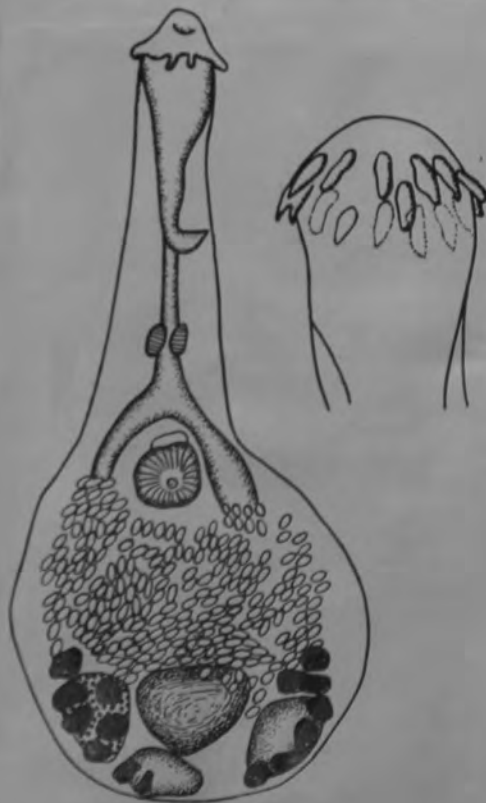
Дефинитивный хозяин: ондатра (*Ondatra zibethica*).

Локализация: кишечник.

Место обнаружения: США (Техас).

Описание вида (по Чендлеру, 1941). Очень мелкие трематоды. Задняя часть тела округлая, передняя — вытянутая и тонкая, длиннее задней части. Длина тела 0,45—0,63 мм. Ширина задней части 0,23—0,26 мм, а ширина передней части только 0,045—0,065 мм. Дорзальный сосочек хорошо развит, округлый. Ротовая присоска 0,045—0,055 мм в диаметре и окружена одним рядом околоротовых шипов в количестве 18, причем 16 из них в одном круге и два расположены несколько сзади на дорзальной стороне. Шипы 0,018—0,020 мм длины. Конический отросток ротовой присоски широкий, в основании сплюснутый, суживающийся и обычно закрученный на конце; длина его 0,090—0,140 мм, большей частью простирается на половину или до двух третей расстояния от ротовой присоски до фаринкса. Фаринкс 0,030—0,033 мм ширины и 0,033—0,038 мм длины. Его передний край лежит на расстоянии 0,120—0,220 мм от переднего конца тела. Пищевод очень короткий. Кишечные ветви не видны позади уровня брюшной присоски; очевидно, они здесь и заканчиваются. Брюшная присоска 0,040—0,05 мм в диаметре, не погружена в генитальный синус и располагается немного позади середины длины тела. Семенники расположены неподалеку от заднего конца тела; они обычно поперечно-продолговатые, 0,060—0,070 или 0,030—0,090 мм в диаметре. Яичник меньше семенников, лежит впереди правого семенника. Семяприемник очень большой, располагается медианно впереди семенников и влево от яичника. Желточники состоят из двух групп, содержащих обычно по 7 фолликулов каждая, располагаются в задней части тела, частично закрывают семенники и тиснуты вперед до уровня яичника. Все пространство между органами размножения от брюшной присоски и задним концом тела занимают неправильные сетли матки, заполненные яйцами. Яйца 0,020—0,021 мм длины и 0,010—0,012 мм ширины.

Литература: Chandler, 1941, стр. 175—181.



Phagicola piriformis (Blanc et Helein, 1913)syn. Echinostoma piriforme B. et H., 1913

Sur 50 Chiens autopsiés, nous avons récolté 4 espèces de Douves de l'intestin, qui doivent probablement constituer autant d'espèces nouvelles.

GENRE Echinostoma RUDOLPHI.

Deux Chiens, sur 50 examinés, ont présenté un grand nombre d'une très petite Douve dont voici la diagnose :

Corps allongé, piriforme, atteignant sa largeur maximale dans son tiers postérieur au niveau des testicules. Longueur des individus adultes 1 millimètre à 1<sup>m</sup>180; plus grande largeur : 280 à 340  $\mu$ . L'extrémité céphalique présente l'épaississement caractéristique des Echinostomes. Ce disque adoral, large de 70 à 75  $\mu$  environ, porte sur chaque face une série de 9 bâtonnets égaux; l'insertion de ces bâtonnets se fait sur une seule ligne, leur longueur moyenne est de 16 à 20  $\mu$ .

La ventouse orale a un diamètre de 65  $\mu$ , la ventouse ventrale mesure de 67 à 70  $\mu$  et se trouve au niveau du tiers postérieur du corps. Le tégument est couvert de fines écailles en rétroversion, serrées sur toute la longueur du cou et s'écartant légèrement à mesure qu'elles se rapprochent de l'extrémité postérieure.

La ventouse buccale se continue par un renflement pharyngien de 76  $\mu$  de diamètre, qui s'amincit en forme de col de cornue à la naissance de l'œsophage. L'œsophage, après un trajet d'environ 245  $\mu$ , aboutit à un second bulbe musculéux, allongé, présentant un grand diamètre de 65 à 70  $\mu$  sur une largeur de 45  $\mu$ , puis, après un trajet de 190  $\mu$ , l'œsophage se dédouble pour donner les branches intestinales simples qui s'étendent jusqu'au voisinage de l'extrémité caudale.

Le pore génital s'ouvre un peu en avant de la ventouse ventrale. Il existe deux gros testicules ovoïdes, placés côte à côte à la partie postérieure du corps, longs de 90  $\mu$  et larges de 68  $\mu$ .

L'ovaire est globuleux, d'un diamètre de 75  $\mu$ ; il est placé en avant des testicules.

Les vitellogènes s'étendent de l'extrémité postérieure du corps jusqu'au niveau du bord antérieur de l'ovaire. L'utérus décrit peu de circonvolutions, il est bourré d'un grand nombre d'œufs à coque brunâtre, longs de 23  $\mu$  et larges de 13  $\mu$ .

Nous rapportons ce Trématode au genre Echinostoma Rudolphi (*sensu lato*), dont il doit constituer une espèce nouvelle que nous proposons de nommer E. piriforme.

143—BROEK, E. VAN DEN, 1967. "*Phagicola septentrionalis* n.sp. (Trematoda: Heterophyidae) from the harbour seal, *Phoca vitulina* L." *Zool. Meded., Leiden*, 42 (1), 1-4.

*Phagicola septentrionalis* n.sp. is described from material collected from *Phoca vitulina* found along the shore of the Wadden Sea, the Netherlands. This is the first record of a species of the *Ascocotyle*-complex from north-western Europe. In *Phagicola septentrionalis* there is a single gonocotyl, the mouth is surrounded by a single row of 16 to 20 spines about 10 to 18  $\mu$  long and the oral sucker appendage extends half the length of the oesophagus. The uterus extends from the level of the testes to the ventral sucker. Eggs measure 16 to 22  $\mu$   $\times$  8.5 to 12  $\mu$ . M.B.-B.

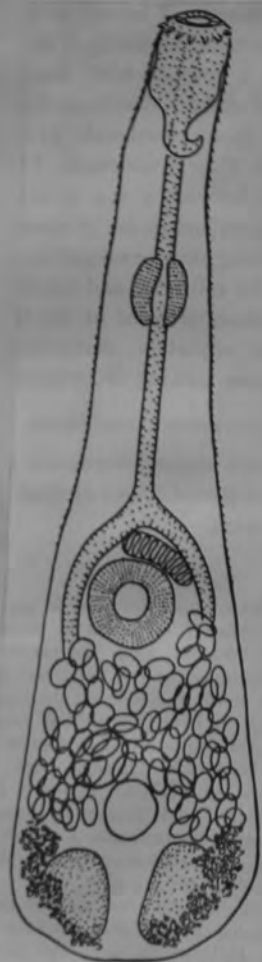
*Phagicola septentrionalis* n.sp. BROEK, 1967

Diagnosis (all measurements in  $\mu$ ). — Body elongate, consisting of a rather narrow anterior part (50-70% of total body length) which gradually widens into a rounded posterior part. Body length 600-1000, maximum width 160-250. Cuticle spinous on anterior part of body, up to level of gonocotyl. Mouth surrounded by a single row of 16 to 20 spines of about 10-18 length. Width of oral sucker: 45-60. Dorsal lip not triangular but broadly rounded. Appendage of oral sucker rather short, 60-120, extending approximately half the distance to pharynx. Length of pharynx 40-55, width 25-37. Ventral sucker almost round, diameter 44-60. Length of oesophagus 80-140, bifurcation of caeca at about half the distance between pharynx and ventral sucker. Caeca extending behind ventral sucker, probably to level of ovary. Size of gonads not exactly determined, position very probably similar to that in other species of the genus. Testes oval, side by side, at posterior end of body. Gonocotyl single, oval, asymmetrically placed in front of ventral sucker, containing several chitinous bars or spines. Seminal receptacle indistinguishable. Seminal vesicle oval, median, in front of testes. Ovary single, in most cases covered by uterus coils. Uterus reaching from testes to ventral sucker, in several transverse loops, covering part of testes and whole ovary, containing many eggs. Vitellaria confined to posterior region, variable in shape, sometimes rather compact, more often forming a chain of rather homogeneous follicles, or consisting of 3 to 5 more dense clusters. Eggs oval, operculate, yellowish brown when mature, length 16-22, width 8.5-12.

Locality. — Dutch Wadden Sea. Found in the duodenum and ileum of *Phoca vitulina* L., 1758. The type specimens (syntypes) are in the Rijksmuseum van Natuurlijke Historie, Leiden (nr. 03100).

DISCUSSION

Comparison with other species of the genus, found in the eastern hemisphere. — *P. septentrionalis* is very similar in shape and in size to *P. longicollis* Kuntz & Chandler, 1956. The main difference is the presence of two gonocotyls in *P. longicollis*. Besides, this species seems to have shorter caeca. *P. septentrionalis* differs from *P. ascolongus* (Witenberg, 1929) and from *P. longus* (Ransom, 1920) in the length of the oral appendage, from the former species in shape as well as in extension of the uterus, from the latter one in the presence of a single gonocotyl. It differs from *P.inglei* Hutton & Sogandares, 1958, mainly in size, and from *P. italicus* (Alessandrini, 1906) in size and shape and also in the extension of the uterus. It can be placed in the *minutus* species group as defined by Sogandares & Lumsden (1963). Apart from in morphological characters, *P. septentrionalis* differs from all described species of the *Ascocotyle*-complex in geographical and in host distribution.



(over)

**Geographical distribution.** — This is the first record of a species of the *Asacotyle*-complex from north-western Europe. Several species have been described from the Mediterranean where they have been found in domestic and in wild carnivores, but the majority of the species has been reported from North and South America.

**Host distribution.** — Although occasionally terns and gulls from the same area in the Wadden Sea have been examined for endoparasites, *P. septentrionalis* has never been found in these or in other birds. It must be noted, however, that the small and slender parasites are easily overlooked. Other species of the *Asacotyle* complex show remarkably little host-specificity and have been collected from various mammals as well as birds. No details of the life cycle of *P. septentrionalis* are known as yet.

**Locality.** — The hosts have been found on several places along the shores of the Wadden Sea and probably all belong to the Wadden Sea population of seals. Parasites have been collected chiefly in the period from 1954 to 1962. The type material is from a juvenile host, found dead near Den Helder, summer 1958, and autopsied at the Netherlands Institute for Sea Research.

**Infection rate.** — Out of 39 examined seals, 24 specimens, juveniles as well as adults, were infected with *P. septentrionalis*. The number of parasites per host was estimated to vary between a few to several hundreds; they were found chiefly in the duodenum and in the proximal part of the ileum.

**State of material.** — During this investigation, the lapse of time between the death of the host and the collection and fixation of the parasites was at least three days. The condition of some of the samples is therefore rather poor. Regarding the most important characters, however, specimens of different samples do not show striking differences.

During an investigation into the causes of mortality of the harbour seals (*Phoca vitulina* L.) in the Dutch Wadden Sea (Van den Broek & Wensvoort, 1959; Van den Broek, 1963), heterophyid trematodes have been regularly collected from the intestines. *Cryptocotyle lingua* (Creplin, 1825) was rather common. Often together with this trematode a second, less conspicuous species was found, which appeared to belong to the *Asacotyle* species complex. The taxonomy of this complex is very complicated and has recently been reviewed by American authors: Burton (1958) and Sogandares & Lumsden (1963). The present author prefers to follow the traditional opinion as expressed by Hutton & Sogandares (1958) in dividing the complex into several genera. The new species possesses the following fundamental characters: (1) spines surrounding oral sucker placed in a single row, (2) vitellaria confined to postovarial region, (3) uterus not extending in front of ventral sucker, (4) cuticle spinous on forebody only. These characters are used to distinguish the genus *Phagicola* Faust, 1920, from *Asacotyle* Looss, 1899, sens. strict. (see Price, 1936; Burton, 1958). The species therefore is placed here in the genus *Phagicola*.



PHAGICOLA

*Phocitremonoides* Martin, 1950

Generic diagnosis. — Heterophyidae, Haplorchiinae: Body small, pyriform to oval, scaled for most part. Oral sucker large, subterminal, prepharynx short, pharynx well developed, esophagus short, ceca reaching to level of posterior margin of testis. Acetabulum large, pre-equatorial, embedded in parenchyma. Testes single, large, in posterior third of body. Seminal vesicle large, bipartite. Genital sac spacious, thick-walled, immediately anterior to acetabulum. Ovary immediately anterior to testis. Seminal receptacle large, close to ovary. Laurer's canal present. Vitellaria between acetabular and posttesticular levels. Uterus mainly intercecal, filling most of hindbody and extending slightly anterior to acetabulum; eggs relatively large. Excretory vesicle U-shaped; excretory pattern  $2[(2+2+2)+(2+2+2)] = 24$ . Remnants of eye-spots may be present. Parasitic experimentally in mammals and birds.

Genotype: *P. ovale* Martin, 1950 (Pl. 98, Fig. 1185).

Oculate monostomatous pleurolophocercous cercaria II of Mazon & Pequegnat, 1949, develops in *Cerithidia californica*; metacercaria encysts on under sides of scales of *Atherinopsis californica* and *Fundulus parvipinnis parvipinnis*; egg-producing adults were obtained 4 days after feeding infected fishes to cats and newly-hatched chicks. — Martin (1950).

Two species of minute heterophyids are here placed in the genus *Phocitremonoides*, erected by Martin (1950c) for the single species *P. ovale*. Martin gave details of the life history and excretory system but not of the terminal reproductive organs, which are extremely difficult to interpret in such small trematodes. Our material contributes to the following revised diagnosis of the genus and prompts a re-examination of its systematic position:

Genus *Phocitremonoides* Martin, 1950, char. emend.

**Diagnosis:** small pyriform to oval trematodes; cuticle with scalelike spines, the free edge of which may be serrated. Suckers well developed; oral sucker slightly larger than ventral sucker, without appendage or enlarged circumoral spines. Prepharynx very short, pharynx well developed, esophagus short; ceca narrow or expanded, extending to, or well within, posterior one fourth of body. Testis single, large, in posterior part of body; seminal vesicle bipartite, thin-walled throughout. Ovary either anterior to testis or overlapped by it dorsally. Laurer's canal present; seminal receptacle well developed, at level of ovary. Ventrogenital sac either with a shallow confluence between portion containing ventral sucker and that associated with genital pore or divided into an anterior genital pit and an inconspicuous posterior ventral pit; genital pit with thickened wall, ringlike in optical section of whole mounts; gonotyl lacking. Ejaculatory duct and metraterm unite to form a tubular genital atrium with pore opening to ventral surface, usually at left edge of genital pit, but *situs inversus* may occur. Vitellaria sparse, confined to hindbody and not reaching its posterior end. Uterus mostly intercecal, from posterior end of body to level of genital pore or intestinal bifurcation. Eggs symmetrical, operculate, few to moderate in number. Excretory vesicle U- or V-shaped with short arms; flame cell formula  $2[(2 + 2 + 2) + (2 + 2 + 2)] = 24$  for both cercaria and adult where known. Cercaria pleurolophocercous, metacercaria in fishes. Contains, in addition to the type species *Phocitremonoides ovale* Martin, 1950, the 2 new species whose descriptions follow:

From Cable, Connor, and Balling, 1960

Yamaguti (1933) proposed the subfamily Phocitreminae to contain "an aberrant opisthorchiid," *Phocitrema fusiforme*, but gave no characterization of the subfamily. In addition to *Phocitrema*, the genera *Witenbergia* and *Phocitremonides* have been assigned to that group. Although Price (1932) included *Phocitrema* in the family Heterophyidae, he later (1940) placed it in the family Opisthorchiidae, but stated that *Phocitrema* apparently differs from the heterophyids only in lacking a gonotyl.

Whether the members of the Phocitreminae should be placed in the family Heterophyidae or Opisthorchiidae is difficult to decide until life cycles of other members of this subfamily are determined along with precise information concerning their internal anatomy, especially the excretory system. We favor their inclusion in the family Heterophyidae, despite the apparent lack of a gonotyl in the 2 species just described; indeed, there is a striking resemblance between the terminal genitalia of *P. butionis* as seen in sagittal section and that region in *Haplorchis (Manorchitrema) taihokui*, an accepted heterophyid, as described by Faust and Nishigori (1926). Martin (1950c) cites the common cercarial type of *P. ovale* and *Opisthorchis felineus* as support for placing the Phocitreminae in the family Opisthorchiidae. It should be pointed out, however, that pleurolophocercous cercariae occur in the Heterophyidae as well as in the Opisthorchiidae.

Gupta (1953) regarded *Phocitremonides* and certain other genera as "a connecting link between Opisthorchiidae and Heterophyidae," but insofar as species of *Phocitremonides* are concerned it seems as likely that they may be aberrant heterophyids, in at least some species of which the ventrogenital sac has become divided into 2 depressions along with the absence of a gonotyl. Indeed, *P. ovale*, as drawn by Martin (1950c), shows a confluence of the 2 and, were a gonotyl present, would be typically heterophyid in structure. The thickened wall of the genital sac in all species of *Phocitremonides* is very similar to the wall of the ventrogenital sac in the galactosome group in which the gonotyl is a papillalike outgrowth from, and having the same structure as the wall. Those trematodes are very large as compared to species of *Phocitremonides* but, even so, the gonotyl in some of them is so inconspicuous as to have been overlooked by some investigators; if those trematodes were reduced to the size of species of *Phocitremonides* the gonotyl would be scarcely recognizable.

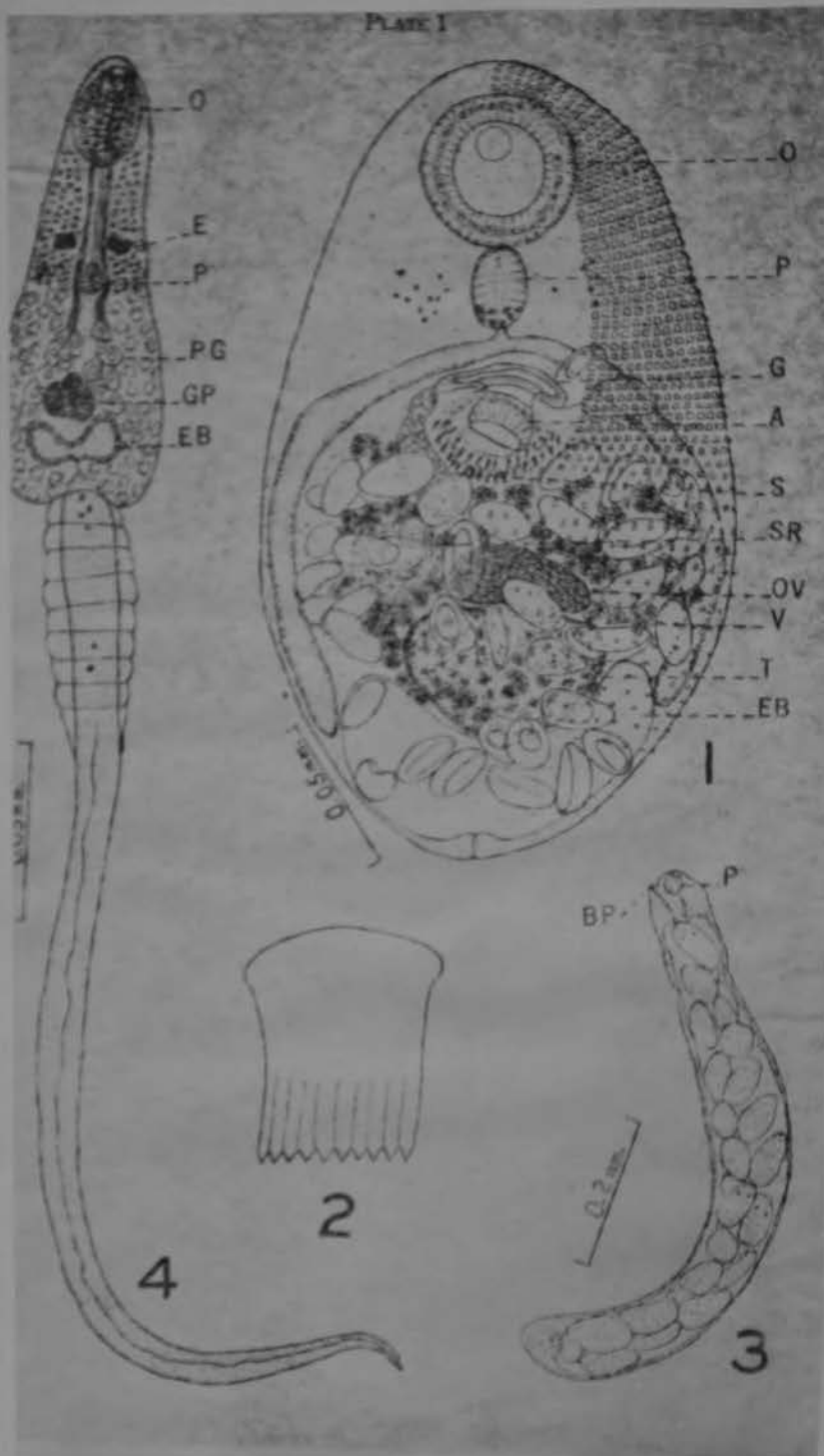
Martin (1950c) reported for *P. ovale* a cercaria that develops in the marine snail *Cerithidea californica* and closely resembles *Cercaria caribbea* XI Cable, 1956, from *Cerithidea costata* in Puerto Rico. Cable observed that snails from mangrove swamps frequented by herons were more often infected with *C. caribbea* XI than were those from more exposed habitats. That cercaria thus may be the larva of 1 of the 2 species of *Phocitremonides* described above from herons.

From: Cable, Connor, and Balling, 1960

Heterophyidae

Phocitrema ovale Martin, 1950

J. Paras. 36:552-558



*Phocitremaides butionis* (FIGURES 30 to 32)

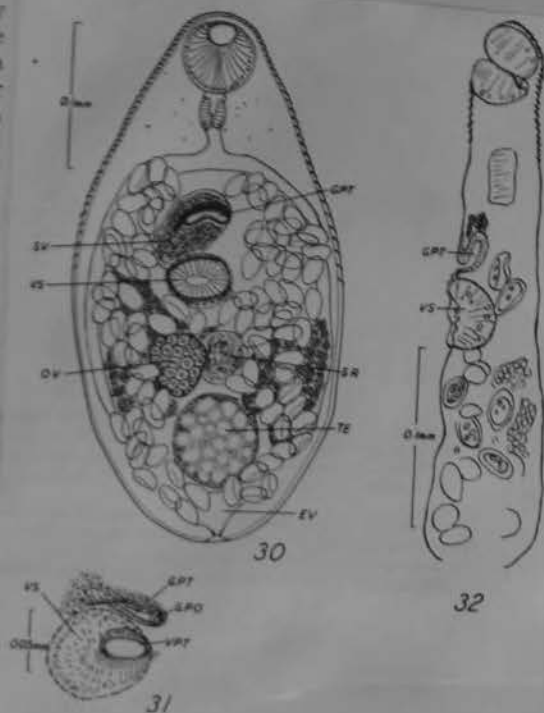
Diagnosis based on 35 specimens with the characters of the genus. Body oval to slightly pyriform, 0.268 to 0.355 long, 0.142 to 0.185 wide. Cuticle armed with scalelike spines laterally, fading at level of ovary and absent on dorsal and ventral surfaces except at anterior end of body. Ventral sucker median, equatorial, subspherical, 0.035 to 0.045 in diameter, contained in shallow ventral pit with posterior border bearing 2 rows of narrow, pointed spines. Ventral pit and genital pit not confluent as in *P. male*. Oral sucker subspherical, 0.038 to 0.052 in diameter; prepharynx not over 0.008 long; pharynx oval, 0.020 to 0.022 long, 0.015 to 0.018 wide; esophagus 0.028 to 0.042 long; intestinal bifurcation about midway between suckers; ceca slender, terminating at about mid-level of testis. Excretory vesicle widely V-shaped, arms not reaching anterior margin of testis; excretory pore terminal. Testis within posterior one fourth of body, spherical to oval, 0.046 to 0.071 in diameter. Seminal vesicle extends well anterior to ventral sucker; prostatic cells few, surrounding genital pit with their ducts extending dorsally; ejaculatory duct joins metraterm to form thin-walled genital atrium opening at genital pore immediately to left of, or perhaps confluent with opening of genital pit. Seminal receptacle overlapping either right or left side of ovary, which is anterior to testis and to either side of midline; diameter of ovary 0.025 to 0.042. Uterus extends from posterior extremity to intestinal bifurcation. Eggs fairly numerous, embryonated, 0.020 to 0.022 by 0.011 to 0.013, with minute antopercular knob.

Host: *Butorides virens maculatus* (little green heron, *Martineti*).

Site: Intestine.

Locality: Cabo Rojo, Puerto Rico.

Type specimen: Holotype No. 38219.



*Phociermoides floridae* n. sp. (FIGURE 33)

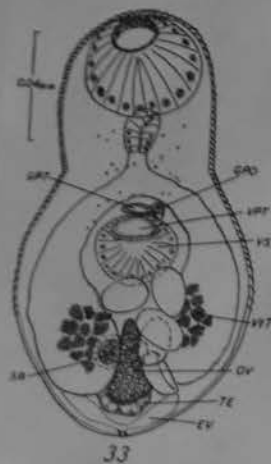
Diagnosis based on 12 specimens with the characters of the genus. Pyriform 0.158 to 0.221 long, 0.050 to 0.094 wide at level of ovary. Cuticle spinose to that level with spines gradually diminishing in number and size. Ventral sucker median, equatorial or slightly posterior to midlevel, subspherical, 0.027 to 0.035 in diameter; ventral pit shallow, with posterior border bearing minute pointed spines. Ventral pit distinct from genital pit as in *P. butionis*. Oral sucker subspherical, 0.031 to 0.045 in diameter; prepharynx not evident or very short; pharynx oval, 0.017 to 0.021 long, 0.014 wide; esophagus not over 0.014 long; intestinal bifurcation about midway between suckers; ceca extend to posterior edge of ovary, expanded, and compressing ovary, testis, and seminal receptacle into narrow median region between excretory vesicle and ventral sucker. Excretory vesicle widely V- or U-shaped, excretory pore terminal. Testis about 0.028 long by 0.021 wide, median, in posterior one fourth of body, slightly posterior and dorsal to ovary, their zones overlapping. Shape and extent of seminal vesicle not determined. Ovary approximates testis in size with receptacle to its right. Uterus, largely median between levels of ventral sucker and ovary. Vitellaria dorsal to ceca, between ventral sucker and ovary. Eggs 0.021 by 0.012, no more than 12 in 1 worm.

Host: *Florida carrulea caerulea* (little blue heron).

Site: posterior intestine between ceca and cloaca.

Locality: Cabo Rojo, Puerto Rico.

Type specimen: Holotype No. 38220.



PHOENIX TREMPIDIA



*Ponticotrema* Issaitschikoff, 1927

Generic diagnosis. — Heterophyidae, Galactosominae: Body very small, elongate, rounded at both extremities. Oral sucker subterminal, large; prepharynx long, very conspicuous, esophagus very short. Ceca not reaching posterior extremity. Acetabulum submedian, equatorial, imbedded in parenchyma and opening into genital atrium. Testes rounded, diagonal, in posterior half of body. Seminal vesicle strongly developed, lying opposite acetabulum. Genital atrium with gonostyl, opening in front of acetabulum. Ovary rounded, submedian, postacetabular. Receptaculum seminis large, postovarian. Vitellaria diffuse in whole hindbody. Uterus descending to posterior extremity and then ascending, passing between gonads; eggs small. Parasitic in mammals.

Genotype: *P. euzini* Issaitschikoff, 1927 (Pl. 83, Fig. 1005), in *Felis catus domesticus*; Russia.

Дефинитивный хозяин: домашняя кошка (*Felis catus domesticus*).

Локализация: тонкие кишки.

Место обнаружения: СССР.

Описание вида (по Исаячинову, 1927). Маленькая или очень маленькая трематода, с плоским, вежним и прозрачным телом, удлинённой или бисекватообразной формы, 1,8 мм длины и 0,48 мм ширины (максимально). Кутикула передней части тела густо покрыта мелкими шипиками. Круглая субтерминальная ротовая присоска достигает 0,202 мм в диаметре, мощно развита и обильно снабжена радиально расположенными мышечными волокнами. Слабая брюшная присоска располагается в передней части паразита немного влево от медианной линии тела; задний край ее достигает середины длины тела, а передний немного прикрыт занимающей наружное положение половой присоской. Размеры брюшной присоски почти вдвое меньше ротовой; диаметр ее 0,108 мм. Половая присоска располагается впереди брюшной, слегка прикрывая своим задним краем ее передний край. Форма ее имеет вид овала, длинная ось которого, достигающая 0,135 мм длины, имеет косое направление по отношению к продольной оси тела паразита. Почти круглый половой синус 0,072 мм в поперечнике; в него открываются мужской и женский половые протоки отдельными половыми отверстиями, расположенными рядом: мужское впереди, женское позади. Канал, открывающийся мужским половым отверстием, отходит от семенного пузыря и располагается впереди идущего рядом с ним канала матки, сообщающегося с внешней средой посредством женского полового отверстия. Префаринкс резко выражен, 0,148 мм длины. Фаринкс почти круглый, с мощными боковыми стенками, обильно снабженными мышечными волокнами; диаметр его 0,117—0,108 мм. Пищевод очень короткий, 0,103 мм длины, иногда он совсем отсутствует. Просвет трубки пищевода может быть несколько шире или уже просвета трубки префаринкса. Кишечные ветви широкие, тянутся по бокам тела



PONTICOTREMA

*Pricetrema* Ciurea, 1933

Generic diagnosis. — Heterophyidae, Apophallinae: Body elongated pyriform, spinose. Oral sucker subterminal, comparatively large. Prepharynx distinct. Esophagus shorter than prepharynx, ceca extending to near posterior extremity. Acetabulum smaller than oral sucker, just postequatorial, opening into genital atrium. Testes situated side by side in posterior fourth of body. Seminal vesicle C-shaped, very voluminous, encircling acetabulum. Two gonotyls present, one on each side of genital pore. Ovary submedian, anterior to right testis. Receptaculum seminis posterodorsal to ovary. Vitellaria consisting of large, closely packed follicles, extending from level of pharynx to anterior end of testes, extensive dorsally, but confluent ventrally near intestinal bifurcation only. Uterine coils confined to intercecal field between testes and genital pore; eggs small. Intestinal parasites of marine mammals.

Genotype: *P. zalophi* (Price, 1932) Ciurea, 1933 (Pl. 86, Fig. 1045), syn. *Apophallus* z. P., in *Zalophus californianus*, U.S.A. (National Zoological Park, Washington D. C.); *Enhydra lutris*, *Zalophus californianus*; Alaska.

## APOPHALLUS ZALOPHI, new species

## PLATE 9, FIGURE 38

*Description.*—*Apophallus*: Body elongated piriform in shape, 435 $\mu$  long by 215 $\mu$  to 263 $\mu$  wide at the level of the ovary. The cuticle is beset with small scalelike spines, 4 $\mu$  long by 2 $\mu$  wide, arranged in alternating transverse rows. Oral sucker slightly subterminal in position, 60 $\mu$  to 75 $\mu$  in diameter. Prepharynx 30 $\mu$  to 33 $\mu$  long; pharynx ovoid to spherical in shape, 29 $\mu$  to 33 $\mu$  wide; esophagus 18 $\mu$  long; intestinal ceca relatively wide and extending to near the posterior end of the body, their blind ends being hidden by the testes. The acetabulum is circular, 52 $\mu$  to 60 $\mu$  in diameter, situated from 235 $\mu$  to 259 $\mu$  from the anterior end of the body and inclosed in the shallow genital sinus. The genital ducts open into the anterior part of the sinus and two elliptical gonotyls are present, one on each side of the genital aperture. The seminal vesicle is voluminous, more or less C shaped, and lying to the right of the acetabulum; there is a sharp constriction of the vesicle near the level of the posterior margin of the acetabulum which divides it into an anterior piriform part and a posterior globular part. The testes are somewhat triangular in outline, 81 $\mu$  to 96 $\mu$  by 81 $\mu$  to 110 $\mu$ , and are situated side by side in the posterior fourth of the body. The ovary is more or less triangular in outline, 55 $\mu$  to 75 $\mu$  by 67 $\mu$  to 92 $\mu$ , situated a short distance cephalad of the right testis. The seminal receptacle is spherical, 44 $\mu$  in diameter, and situated dorsal to the ovary and right testis. The vitellaria consist of large, closely packed follicles, which extend from the level of the acetabulum to the level of the anterior margin of the testes; the follicles are distributed over the entire dorsal surface but ventrally they are chiefly lateral except near the intestinal bifurcation where they form a distinct band across the body. The uterus consists of a few loops confined to the intercecal field between the anterior margin of the testes and the genital aperture. The eggs are 33 $\mu$  long by 18 $\mu$  wide, golden yellow, and slightly piriform in shape.

*Host.*—*Zalophus californianus*.

*Location.*—Small intestine.

*Distribution.*—North America (United States—National Zoological Park, Washington, D. C.).

*Type specimens.*—U.S.N.M. Helm. Coll. No. 30808; paratypes, No. 26632.

*Remarks.*—*Apophallus zalophi* is easily distinguished from *A. donicus*, the only species of the genus with which it might possibly be confused, by its size, relative length of the prepharynx and esophagus, and by the distribution of the vitellaria. *A. zalophi* is on the whole a much smaller species than *A. donicus* and the body is somewhat thicker. The prepharynx is longer than the esophagus in *A. zalophi*, while in *A. donicus* the reverse is true. The vitelline follicles are relatively larger in *A. zalophi* and extend from the level of the pharynx to the anterior margin of the testes, while in *A. donicus* the follicles extend from about midway between the pharynx and intestinal bifurcation to the posterior end of the body. The arrangement of the genital glands is essentially the same in

both species; there is, however, a greater tendency for the testes to be opposed in *A. zalophi* than in *A. donicus*.



*Pricetrema zalophi* (Price, 1932)

Синоним: *Aporhallsus zalophi* Price, 1932

(Рис. 77)

Дефинитивный хозяин: *Zalophus californicus*.  
Локализация: тонкие кишки.  
Место обнаружения: Северная Америка.



# LOOSE LEAF ORGANIZER

## SCHEDULE

PERIOD OR TIME								
COURSE MON. INSTRUCTOR								
COURSE TUE. INSTRUCTOR								
COURSE WED. INSTRUCTOR								
COURSE THU. INSTRUCTOR								
COURSE FRI. INSTRUCTOR								
COURSE SAT. INSTRUCTOR								

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

SCHOOL \_\_\_\_\_ TELEPHONE \_\_\_\_\_

#### Procerovum Onji and Nishio

*Procerovum* was first established by Onji and Nishio (1924) for their new species *P. varium*. Its generic diagnosis is as follows: body small, covered with cuticular spine acetabulum to the right; genital atrium small; testis single, located at the posterior part of the body; seminal vesicle well developed, with a thick and chitinous wall; ovary to the right of and behind the acetabulum.

Price (1940a) placed Onji and Nishio's genus in the subfamily Stellantchasmin established by him in 1939, and included in it *Monorchotrema microcha* and *H. calderoni*. *M. microcha* was considered by Chen (1936) to be a synonym of *H. yokogawai*, of which the seminal vesicle is not provided with a thick wall reinforced by chitinous substance hence it should remain in *Haplorchis*. *H. sisoni*, a smaller species, possesses a seminal vesicle very similar to that of *P. calderoni*, and should therefore be transferred to the genus *Procerovum*. There is a possibility, however, when a more careful study is made of *P. varium*, that *P. calderoni* or *P. sisoni* may be found to be synonymous with this species or the present all three species must be tentatively accepted as valid.

In a study of trematodes of which the encysted stages are found in freshwater fishes in Hong Kong, a large number were found belonging to *P. calderoni* and *P. sisoni*. A careful study of these specimens shows many variations from the original descriptions made by Africa and Garcia and by Africa, and for this reason detailed descriptions are given herewith.

FROM CHEN, 1949

#### VI. GENUS *PROCEROVUM* ONJI & NISHIO

Syn. *Procerovum* Onji & Nishio, 1916 (type by monotypy, *Procerovum varium* Onji & Nishio).

*Monorchotrema* Nishigori, 1924 (in part).

*Haplorchis* Looss, 1899 (in part).

The genus *Procerovum* was proposed by Onji & Nishio (1916), and the generic diagnosis has been emended by Onji & Nishio (1924) and by Chen (1949). In the light of the redescription of the type species and of a new species given below, many features of which are thought to be of generic significance, the generic diagnosis is further emended to read: *Procerovum* Onji & Nishio, 1916. With the characters of the family Heterophyidae: Haplorchinae: *Haplorchis* Group. Small, pyriform, scaly trematodes. Oral sucker of medium size; prepharynx, pharynx, and oesophagus present; caeca of variable length. Ventrogenital sac present, in or near midline immediately behind bifurcation of gut; contains little modified ventral sucker embedded in right side posteriorly, and small, dome-shaped, armed or unarmed gonotyl arising from dorsal wall. Genital sinus or separate male and female pores present; short and muscular; opens into ventrogenital sac on ventral face of gonotyl or separate from gonotyl, opposite mouth of ventral sucker. Ovary submedian, on right side behind ventrogenital sac; seminal receptacle present large or small, spherical, thick-walled, on right side dorsally. Laurer's canal long, arises from seminal receptacle and opens dorsally on left side; uterus with three primary loops. Testis single, median, or on right side, ventral; with single efferent duct; seminal vesicle of one or two thin-walled proximal portions and a distal thick-walled, muscular expulsoir lying dorsally along medial face of left caecum; ejaculatory duct short, thick-walled, muscular, with small dilated prostatic portion receiving ducts of free prostate glands, and unites with uterus to form genital sinus. Excretory system mesostomate; bladder triangular or spherical, behind testis.

TYPE SPECIES. *Procerovum varium* Onji & Nishio, 1916, emend.

OTHER SPECIES. *Procerovum calderoni* (Africa & Garcia); *Procerovum cheni* Hsu; *Procerovum batillans* sp. nov.; *Procerovum* sp. (= *P. sisoni* Chen (not Africa, 1938), 1949).



At the present time four species of *Procerovum* are considered as valid, namely *P. varium* Onji & Nishio, 1916, emend. Onji & Nishio, 1924; *P. calderoni* (Africa & Garnia, 1938) Price, 1940b, redescribed by Africa (1938) as *Haplorchis calderoni*; *P. sisoni* (Africa, 1938) Chen, 1949, redescribed by Chen (1949) and by Hsu (1950a); and *P. cheni* Hsu, 1950.

Although type or other material of *P. varium* could not be located, and hence a direct comparison made, the writer is convinced that the material described herein belongs to *P. varium*, despite the fact that this species is described by Onji & Nishio (1924) as having a proportionately larger ventral sucker. Onji & Nishio did not distinguish between gonotyl and ventral sucker, and indeed appeared to believe that the ventral sucker opened on the ventral surface; hence it seems likely that they measured not the ventral sucker but the ventral sucker and gonotyl together, and this, in the writer's specimens, would give a 'ventral sucker length' equal to that given by Onji & Nishio.

*Procerovum sisoni*, as described by Africa (1938), does not differ distinctly from *P. varium* as redescribed herein; further, the types of both species are unavailable (*sisoni* destroyed and *varium* presumed lost); hence it is proposed that *P. sisoni* be reduced to a synonym of *P. varium*.

A reappraisal of the species described by Chen (1949) and Hsu (1950a) as *P. calderoni* and *P. sisoni* suggests (i) that Chen's and Hsu's *P. calderoni* is the same as *P. sisoni* of Africa (1938) (= *P. varium*) as described by Africa (1938) and by me since it has an expulsor more than 100 $\mu$  and less than 200 $\mu$  long, a gonotyl with numerous tiny spines, and caeca terminating at about the middle of the testis; and (ii) that Chen's and Hsu's *P. sisoni* is not the same as Africa's *P. sisoni* (= *P. varium*) as it has an expulsor less than 100 $\mu$  long and caeca terminating in front of the posterior border of the ovary. Indeed, the combination of these two characters separates *P. sisoni* of Chen and of Hsu from all other species of *Procerovum*.

Kobayashi (1942) described five species, namely *Haplorchis minutus*, *H. hoihowensis*, *H. cordatus*, *H. microvesica* and *H. macrovesica*. Chen, 1949, on the basis of Kobayashi's descriptions, proposed that *H. macrovesica* be considered a synonym of *P. calderoni*, that *H. minutus*, *H. cordatus* and *H. hoihowensis* be considered synonyms of *P. sisoni*, and suggested that *H. microvesica* is probably a synonym of *P. sisoni*. However examination of two of Kobayashi's original specimens of each of his five species has shown (i) that all five belong to a single species, and (ii) that in length of caeca and expulsor they agree with *P. varium* as redescribed herein. It is proposed then, that the five species of *Haplorchis* of Kobayashi (1942) be considered synonyms of *P. varium*.

From Pearson, 1964

Heterophyidae  
Haplorchiinae

*Procerovum* Onji et Nishio, 1916

Generic diagnosis. — See p. 879.

Representatives from birds:

- P. cheni* Hsü, 1950, in *Macropodus opercularis*, adult experimentally in duckling and chicken; Canton.  
*P. sisoni* (Africa, 1938) (Pl. 72, Fig. 879), syn. *Haplorchis minutus*, *H. microvesica*, *H. hoihowensis*, *H. cordatus* — Chen, 1949, in *Oryzias latipes*, *Macropodus opercularis*, *Puntius semifasciolatus*, adult in duckling, chicken and kitten — Hsü (1950).

*Procerovum* Onji et Nishio, 1916

Generic diagnosis. — Heterophyidae, Haplorchiinae: Body very small-elongate pyriform, flattened, spinose. Oral sucker subterminal, prepharynx present, pharynx elliptical, esophagus comparatively long, ceca half-long. Acetabulum nearly as large as oral sucker, on the right of median line behind intestinal bifurcation. Testes single, oval, at posterior extremity, a little to the left. Seminal vesicle pretesticular, followed by fusiform expulsores. Ejaculatory duct passing dorsal to acetabulum and opening into narrow genital atrium. Genital pore anterodextral to acetabulum, occasionally median in extended specimens, immediately behind acetabulum. Receptaculum seminis and Laurer's canal present. Uterine coils occupying most of hindbody; eggs small, elongate. Vitellaria extending in dorsal area from behind ovary toward posterior extremity. Excretory vesicle funnel-shaped. Experimentally in mammals, probably in piscivorous birds in nature.

Genotype: *P. varium* Onji et Nishio, 1916 (Pl. 62, Fig. 759), experimentally in intestine of cat.

Other species:

- P. calderoni* (Africa et Garcia, 1935) Price, 1940, syn. *Monorchotrema* c. A. et G. (Pl. 99, Fig. 1203), in dog, cat and man; Philippines.

Metacercaria in *Ophiocephalus striatus*, *Glossogobius giuris*, *Ambassis*, *Croisson*, *Eleutheronema*, *Gerres*, *Hemiramphus*, *Hoplostia*, *Mugil*, *Palates*, *Tautis*, etc. — Vazquez-Colet and Garcia (1939, 40), Africa and Garcia (1940).

- P. cordatum* (Kobayasi, 1942) in dog (experimentally).

Metacercaria in *Anabas testudineus*, *Mugil affinis*, *Carassius*, sp., *Ophiocephalus maculatus*, *Misgurnus* sp.; Hainan Island.

- P. hoihowensis* (Kobayasi, 1942), syn. of *P. sisoni* — Chen (1949), in dog experimentally.

Metacercaria in *Ophiocephalus maculatus*, *Mugil affinis*, *Parabramis bramula*, *Hemiculter kneri*; Hainan Island.

- P. macrovesica* (Kobayasi, 1942), syn. of *P. calderoni* — Chen (1949), in dog (experimentally).

Metacercaria in *Ophiocephalus maculatus*, *Mugil affinis*, *Cyprinus carpio*, *Hemiculter kneri*, *Clarias fuscus*, *Anabas testudineus*; Hainan Island.

- P. microvesica* (Kobayasi, 1942), syn. of *P. sisoni* — Chen, (1949), in dog (experimentally).

Metacercaria in *Ophiocephalus maculatus*, *Mugil affinis*, *Acanthogobius flavimanus*, *Hemiculter kneri* and *Carassius* sp.; Hainan Island.

- P. minutum* (Kobayasi, 1942), syn. of *P. sisoni* — Chen (1949), in dog (experimentally).

Metacercaria in *Parabramis bramula*, *Carassius* sp., *Hemiculter kneri*, *Ophiocephalus maculatus*, *Acanthogobius flavimanus*, and *Mugil affinis*; Hainan Island.

- P. sisoni* (Africa, 1938) Chen, 1949 (Pl. 99, Fig. 1194), syn. *Haplorchis minutus*, *H. microvesica*, *H. hoihowensis*, *H. cordatus* — Chen (1949), in cat and dog; Philippines. In *Oryzias latipes*, *Macropodus opercularis*, *Puntius semifasciolatus*, adult in ducklings, chicken and kitten — Hsü (1950).

Metacercaria in *Therapon plumbeus*, adult experimentally in cats and dogs — Vazquez-Colet and Garcia (1939), Africa and Garcia (1940).

The description is based on a study of living flukes, 45 unflattened whole mounts, and serial sections of three worms from a naturally infected water rat, *Hydromys chrysogaster*. This material is considered to represent a new species which differs from the known species in having a shovel-shaped cuticular structure on the ventral sucker. To call attention to this difference, the name *Procerovum batillans* is proposed for it. Measurements (average and range) are given in microns of the holotype and the nine paratypes.

(1) *Description* (Figs. 31-33)

Small, pyriform, lightly pigmented, scaly trematode. Body 274 (258-296)  $\mu$  long; fore body flattened, tapering to anterior end; hind body cylindrical, 95 (90-108)  $\mu$  wide. Subcuticular gland cells as in *Haplorchis sprenti*, with addition of three gland cells with bodies beside oesophagus and ducts opening with prepharynx into cavity of oral sucker. Scelation of body as in *Haplorchis sprenti*, but with only two rows pre-oral scales. Brown cercarial pigment lightly scattered throughout body.

Oral sucker 30 (27-33)  $\mu$  long and 31 (28-33)  $\mu$  wide; prepharynx 21 (15-27)  $\mu$  long; pharynx 18 (17-22)  $\mu$  long and 15 (14-17)  $\mu$  wide, with nuclei confined to posterior third, caeca short, thick-walled extend typically to mid-level of ovary, occasionally just exceed posterior border.

Ovary median, toward ventral side, separated by a short space from ventral sucker. 32 (29-36)  $\mu$  long and 27 (22-31)  $\mu$  wide. Relations of oviduct, seminal receptacle and its duct, Laurer's canal, and common vitelline duct as in *Haplorchis sprenti*. Seminal receptacle very small, apparently non-functional; sperm stored in uterine coils. Uterus with three primary loops; course of uterus as in *Haplorchis sprenti*, but with first loop longer than other two and reaching posterior end (apparently as a result of shift of testis); metraterm short, thick-walled, transverse fusiform; runs mediad ventral to seminal vesicle and opens on left wall of ventrogenital sac separate from but immediately dorsal to male genital pore. Eggs (10, uterine) 23 (21-24)  $\mu$  long and 12 (11-12)  $\mu$  wide. Vitelline follicles large, dorsal; extend from between ventral sucker and middle of ovary to about posterior border of testis; arrangement of follicles variable, sometimes symmetric, sometimes asymmetric (Fig. 32), occasionally in a rosette, usually in a solid sheet.

Testis single, on left side; usually behind level of ovary, sometimes overlapping ovary; nearer dorsal surface; 56 (50-63)  $\mu$  long, and 38 (33-46)  $\mu$  wide. Single vas efferens arises anteriorly, runs antero-medially and empties into medial end of first part of seminal vesicle. Seminal vesicle bipartite; first (proximal) part large, 36 (28-43)  $\mu$  long and 28 (22-36)  $\mu$  wide, thin-walled, transverse, on left side ventrally in area bounded by ventral sucker, ovary and left caecum, may overlap ovary dorsally or ventrally, opens into second part through relatively long narrow duct; second distal part an expulsor, 35 (26-42)  $\mu$  long and 12 (11-12)  $\mu$  wide, with relatively thick wall of spirally wound muscle fibres, and lying dorsally medial and parallel to left caecum, with anterior end dorsal or lateral to ventral sucker. Ejaculatory duct relatively long, thick-walled; receives in slightly dilated region ducts of free prostatic glands lying along sides of expulsor and about ejaculatory duct; curves forward and ventrally to open ventral and slightly posterior to female pore on left wall of ventrogenital sac on small papilla opposite mouth of ventral sucker.

Ventrogenital sac median, or slightly to right, small, immediately post-bifurcal; 130 (110-150)  $\mu$  from anterior end; lined with thick, unarmed cuticle; contains ventral sucker, gonotyl, and separate male and female genital pores, largely filled by gonotyl and anterior lip of ventral sucker. Ventral sucker slightly modified; 25 (23-26)  $\mu$  long and 25 (23-27)  $\mu$  wide; opens into ventrogenital sac posterolatero-dorsally on right, with long axis inclined to the left and anteriorly; solidly muscular, with lip enlarged anteriorly, projecting into ventrogenital sac, and bearing a complex, stout cuticular ridge ending in a somewhat hooked, spoon-like projection on the left side opposite and ventral to the genital pores, and closely

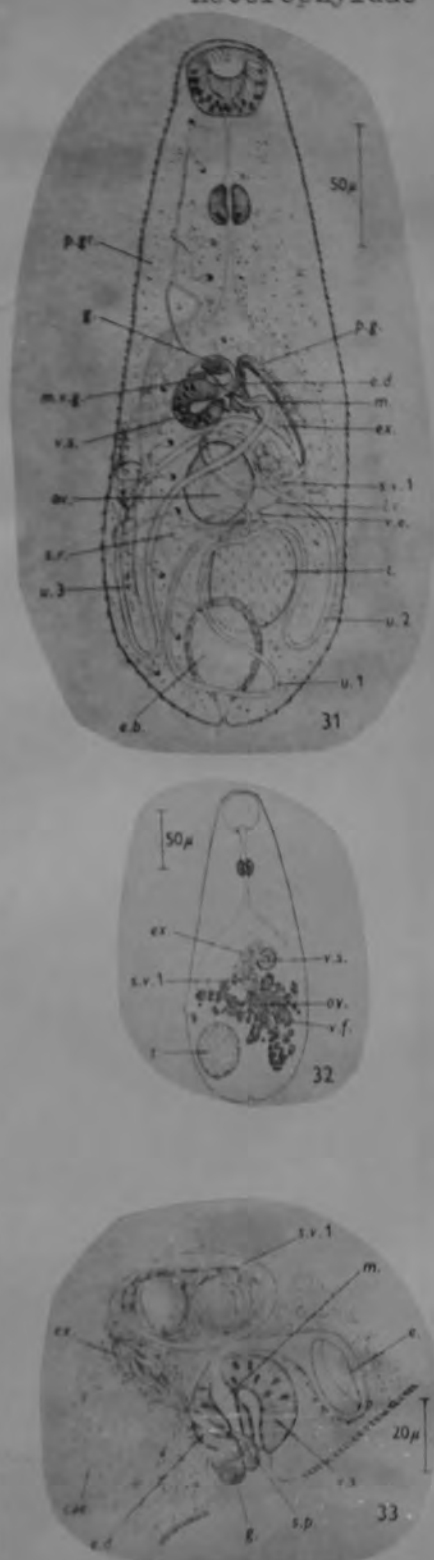


Fig. 33. Ventrogenital complex (lateral view)

associated with male genital pore. Gonotyl broad, tongue-like, transverse, solidly muscular, unarmed; arises from anterior wall of ventrogenital sac and projects ventrally anterior to ventral sucker and not closely associated with lateral genital pores; 7 (6-8)  $\mu$  long and 13 (12-15)  $\mu$  wide. Out-pocketing of ventrogenital sac absent.

Excretory system mesodermate; excretory pore terminal. Excretory bladder saccate, thick-walled, epithelial, extends anteriorly to or slightly beyond posterior border of testis ventrally. Primary collecting tubules arise antero-laterally, each runs forward and lateral ventral to caecum and divides at about level of gut bifurcation into anterior and posterior (secondary) collecting tubules, each of which receives tubules from three pairs of flame cells; of the three posterior pairs of flame cells, one member is ventral and the other dorsal in the first and third pairs (and in the posterior group of the anterior collecting tubules), whereas both are ventral in the second pair. Flame cell formula 2 [(2+2+2) = 6] (2+2+2).

**DIAGNOSIS OF *batillans*** (Fig. 31). With characters of the genus *Procerovum*, as amended above. Length 270  $\mu$ ; fore body tapering; width (of hind body) 100  $\mu$ ; oral sucker 29  $\times$  32  $\mu$ ; prepharynx 24  $\mu$  long; pharynx 17  $\times$  15  $\mu$ ; oesophagus 31  $\mu$  long; caeca extend to mid-ovary. Ovary 33  $\times$  28  $\mu$ , median, ventral; vitellaria coarsely follicular, dorsal, extend from anterior border ovary to posterior border testis, concentrated on right side; metraterm short, transverse, opens into left side ventrogenital sac dorsal to and separate from male genital pore. Testis single, behind and dorsal to ovary, on left side, 49  $\times$  45  $\mu$ ; vas efferens single; seminal vesicle bipartite, first part 38  $\times$  29  $\mu$ , thin-walled, transverse, second part an expulser, 42  $\times$  11  $\mu$ , lying along medial side of left caecum dorsally; ejaculatory duct thick-walled, curves ventrally and crosses metraterm to open ventral to female genital pore apparently on a small papilla on left wall of ventrogenital sac opposite mouth of ventral sucker and close to cuticular projection. Ventrogenital sac median, post-bifurcal, 130  $\mu$  from anterior end; contains ventral sucker, gonotyl and separate male and female genital pores. Ventral sucker, 24  $\times$  23  $\mu$  skewed antero-laterally toward left; solidly muscular; with complex cuticular ridge ending in lateral shovel-shaped prominence on lip anteriorly. Gonotyl 7  $\times$  12  $\mu$ , tongue-like, unarmed (transverse anterior to ventral sucker and separate from genital pores). Excretory bladder saccate; pore terminal; extends anteriorly to mid-testis ventrally.

**HOST.** Eastern water rat, *Hydromys chrysogaster* Geoffr.

**LOCATION.** Lower half of small intestine.

**LOCALITY.** Cairns, north Queensland, Australia.

**DISPOSITION OF MATERIAL.** U.S. Nat. Mus. (Helm. Coll.) 60336 (holotype and 3 paratypes), Brit. Mus. (Nat. Hist.) 1963. 5.1.18 (paratypes); author's collection.

### (2) Remarks

The intimate association of the slightly raised male genital pore with the concave postero-dorsal surface of the cuticular projection on the ventral sucker lip suggests that the latter functions as a sperm guide during copulation (Fig. 33). Further, as the male and female genital pores are separate, it seems likely that mutual insemination may occur. However, in the absence of observations on worms in copula, it is difficult to imagine how the ventrogenital complex actually functions.

### (3) Comparison

*Procerovum batillans* can be separated from the four valid species (see above) of *Procerovum*, namely *varium*, *calderoni*, *cheni*, and *Procerovum* sp. of Chen by the following combination of characters; (i) separate male and female genital pores, (ii) gonotyl unarmed and not bearing genital pore, (iii) ventral sucker with cuticular ridge, and (iv) testis lateral.

A critical appraisal of the relationships (and position) of *P. batillans* is not possible at this time as details of the ventrogenital complex are not known for *Procerovum cheni*, and *Procerovum* sp. of Chen. However, it may be of interest to point out *P. batillans* resembles *Stellantchasmus falcatus* and *S. aspinosus* in having an unarmed gonotyl not surrounding the genital pore, and differs markedly from *P. varium* (and apparently *P. calderoni*, *P. cheni* and *Procerovum* sp. of Chen) in which the ventral gonotyl does surround the genital pore. Should it be found that the occurrence of *P. batillans* is of the *Stellantchasmus* type without lateral caudal finfolds, and not of the *Haploechis-Procerovum* type with such finfolds, then it will be necessary to reconsider the limits of the genera *Procerovum* and *Stellantchasmus*.

*Procerovum calderoni* (Africa and Garcia, 1935)

(FIG. 1)

The material on which the present description of *P. calderoni* is based consists of 20

specimens, stained in Delaunoy's haematoxylin or borax carmine, supplemented by many living specimens and several sets of serial sections  $5\mu$  thick. The specimens were stained from the small intestine of dogs.

The trematode is elongated, pear-shaped, and almost cylindrical at the posterior end. The body is covered with scale-like spines, densely distributed anteriorly, but farther apart towards the posterior end.

Body length 0.400-0.614 mm., width 0.100-0.233 mm. (average 0.473 by 0.180 mm.); greatest width at level of posterior third. Oral sucker terminal, 0.036-0.053 mm. long by 0.036-0.060 mm. wide (average 0.041 by 0.045 mm.). Acetabulum small, weakly developed, conspicuous and buried in parenchyma, average diameter 0.022 mm.; located behind the testinal bifurcation at the anterior  $\frac{2}{5}$  of the body. It is closely associated with a tiny gonotyl, about 0.01 mm. in diameter, with which it forms a ventrogenital-sucker complex. Gonotyl covered with numerous spines. Genital sac small.

Prepharynx present, 0.002-0.016 mm. long (average 0.008 mm.). Pharynx almost globular, 0.022-0.036 mm. long and 0.023-0.030 mm. wide (average 0.028 by 0.027 mm.), its posterior third or fourth is glandular and takes stains deeply. Oesophagus slender, 0.038-0.080 mm. long. Bifurcation of the intestines at the anterior third of the body. The intestines extend to the middle level of the body, in front of the seminal receptacle and testis.

Located in the median field and at the posterior third of the body, or occasionally most at the posterior half, is a single testis, large and almost globular, 0.092-0.133 by 0.092-0.148 mm. (average 0.117 by 0.118 mm.). A short duct connects it with a large elongated seminal vesicle (average measurements 0.089 by 0.046 mm.), which lies diagonally on the upper side of the testis. It ends in a constriction which has an acute bend and is immediately followed by a long expulsor (average measurements 0.147 by 0.033 mm.) which leads forward, almost parallel to the seminal vesicle and the left caecum, to a level slightly in front of the acetabulum. The expulsor has a thick wall, of about  $7\mu$  or more made up of longitudinal chitinous fibres. The ejaculatory duct, which is about 0.025 mm. long, bends posteriorly and terminates with the metraterm.

Ovary spherical, 0.057 mm. in diameter, located at about the middle of the body between the testis and the acetabulum. Seminal receptacle located on the upper right side of the testis; about 0.05 mm. in diameter. Eggs numerous, brown, thick-shelled, with prominent opercular rim and occasionally thickened at the non-operculated pole; embryonated when fully developed, and measuring on an average 0.023 by 0.012 mm., filling the spaces of about the posterior  $\frac{2}{3}$  or  $\frac{3}{5}$  of the body. The metraterm ends with the ejaculatory duct.

Vitellaria in the form of large follicles, located behind the ovary and the vitelline duct about the middle level of the testis.

*Discussion.* The present species is identified as *P. calderoni* because of the large expulsor and the spiny gonotyl. In the original description the expulsor is even larger, being 0.230-0.250 mm. long, whereas in the present specimens it is only 0.147 mm. An important variation occurs in the length of the intestines, which in the present specimens extend to a level in front of the testis, and in the Philippine material to a region beyond the posterior level of the testis at the posterior end of the body. Probable variation also exists in the Philippine material.



*Procerovum calderoni*, ventral

From Chen, 1949

*Procerovum calderoni* (Africa et Garcia, 1935)

Синонимы: *Haplarchis calderoni* Africa et Garcia, 1935;  
*H. macrooestica* Kobayashi, 1942

(Рис. 137)

Дефинитивные хозяева: собака (*Canis familiaris*), кошка (*Felis catus domesticus*), а также человек.

Дополнительные хозяева: рыбы — *Macropodus opercularis* и *Puntius semifasciolatus*.

Промежуточный хозяин: *Melanoides tuberculata*.

Локализация: взрослые — в кишечнике окончательного хозяина; метатеркарии — в тканях рыб.



The following description is based on a dozen specimens stained in Delafield's haematoxylin or borax carmine and on about as many fresh specimens from the small intestine of local domesticated ducks (*Anas* sp.). After our study had been completed, some material was also collected from a cat, and it was found that there was considerable variation in size between the two sets of material. The specimens from both the duck and the cat are quite different from the original description given by Africa. Unless otherwise stated, the following description is based on the specimens obtained from ducks only, although it is equally applicable (except as regards size) to those from cats.

The trematode is an extremely small heterophyid, measuring 0.213 mm. long by 0.126 mm. wide when mounted without being previously pressed, and 0.391 by 0.189 mm

when previously pressed and mounted. The specimen from the cat is much larger, being 0.325 by 0.217 mm. and 0.534 by 0.222 mm. respectively. The body is ovoid or pear-shaped and is provided with scale-like spines, which are either absent or more widely spaced at the posterior end.

Oral sucker terminal, 0.033 mm. long by 0.037 mm. wide (in the cat 0.037 by 0.04 mm.). Mouth-opening somewhat subterminal and connected with a short prepharynx which varies from 0.002 to 0.020 mm. in length (average 0.012 mm.). Pharynx somewhat elongated, 0.027 mm. long by 0.022 mm. wide; posterior third or fourth glandular and takes deeply. Oesophagus slender, varying from 0.031 to 0.083 mm. long (average 0.065 mm.). The intestines extend to a level in front of the seminal receptacle or perhaps to the anterior border of the testis, but rarely beyond it.

Ventrogenital-sucker complex consists of a small acetabulum, 0.018 mm. in diameter

associated intimately with a gonotyl of about half its size, located at about the middle to the anterior third of the body, according to the state of contraction of the latter. The surface of the gonotyl is covered with numerous minute spines. Genital sac small.

Testis large, 0.086-0.155 mm. long and 0.052-0.142 mm. wide (average 0.119 by 0.097 mm.), located at the posterior third of the body. A short duct connects it with a seminal vesicle, 0.041 by 0.022 mm., which lies at the anterior border and on the right side of the testis. Expulsor long, 0.074 by 0.020 mm. (in the cat 0.117 by 0.024 mm.), with wall 2-6 $\mu$  thick, made up of fine longitudinal fibres. This structure lies almost horizontally, at about the same level as, or slightly above or below, the ventrogenital-sucker complex. Ejaculatory duct short, about 0.018 mm. long, terminating with the metraterm.

Ovary oval to almost globular, average measurements 0.046 by 0.044 mm. (in the cat 0.061 by 0.053 mm.), located to the right of centre, just above the testis. Seminal receptacle either globular or oval, measuring 0.038 by 0.039 mm. (in the cat 0.058 by 0.053 mm.), located laterally at the tip of the right caecum. Vitellaria in the form of follicles, arranged in two groups connected in the middle by a vitelline duct at about the level of the middle of the testis. Eggs numerous, brown, thick-shelled, with a prominent rim at the edge of the operculum, and slightly thickened at the non-operculated pole, measuring 0.009 by 0.012 mm. They are embryonated in the terminal part of the uterus, which passes between the left intestine above and the expulsor below and terminates with the ejaculatory duct.

**Discussion.** In general structure the specimens conform with Africa's original description, but they differ in having shorter intestines and by the absence of parallel transverse striations on the inner lining of the expulsor, which, according to Africa, can be seen in fresh preparations of the Philippine material. The first difference is unquestionably not important, as variations were noted among the specimens examined, while the parallel transverse striations of the expulsor are, according to Africa (personal communication 1941), not invariably present, even in the Philippine material.

In size the specimens vary considerably from the two kinds of host. From the duck they are decidedly much smaller than those from the cat, and consequently several internal structures are correspondingly also somewhat smaller. The size of the specimens from the cat is about the same as that of the Philippine material, which, it should be noted, is also from cats and dogs. It is most likely that the size of the body varies according to that of the hosts.



FIG. 2. *Procerocum sisoni*, ventral view.

From:  
Chen, 1949

Kobayashi (1942) described *H. minutus*, *H. hoikowensis* and *H. cordatus* from dogs used experimentally in Hainan. All three species were invariably characterized by thick-walled anterior portion of the seminal vesicle, which is here called an expulso. They thus fit in very well with the description of *P. sisoni*, with which, therefore, they should be synonymous.

*H. microvesica* is described by Kobayashi (1942) from dogs as typical of those haplorchi trematodes which possess a small seminal vesicle. In our experience with numerous aplocheilid trematodes we have often encountered specimens with a small seminal vesicle and it seems probable that in many instances the size of the organ may depend, to a certain extent, on the contents within. *H. microvesica* is most probably the same as *P. sisoni*, but its final status will depend on the nature of the wall of the anterior portion of the seminal vesicle, which Kobayashi describes as thin, though his accompanying drawing indicates clearly that the wall is quite rigid, as if possessing a chitinous wall.

Kobayashi (1942) also describes another species, *H. macrovesica*. This is the same as *alderoni*.

One cannot but be impressed by the great variations in size and structure of *P. sisoni* exemplified in the classifications made by Kobayashi.



*Procerovum sisoni* (Africa et Garcia, 1935)

Синонимы: *Haplarchis sisoni* Africa et Garcia, 1935; *H. minutus* Kobayashi, 1947; *H. boikowensis* Kobayashi, 1942; *H. cordatus* Kobayashi, 1942; *H. microserica*, Kobayashi, 1942

(Рис. 138)

Дефинитивные хозяева: кошка (*Felis catus domesticus*), собака (*Canis familiaris*), утка домашняя (*Anas boschas dom.*).

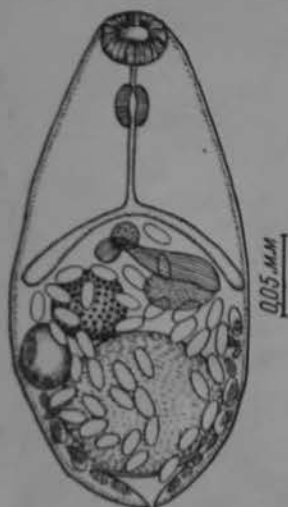
Дополнительные хозяева: рыбы — *Macropodus opercularis*, *Puntius semifasciolatus*.

Промежуточные хозяева: моллюск — *Melanoides tuberculata*.

Локализация: взрослые — в кишечнике окончательного хозяина; метатеркарии — в мышцах рыб.

Места обнаружения: Филиппинские острова, Китай.

Описание вида (по Чену, 1949). Наиболее мелкие из гетероцидных трематод, 0,213 мм длины и 0,126 мм ширины (прессованные —



*Procerovum varium* Onji et Nishio, 1924

Дефинитивный хозяин: *Felis catus domesticus*.

Локализация: кишечник.

Место обнаружения: Япония.

Описание не приводится из-за отсутствия литературы.

PROCEROVUM

Generic diagnosis of *Pseudascocotyle*.— SOGANDARES-BEPARL AND BRIDGMAN, 1960

Small hermaphroditic trematodes with a dorso-ventrally flattened pear-shaped body. Eyespots present. Cuticle spined. Oral sucker terminal, lacking spines, with a rudimentary muscular appendage. Prepharynx, pharynx, and esophagus present. Ceca 2, one on each side of body, terminating a short distance posterior to equator. Acetabulum present. Ventrogenital pore immediately anterior to acetabulum, followed by an anteriorly directed ventrogenital sac bearing, on its anterior portion, a prominent gonostyl which is transversely spined at its equator. Testes 2, side by side, on posterior end of body. Seminal vesicle non-muscular, sacular, extending from a short distance behind acetabulum to insert sinistrally on ventrogenital sac at level of posterior border of gonostyl, surrounded by prostate cells at junction with ventrogenital sac. Ovary between acetabulum and testes, slightly displaced to right of body midline. Seminal receptacle adjacent and sinistral to ovary. Mehlis gland amid ovary, seminal receptacle, and sinistral testes. Oviduct ciliated (in metacercaria). Vitelline glands composed of coarse follicles, extending from behind testes to level of ovary, overlapping testes dorsally and ventrally on their anterior course; vitelline reservoir at level of Mehlis gland. Uterus confined between pretesticular area and cecal bifurcation, approaching ventrogenital sac on its dextral side, entering sac anteriorly where it penetrates the gonostyl to open on its median posterior border. Eggs small, thin shelled. Excretory vesicle extending from terminal excretory pore, intertesticular, usually following contour of testes on its anterior extent, to end on anterior aspect of testes, excretory ducts branching in region of acetabulum, flame cell formula  $2\{12 + 2\}$ .

Type species.—*Pseudascocotyle molhensis-cola*.

Discussion.—The genus *Pseudascocotyle* is most closely related to the heterophyid genera *Ascocotyle* Loos, 1899, *Phagicola* Faust, 1920, and *Parascocotyle* Stunkard and Haviland, 1924, but differs by possessing a gonostyl that is perforated by the uterus, and by lacking oral spines. *Pseudascocotyle* seems to be most closely related to *Phagicola* and *Parascocotyle* in that the vitellaria extend to the level of the ovary.

The lack of oral spines in *Pseudascocotyle*

was at first believed to represent an artifact when adults were removed from an experimental hamster infection. Studies of the metacercariae soon removed these doubts. Cuticular spines, which in most species of *Ascocotyle*, *Phagicola*, and *Parascocotyle* begin a short distance posterior to the crown spines, leaving a bare zone, extended almost to the oral sucker aperture in our specimens of *Pseudascocotyle*. We have not made an exact count of sailfin mollies found infected but the incidence is high, at least 95 percent. Sailfin mollies of 25 mm total length were infected.

The following artificial key will serve to separate the four genera of the *Ascocotylinae* Yamaguti, 1958, as we presently visualize the subfamily.

1. Oral sucker with one or more circlets (a) of spines (figs. 5 to 7); vitellaria extending either to level of ovary or to acetabulum 2
  - Oral sucker lacking spines (fig. 8); vitellaria extending to level of ovary
    - Pseudascocotyle*, (this paper)
2. Oral sucker with two complete circlets of spines (fig. 5); vitellaria usually extending to level of acetabulum
  - Ascocotyle*, *sensu stricto*
  - Oral sucker never with two complete circlets of spines (figs. 6 to 7); vitellaria never extending to acetabulum 3
3. Oral sucker with a single complete circlet of spines and an incomplete accessory dorsal row of from 2 to 4 spines (fig. 6); vitellaria extending to level of ovary
  - Parascocotyle*, *sensu stricto*
  - Oral sucker with a single complete circlet of spines (fig. 7); vitellaria extending to level of ovary
    - Phagicola*, *sensu stricto*

3. *Pseudascocotyle mollieniscola*.

n. gen., n. sp. SOGINOVICS, BEANER  
AND BRUGMANN, 1960  
(Figures 2-4)

Second intermediate host in Louisiana—*Mollieniscus latipinna* LeSueur, sailfin molly (family Poeciliidae).

Location.—Encysted on wall and surface of intestine, body musculature, and on gill branchiae.

Locality of second intermediate host.—West end of U. S. Highway 11 Causeway, south shore of Lake Ponchartrain, Louisiana.

Holotype.—U. S. Nat. Mus. Helm. Coll. No. 39446.

Diagnosis (measurements on 3 gravid specimens, obtained from an experimental hamster infection, killed in boiling water).—Body flattened dorsoventrally, pyriform in outline, 0.476 to 0.527 long by 0.221 to

0.255 wide. Forebody 0.255 to 0.289 long. Cuticle completely spined to level of testes.

"Eyespots" present in region of prepharynx and/or pharynx. Oral sucker terminal, with a rudimentary muscular appendage, lacking oral spines; 0.056 to 0.056 wide by 0.056 to 0.056 from anterior end of sucker to

posterior tip of muscular appendage. Pre-

pharynx inserting ventral to muscular appendage of oral sucker, 0.088 to 0.100 long, or about 1.57 to 1.78 times longer than oral sucker, depending upon contraction of forebody. Pharynx 0.040 to 0.048 long by 0.040 to 0.040 wide. Esophagus from 0.044 to 0.052 long, depending upon contraction of forebody. Ceca 2, connecting with esophagus, one on each side of body, extending a short distance posterior to acetabulum. Acetabulum 0.048 to 0.048 long by 0.056 to 0.056 wide. Sucker width ratio about 1:1.4.

Ventrogenital pore median followed by a ventrogenital sac with a gonostyl about 0.012 to 0.016 long by 0.044 to 0.048 wide at its anterior border. Gonostyl with a ventral set of 17 conspicuous spines arranged equatorially in a transverse row. Testes 2, in posterior  $\frac{1}{4}$  body, side by side; sinistral testis 0.048 to 0.064 long by 0.048 to 0.072 wide; dextral testis 0.064 to 0.064 long by 0.056 to 0.076 wide. Seminal vesicle saccular, extending from a short distance posterior to acetabulum to insert on sinistral side of ventrogenital sac at level of posterior border of gonostyl where it is surrounded by prostate cells. Ovary between acetabulum and testes, displaced to right of body midline; oval in shape, 0.056 to 0.076 long by 0.068 to 0.076 wide. Seminal receptacle equatorial and sinistral to ovary. Mehlis' gland amid ovary, seminal receptacle, and sinistral testis. Oviduct (visible in live metacercariae) ciliated. Vitelline glands of coarse follicles, usually dorsal and ventral to outer aspect of testes, extending from behind testes to level of ovary. Vitelline duct between testes and ovary, expanding to form



a small vitelline receptacle at level of Mehlis' gland. Uterus in transverse coils, restricted between testes and cecal bifurcation, approaching ventrogenital sac on dextral side to insert into anterior border where it perforates the gonostyl to open on its median posterior border as a uterine pore. Eggs (fig. 4) 0.016 to 0.020 long by 0.012 to 0.012 wide. Excretory vesicle extending from a median posterior excretory pore, between testes, usually following their contour, to end on anterior aspect of testes; excretory ducts branching at level of or slightly anterior to acetabulum; flame cell formula 2 [(2 + 2) + (2 + 2)].

PSEUDASCOCOTYLE

*Pseudogalactosoma* Yamaguti, 1942

*Generic diagnosis.* — Heterophyidae, Galactosominae: Body elongate, spined. Oral sucker terminal, very large. Prepharynx long. Pharynx well developed. Esophagus very short or practically absent. Ceca opening into excretory vesicle at posterior extremity. Acetabulum small, imbedded in body parenchyma in anterior half of body. Testes tandem, intercecal, in posterior half of body. Vesicula seminalis winding, extending back of acetabulum. No cirrus pouch. Genital atrium simple, opening immediately in front of acetabulum. Ovary between acetabulum and anterior testis. Receptaculum seminis and Laurer's canal present. Vitellaria extending in lateral fields of hindbody and intruding into forebody, confluent dorsally in front of acetabulum. Uterus descending to posterior extremity. Excretory vesicle Y-shaped, bifurcating between two testes, forming cloaca at posterior end; pore terminal. Parasitic in marine fishes as larva; adult unknown, may be parasitic in marine birds.

*Genotype:* *P. macrostoma* Yamaguti, 1942 (Pl. 80, Fig. 970), in flesh and body cavity of *Acanthogobius flavimanus*; Japan.

PSEUDOGALACTOSOMA



## Pygidiospiinae Yamaguti, 1958

Heterophyidae: Body very small, flattened pyriform, concave ventrally or not. Oral sucker rather small, prepharynx distinct, pharynx well developed, esophagus short, ceca terminating in front of testes or reaching to posterior end. Acetabulum small, enclosed in genital atrium. Testes symmetrical or diagonal, at or near posterior end. Seminal vesicle divided. No cirrus pouch. Genital atrium median, in midregion of body or a little more anteriorly. Ovary submedian, pretesticular. Seminal receptacle present. Uterus occupying most of hindbody anterior to testes, may intrude into intertesticular space. Vitellaria in two lateral groups in testicular or pretesticular zone. Excretory vesicle with paired lateral branches in type genus. Parasites of birds, occasionally of mammals.

## Key to genera from birds:

Ceca reaching to posterior end; testes diagonal in posterior quarter of body; vitellaria in pretesticular lateral fields..... Taphrogonimus

Ceca ending in front of testes; testes symmetrical, at posterior end of body; vitellaria in testicular lateral fields...  
LL..... Pygidiospis Looss, 1907

*Pygidiospis* Looss, 1907

Generic diagnosis. — See p. 719.

Genotype: *P. genata* Looss, 1907 (Pl. 77, Fig. 938), in *Pelecanus onocrotalus*; Egypt. Ciurea (1933) obtained this species experimentally from dogs fed with different fishes from Black Sea. Adults were obtained by feeding metacercariae from *Astatotilapia desfontainesi* to rats — Balozet and Callot (1939). In dog; Egypt, Palestine, China, Europe. Experimentally in dog or cat — Vazquez-Colet and Africa (1938), Khalil (1939), Africa and Garcia (1940). Cercaria develops in *Melania tuberculata*; Egypt — Khalil (1939). Fish hosts: Witenberg (1929), Ciurea (1933), Balozet and Callot (1938), Vazquez-Colet and Africa (1938), Khalil (1939), Africa and Garcia (1940), Christensen and Roth (1949). Avian hosts: Looss (1911, 33, 34), Goddar, (1934).

Other species from mammals.

*P. (?) microstomum* Travassos, 1928, in *Mus norvegicus*; Brazil.

*P. summa* Onji et Nishio, 1916, in *Colymbus arcticus pacificus*; experimentally in cats and dogs.

Oculate lophocercous cercaria with 7 pairs of penetration glands develops in *Tympanotomus microptera* — Ochi (1931). Metacercaria in *Mugil cephalus* and *Glossogobius brunneus*; adults in cat, dog and rat experimentally — Onji and Nishio (1916, 24). *Pseudorasbora parva* — Hasegawa (1934). Naturally in dog of Japan and China, and *Milvus lineatus* of Japan.

*Pygidiopsis* Looss, 1907

Generic diagnosis. — Heterophyidae, Pygidiopsinae: Body small, flattened pyriform, with ventral concavity, spined. Oral sucker subterminal, prepharynx moderately long, esophagus short or of moderate length; ceca terminating just in front of testes. Acetabulum small, usually postequatorial. Testes symmetrical, at posterior end of body. Vesicula seminalis bipartite, postacetabular. Prostatic complex distinct. Cirrus modified into hollow eversible lentiform plug, opening immediately anterolateral to acetabulum. Ovary submedian, pretesticular, medial to right cecal end. Receptaculum seminis and Laurer's canal present. Uterus coiled between testes and acetabulum, overreaching ceca laterally; eggs small. Vitelline follicles comparatively large, massed together laterally in ovariovascular zone. Excretory vesicle with paired lateral

7. *Pygidiopsis* (n. g.) *genata* (n. spec.) <sup>Looss, 1907</sup>

Fig. 7.

Eine sehr kleine Form, in vereinzelt Exemplaren unter den *Heterophyes fraterus* im Darne von *Pelecanus onocrotalus*, Cairo.

Maximallänge gestreckt konservierter Individuen bis gegen 0,5 mm, meist aber nicht mehr wie 0,3—0,4 mm. Körperform *Heterophyes*-ähnlich, d. h. aus einem blattartig dünnen Vorderkörper und einem dicken Hinterkörper bestehend, die dicht hinter dem Bauchsaugnapfe ziemlich unvermittelt ineinander übergehen und sich bei der Konservierung mehr oder weniger stark aufeinander zu biegen. Abweichend von *Heterophyes*, sind hier die Seitenränder beider, i. e. des Vorder- und Hinterkörpers, nach der Ventralseite eingekrümmt, so daß stark kontrahierte Individuen eine ganz eigenartige Körperform annehmen können. Vorderkörper im Umriss je nach der Kontraktion entweder mehr oval oder fast dreieckig nach dem Mundende verjüngt; Hinterkörper stets breiter, im Maximum 0,2—0,22 mm, abgerundet, und nur das den Exkretionsporus tragende äußere Ende gelegentlich etwas papillenartig erhoben. Haut dicht mit breiten, kurzen Schuppen bewaffnet, die erst in unmittelbarer Nähe des Hinterendes ganz aufhören. Saugnapfe von fast gleicher Größe; Mundsaugnapf im Durchmesser um 0,04 mm schwankend, Bauchsaugnapf eine Spur kleiner, 0,037—0,039 mm, und, wie schon erwähnt, dicht vor dem Uebergang in den verdickten Hinterkörper gelegen. Pharynx meist lang gestreckt (Maße 0,036:0,024), vom Mundsaugnapf durch einen so langen Präpharynx getrennt, daß er meist in der Mitte des unpaaren Darmabschnittes gelegen erscheint. Darmschenkel mittellang, biegen vor dem Bauchsaugnapfe ziemlich scharf nach den Seiten und damit ventralwärts ab, kehren aber auf ungefähr halber Höhe des Hinterkörpers wieder nach der Medianebene und dem Rücken um und endigen hier einander gerade gegenüber. Exkretionsporus auf der schon erwähnten, papillenartigen Hinterleibspitze; Blase im Prinzip V-förmig, die kurzen Schenkel unter der Rückenfläche zwischen Hoden und das große Receptaculum seminis sich eindrängend (Fig. 7 B u. C). Hinter ihnen sieht man vom Stamme der Blase noch jederseits einen zweiten Seitenast ausgehen, der sich von hinten her dicht an die Hoden anlegt; es war aber nicht mit Sicherheit festzustellen, ob diese beiden Seitenäste selbständige Bildungen darstellen. Wahrscheinlicher ist, daß die normalerweise weiten, echten Blasenschenkel von den Hoden derart gegen die Rückenfläche gedrängt werden, daß ein Teil von ihnen vor, ein anderer Teil von ihnen hinter denselben zum Vorschein kommt.

Genitalporus ungefähr median dicht vor dem Bauchsaugnapf. Er stellt einen ziemlich breiten und tiefen Spalt dar, dessen rechte Hälfte sich anscheinend direkt in das äußerste blasse und schwer sichtbare Metratrum fortsetzt. Die linke Hälfte des Genitalspaltes führt zunächst in ein linsenförmiges, mit der Ebene seiner größten Ausdehnung senkrecht zur Körperfläche gestelltes Körper von etwa halber Größe des

Bauchsaugnapfes, dessen Innenwand (der Körper ist selbstredend hohl, seine Höhlung eine Fortsetzung des Genitalspaltes) in eine kleine Anzahl

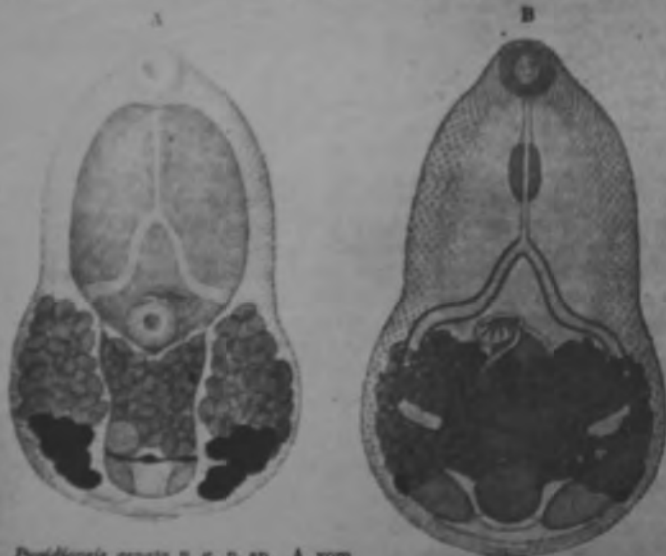


Fig. 7. *Pygidiopsis genata* n. g. n. sp. A vom Dorsale, B vom Rücken, C von der linken Seite; Vergr. ca. 200.

scherförmig nach der Peripherie ausstrahlender Falten gelegt ist. An einer der Genitalöffnung ungefähr gegenüberliegenden Stelle am Grunde des Körpers nimmt der eigentliche Ductus ejaculatorius seinen Ursprung. Der Körper kann, wie eines der Individuen zeigt, nach außen vorgestülpt werden und repräsentiert dann einen knopfartigen, glattwandigen Anhang mit einer Öffnung an seiner freien Fläche: der Öffnung des Ductus ejaculatorius. Dieser letztere ist ebenfalls sehr blaß und schwer erkennbar; er geht nach kurzem Verlaufe in eine schwach entwickelte Pars prostatica über — die wenigen Prostatazellen liegen zerstreut in der Nachbarschaft — und diese schließlich in eine 8-förmige Samenblase, von der gewöhnlich nur die beiden letzten Windungen in U-Form sichtbar sind (Fig. 7 B); sie liegen, ebenso wie der Ductus selbst, dicht unter der Rückenfläche. Die beiden längsovalen Hoden haben, wie bei *Heterophyes* und *Ascocotyle*, ihre Lage symmetrisch nahe am Hinterende. Der etwas kleinere, rundliche Keimstock findet sich, wiederum



Ventralseite (Fig. 7 A). Der Schalendrüsenskomplex liegt medianwärts von ihm ungefähr in der Mittellinie des Körpers; er ist wegen dessen Dicke niemals deutlich zu sehen, dagegen erscheint ventral unter ihm ein kleines Dotterreservoir, von dem die queren Dottergänge nach den Seiten ausstrahlen (Fig. 7 A). Die Dotterstöcke selbst liegen seitlich in der ventralen Körperhälfte und sind infolgedessen vom Rücken her nicht, oder nur in ihren äußersten Ausläufern sichtbar (Fig. 7 B). Sie bestehen aus relativ wenigen und großen Follikeln und reichen vom Vorderrande des Keimstockes bis zum Hinterende der Hoden. Dorsal vom Schalendrüsenskomplex und dicht unter der Rückenfläche (Fig. 6 B, C) erscheint ein großes kugeliges Receptaculum seminis, in dem die Samenfäden in der charakteristischen Weise radiär angeordnet liegen. Ein Laurerscher Kanal war nicht mit Sicherheit aufzufinden, dürfte aber vorhanden sein. Die Uterusschlingen erfüllen den gesamten verdickten Hinterkörper bis an den Vorderrand der Dotterstöcke und Keimdrüsen hin und lassen auf der Rückenseite nur Receptaculum seminis, Samenblase und die Enden der Darmschenkel frei. Die hellgelbbraunen, dünnschaligen Eier sind im Mittel 0,021 : 0,011 mm groß.

Daß das Genus *Pygidiopsis* den Heterophyiden zugehört und *Ascocotyle* besonders nahe steht, braucht kaum besonders erwähnt zu werden; seine hauptsächlich unterscheidenden Merkmale liegen in der Körperform und der Gestaltung der Genitalorgane.

Таблица для определения видов  
рода *Pygidiopsis* Looss, 1907

- 1 (6). Префаринкс длиннее пищевода.
- 2 (5). Петли матки не заходят за уровень брюшной присоски.
- 3 (4). Ротовая присоска вдвое меньше брюшной присоски и снабжена мешковидным задним придатком... *P. pindoramensis* Travassos, 1929.
- 4 (3). Ротовая присоска таких же размеров, как и брюшная, снабжена задним коническим придатком... *P. phalacrocoracis* Yamaguti, 1939.
- 5 (2). Петли матки заходят вперед за уровень бифуркации кишечника. Ротовая присоска без придатков... *P. macrostomum* Travassos, 1928.
- 6 (1). Префаринкс короче пищевода.
- 7 (8). Ротовая присоска не снабжена придатком. Петли матки доходят до уровня переднего края брюшной присоски. Желточники состоят из 5—7 фолликулов . . . . . *P. genata* Looss, 1907.
- 8 (7). Ротовая присоска снабжена маленьким задним придатком. Желточники простираются вперед до уровня переднего края яичника . . . . . *P. summa* Onji et Nishio, 1924.

*Pygidiopsis genata* Looss, 1907

(Рис. 105)

Дефинитивные хозяева: кошка (*Felis catus domesticus*), персидский волк (*Canis lupus*), собака (*Canis familiaris*), крыса (*Rattus norvegicus*), кролик (*Oryctolagus cuniculus* — экспериментально), еж (*Erinaceus europaeus*); птицы — *Pelecanus crispus*, *Pelecanus onocrotalus*, *Butorides virescens*,

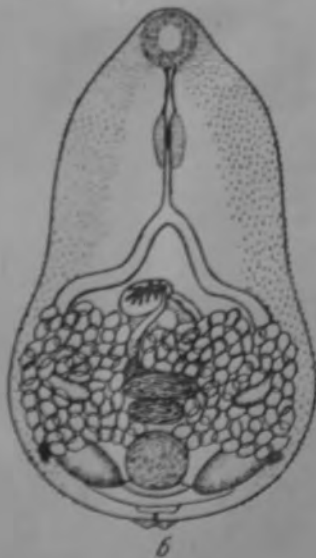
*Egretta garzetta*, *Haliaeetus albicilla*, *Platalea leucorodia*, *Larus argentatus*, *Ardea cinerea*, *Ardea purpurea*, *Azio otus*, *Podiceps cristatus*, *Plegadis falcinellus*, *Nycticorax nycticorax*.

Дополнительные хозяева: *Tilapia galilea*, *T. simonsis*, *Gobius cephalargus*, *Gobius fluvidilis*, *Barbus canis*, *Aterina pontica*, *Pleuronectes flesus*, *Scardinius erythrophthalmus*.

Локализация: взрослые — в кишечнике окончательного хозяина; метациррарии — в жабрах и мускулатуре рыб.

Места обнаружения: США, Египет, Китай, Палестина, Румыния.

Описание вида (Витенбергу, 1929). Тело состоит из почти шарообразной задней части и приплюснутой передней части. Длина тела 0,4—0,7 мм и ширина 0,2—0,4 мм. Все тело, исключая заднюю часть, покрыто толстыми чешуеобразными шипиками. Вокруг ротового отверстия имеется ряд шипиков, в количестве 16; они вдвое длиннее кутикулярных и заметны лишь на свежем материале.

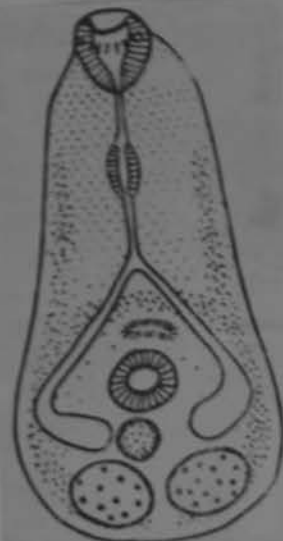


3. *Pygidiopsis genata* Looss, 1907  
(рис. 2)

Один видистронованный метацир-  
карий этого вида выделен из муску-  
латуры ластовиной щуки в районе  
Куды-Мамы.

В рыбах СССР метациркая P.  
genata до последнего времени не ре-  
гистрировалась, хотя широкая фор-  
ма сосальщика распространена ши-  
роко у щуки, леща и в часте  
отмечена в районе Дуды Сако-  
вой, 1952, на Рыбхозе водохрани-  
лище Шегинин, 1954, 1957, в Азе-  
рбайджане Шахтаткиной, 1953, в  
Черноморском заливе Леоно-  
вич, 1960).

Рис. Киевский, 1964 (по рисунку)



*Pygidiopsis macrostomum* Travassos, 1928

(Рис. 108)

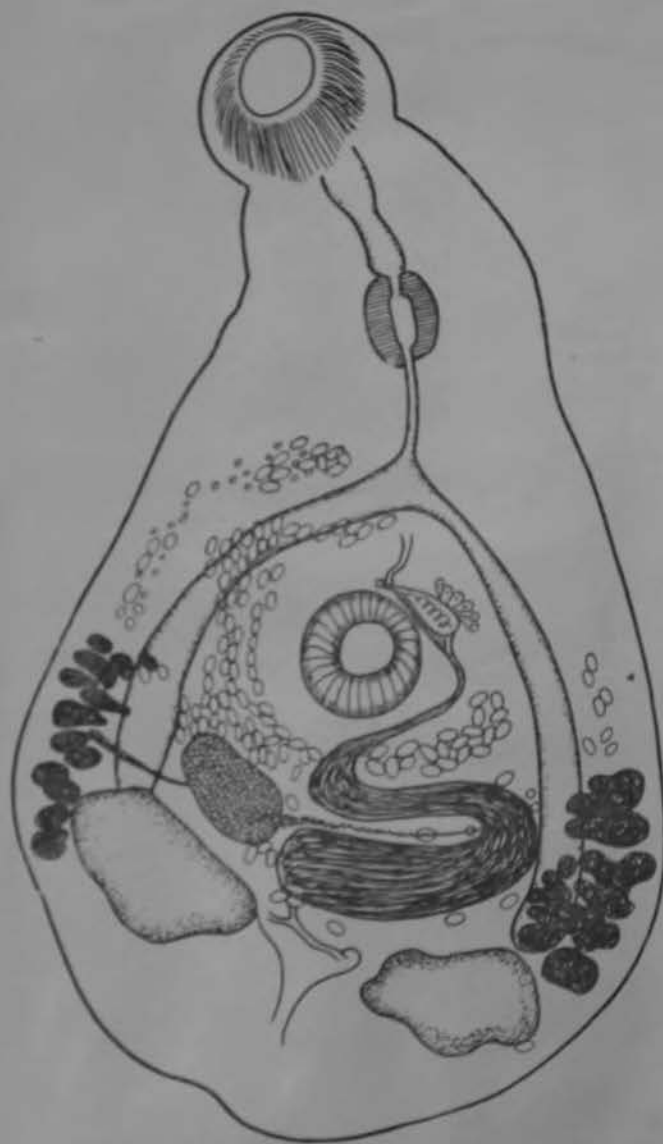
Дефинитивный хозяин: *Mus norvegicus*.

Локализация: кишечник.

Место обнаружения: Бразилия (Рио де Жанейро).

Описание вида (по Travassos, 1928). Тело 0,84 мм длины и 0,48 мм максимальной ширины. Кутинула покрыта шипиками. Ротовая присоска сравнительно большая, 0,12 мм в диаметре. Пищевод 0,086 мм длиной. Префаринкс 0,10 мм длиной. Фаринкс 0,075—0,056 мм в диаметре. Кишечные ветви тянутся до уровня семенников. Генитальное отверстие открывается впереди брюшной присоски медианно. Брюшная присоска 0,097 мм в диаметре. Простатическая часть заметна. Семенной пузырек неправильной формы. Семенники лежат в задней части тела. Яичник располагается впереди семенников. Матка занимает пространство между семенниками и бифуркацией кишечника; ветви ее пересекают кишечные ветви. Яйца 0,024 мм длины и 0,013—0,016 мм ширины.

Литература: Travassos, 1928, стр. 3—5.



*Pygidiopsis phalacrocoracis* Yamaguti, 1939

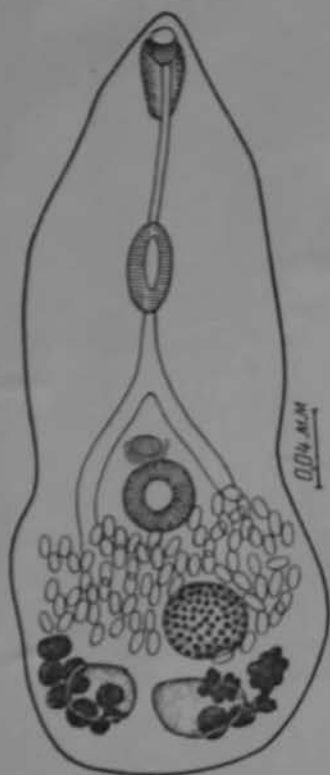
(Pl. 106)

Дефинитивный хозяин: *Phalacrocorax carbo*.

Локализация: тонкие кишки.

Место обнаружения: Япония.

Описание вида (по Ямагути, 1939). Тело сплюснутое, булавовидное, длиной 0,43—0,65 мм, при максимальной ширине 0,15—0,225 мм вблизи закругленного заднего конца. Боковые края повернуты вентрально, образуя впадину в форме лодки. Кутикула на всем протяжении окружена микроскопическими шипиками. Ротовая присоска расположена





## Un *Pygidiopsis* (Trematoda Heterophyoidea) de *Sterna* de la côte du Sénégal

par ROBERT PR. DOLLFUS et ANDRÉ CAPRON.

MATÉRIEL EXAMINÉ : environ 180 spécimens récoltés dans l'intestin d'un *Sterna hirundo* L. 1758, à Rufisque (Sénégal). Dr Vétérinaire Pierre-Claude MORNI, leg., 30-7-1955.

Tous les spécimens sont malheureusement un peu macérés (1).

DESCRIPTION : Corps plat, piriforme, environ 3 fois 1/2 plus long que large. Les plus grands individus n'atteignent pas une longueur de 1 mm. Aucun exemplaire n'a conservé sa cuticule, par suite d'une fixation trop tardive, mais la cuticule était certainement spinulée ; il reste quelques épines sur le bord interne de la ventouse ventrale et dans la cavité de celle-ci.

Ventouse orale terminale. Ventouse ventrale un peu plus grande que l'orale, située à la fin du 2<sup>e</sup> tiers de la longueur du corps, pénétrant quelquefois un peu dans le dernier tiers. Prépharynx, pharynx et œsophage de longueurs très variables selon que la région antérieure du corps était plus ou moins en extension ou en rétraction lors de la mort. Le prépharynx peut être de plus court que le pharynx (fig. 2) à 1 fois 1/2 plus long. Le pharynx est moins long que la ventouse orale, il est généralement ovale allongé longitudinalement ; quelquefois il est un peu plus large que long. L'œsophage est généralement un peu plus de 2 fois plus long que le pharynx. Les branches intestinales divergent lentement et s'étendent postérieurement à peu près jusqu'à la fin du 1<sup>er</sup> septième de la longueur du corps, atteignant, ou presque, le bord antérieur des testicules.

(1) Mélanges à ces *Pygidiopsis*, il y a environ une dizaine de *Galactosomum caelatum* (DRECHER, 1866), espèce connue chez d'autres espèces de *Sterna*. F. N. MONTAUDO (in SERRAVALLE, 1952, p. 414) a eu grand tort de réunir cette espèce à *G. caelatum* (DRECHER, 1866), espèce bien distincte, comme l'a rappelé St. PASTOR (1950, p. 113-115.)



FIG. 2.

visible, ils sont souvent un peu rétrécis au voisinage de l'opercule.  
L'appareil excréteur, sauf la partie terminale de la vessie, n'a pas été observé.

Deux testicules côte à côte au même niveau, dans le dernier 7<sup>e</sup> du corps, dont ils occupent toute la largeur; ils sont ovales-transverses, de forme à peu près régulière, non lobés et en contact l'un avec l'autre sur la ligne médiane. La vésicule séminale, piriforme, se trouve immédiatement en arrière de la ventouse ventrale et se prolonge le long du bord gauche de celle-ci pour aboutir



FIG. 3. — Appareil génital ♀, région centrale.

O : ovaires. RS : receptaculum seminis. V : vitellogènes. T : testicule.

au sinus génital, arqué en forme de courte banane, situé contre le bord antérieur de la ventouse ventrale et un peu vers la gauche.

L'ovaire, à contour généralement circulaire, est légèrement en avant du testicule droit, parfois en contact avec lui; son bord droit est en contact avec le caecum droit.

Les vitellogènes consistent en 5 ou 6 gros follicules de chaque côté du corps, dans le 7<sup>e</sup> huitième ou les 8<sup>e</sup> et 9<sup>e</sup> dixièmes de sa longueur; le dernier follicule empiète souvent un peu sur le bord antéro-externe du testicule correspondant. Le *receptaculum seminis*, généralement volumineux, est arqué, immédiatement en avant et en contact des testicules, immédiatement à gauche et au contact, ou presque, de l'ovaire. La vitelloducte transverse est au niveau de l'ovaire ou au niveau du bord

postérieur de celui-ci. L'utérus décrit des sinuosités transversales, d'abord dans l'espace entre les vitellogènes, ensuite il s'étend plus en dehors, dépassant les caeca intestinaux et rejoint l'ouverture du sinus génital en passant du côté droit, contre le bord droit de la ventouse ventrale. Les œufs ont une coque assez épaisse et un opercule très

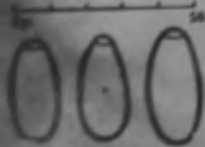


FIG. 4. — Œufs.



FIG. 1.

Dimensions de deux individus (mm) :

Longueur .....	0,908	0,785
Largeur .....	0,263	0,263
Ventouse orale .....	0,055	0,053
Ventouse ventrale .....	0,069	0,077 × 0,063
Prépharynx .....	0,105	0,075
Pharynx .....	0,038 × 0,050	0,033 × 0,019
Œsophage .....	0,063	0,083
Testicules .....	0,087	0,097-0,102 × 0,076
Œufs (μ) .....	27,7 × 16,6 μ, 26 × 16,5, 26,3 × 17,5, 26,4 × 14; maximum 32 × 16,6	

DISCUSSION : Par tous ses caractères, ce Distome appartient au genre *Pygidiopsis* A. LOOSS 1907. Dans ce genre, 5 espèces ont été décrites : *genata* A. LOOSS 1907, *macrostomum* L. TRAVASSOS 1928, *pindoramensis* L. TRAVASSOS 1929, *summa* ONJI et NISHIO 1924, *phalacrocoracia* S. YAMAGUTI 1939. Une seule de ces espèces est voisine de la nôtre ; c'est *P. pindoramensis* TRAV., d'*Ardetta erythromelas* (VIEILLOT), de Rio de Janeiro (Brésil) ; mais la nôtre est plus grande ; les œufs aussi sont plus grands, les vitellogènes s'étendent moins loin postérieurement et le sinus génital a un emplacement un peu différent ; il n'est pas contre le bord droit de la ventouse ventrale, mais contre le bord antérieur. Nous estimons donc que notre espèce est nouvelle et nous la nommons

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(1) Mélangés à ces *Pygidiopsis*, il y a environ une dizaine de *Galactosomum cochlear* (DIESING, 1850), espèce connue chez d'autres espèces de *Sterna*. F. N. MOROSOV (in SKRJABIN, 1952, p. 416) a eu grand tort de réunir cette espèce à *G. cochleariforme* (RUDOLPHI, 1819), espèce bien distincte, comme l'a rappelé St. PRUDHOE (1950, p. 143-145).

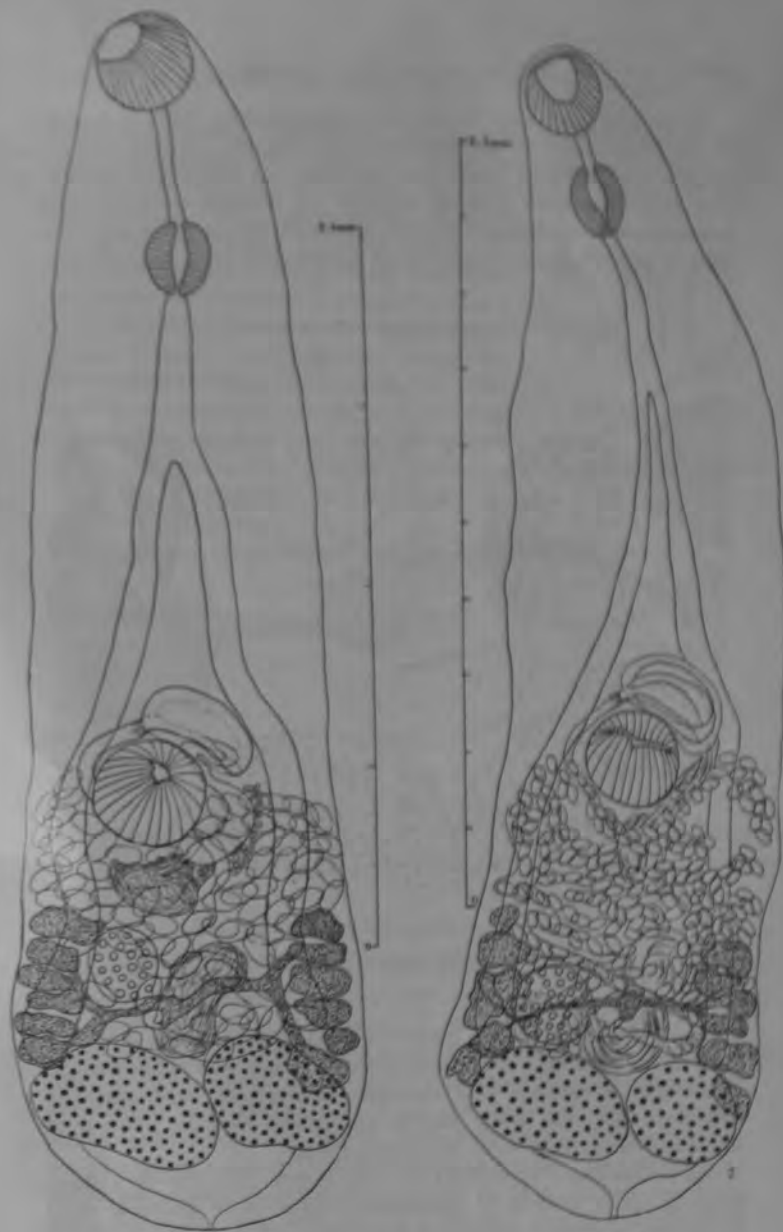


FIG. 1.

FIG. 2.

FIG. 1. — *Pygidiopsis piclaumorelli* n. sp., de l'intestin de *Sterna hirundo* L. Rufisque (Sénégal). D<sup>r</sup> Vét. Pierre Claude MOREL *leg.*, 30-7-1955.

FIG. 2. — Même espèce et même provenance. Individu plus petit.

*P. pichauxmoreli* n. sp. (1). Jusqu'à maintenant, aucun *Pygidiopsis*, à notre connaissance, n'avait été signalé chez des Lariformes du genre *Sterna*.

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et laboratoire de Parasitologie  
de la Fac. de Médecine de Lille (Nord).

(1) Nous la dédions au D<sup>r</sup> Vétérinaire Pierre Claude MOREL, qui l'a découverte, en remerciant de nous l'avoir communiquée.

*Pygidiopsis pindoramensis* Travassos, 1929

(Рис. 107)

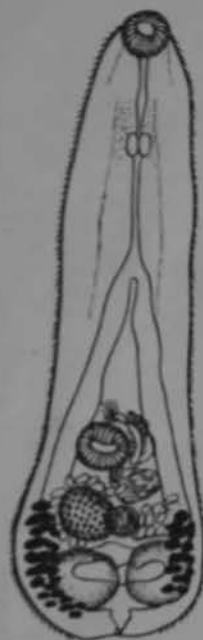
Дефинитивный хозяин: *Ardetta erythromelas*.

Локализация: кишечник.

Место обнаружения: Бразилия (Рио де Жанейро).

Описание вида (по Травассосу, 1929). Тело продолговатое, утонченное в передней части до уровня брюшной присоски. Длина тела 0,37—0,41 мм. Максимальная ширина 0,15—0,21 мм. Кутикула покрыта шипиками длиной 0,003 мм. Брюшная присоска 0,044—0,048 мм в диа-

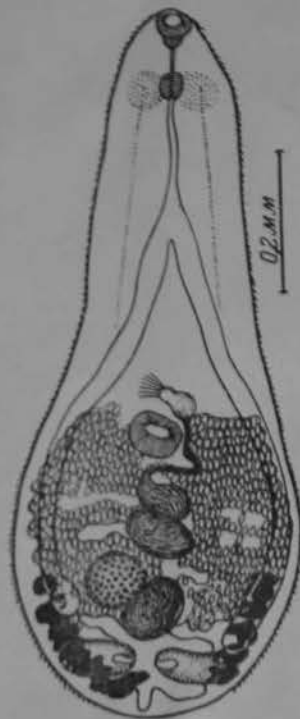
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Pygidiopsis summa Onji & Nishio, 1924

Hosts: Milvus migrans lineatus  
Canis familiaris  
Felis catus domesticus



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PYGIDIOPSIS



*Pygidiopsoides* Martin, 1951

Generic diagnosis. — See p. 880.

Genotype: *P. spindalis* Martin, 1951 (Pl. 96, Fig. 1175), in small intestine of cats and chicks (experimentally). Second intermediate hosts: *Fundulus parvispinnis parvispinnis*; Southern California.

*Pygidiopsoides* Martin, 1951

Generic diagnosis. — Heterophyidae, Haplorchiinae: Body small, oval to fusiform, spinose, oculate. Mouth terminal, surrounded by a single crown of large spines. Oral sucker oval; prepharynx nearly as long as pharynx; esophagus moderately long, ceca short, terminating at or near level of posterior end of acetabulum. Acetabulum in middle third of body, enclosed in genital sac. Testes single, in posterior third of body. Seminal vesicle large, bipartite; pars prostatica well developed. Ductus

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lactorius joining metraterm to form hermaphroditic duct provided powerful sphincter, serving as "common genital ejector". Acetogenital sac eversible, containing two lateral lenticular gonotyls, one between testis and acetabulum. Receptaculum seminis and uterus present. Uterus filling most of posterior third of body; small. Vitellaria extending transversely between testis and ovary. Seminal vesicle simple, fusiform to tubular; flame cell formula:  $(+2) + (2+2) = 16$ . Parasites of mammals and birds.

Genotype: *P. spindalis* Martin, 1951 (Pl. 97, Fig. 1175) in small intestine of cats and chicks (experimentally). Second intermediate host: *Fundulus parvispinnis parvispinnis*; Southern California.

Martin, W.E. 1951.

Jour. Parasit.

37 (3): 297-300

*Pygidiopneides spindalis* Martin, 1951

(Figs. 109a)

Хозяева: definitivoный (экспериментальный)—*Felis catusdomesticus*,  
*Gallus gallus domesticus*.

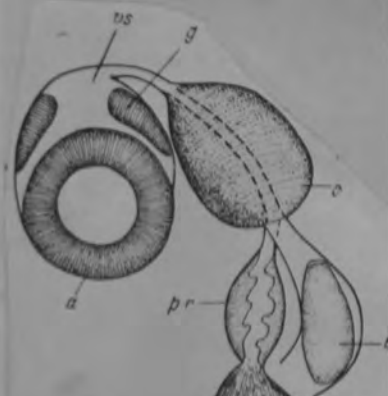
Второй промежуточный (естественный) — *Fundulus parvipinnis par-*  
*vipinnis*.

Локализация: не указана.

Место обнаружения: США.

Описание вида (по Мартину, 1951). Тело веретеновидное, до овального, длиной 0,223—0,429 мм при максимальной ширине 0,066—0,095 мм (в среднем 0,314 × 0,081 мм). Кутикула покрыта шипами, которые уменьшаются в размере к обоим концам тела. Рот окружен четырнадцатью шипами длиной 0,010—0,012 мм и шириной 0,003 мм. Непосредственно в медиальном направлении от этих шипов лежат круговые мышцы. Между фарингесом и брюшной присоской видны остатки глазков. Ротовая присоска овальная (если смотреть на нее сбоку), длиной 0,049 мм и шириной 0,028 мм. Префаринкс приблизительно одинаковой длины с фарингесом. Фаринкс мышечный шаровидный, диаметром 0,016 мм, он может быть также овальным. Пищевод в 2—3 раза длиннее фаринкса. Развилка кишечника находится впереди брюшной присоски; кишечные стволы оканчиваются на уровне заднего края брюшной присоски или вблизи этого уровня. Брюшная присоска размером 0,028—0,033 × 0,025—0,028 мм (в среднем 0,03 × 0,027 мм) находится в середине тела и заключена в половую присоску. Два чечевицеобразных гонотили, расположенные латерально и впереди брюшной присоски, тоже заключены в половую присоску, которая обладает способностью выворачиваться, и тогда брюшная присоска и гонотили отыраиваются. Семенник один, размером около 0,04 × 0,024 мм. Семенной пузырек крупный, состоящий из двух частей, заполнен сперматоzoоидами. Простатическая часть хорошо развита, с лопастными клетками, выступающими в ее просвет. Яичник расположен впереди семенника и достигает приблизительно  $\frac{2}{3}$  размера последнего. Семяприемник почти одинакового размера с яичником и лежит дорзально от него. Лауреров канал отыраивается на дорзальной поверхности тела. Матка у зрелых экземпляров занимает большую часть задней половины тела и наполнена относительно крупными яйцами с крышечками; только что сформировавшиеся яйца почти бесцветные, в дистальных отрезках матки становятся желтыми. Размер яиц достигает 0,026—0,028 × 0,013—0,015 мм (в среднем 0,028 × 0,014 мм). В более старых яйцах содержится мерицидия, без глазков. Общий половой извергательный проток (ejector) почти одинакового размера с брюшной присоской, снабжен толстыми, мышечными, исчерченными стенками. Общий половой канал ведет от общего полового извергательного протока к половой присоске. Экскреторный пузырь трубчатый или веретеновидный. Главные экскреторные сосуды идут от пузыря вперед до середины тела, где разделяются на переднюю и заднюю ветви, каждая из которых связана с двумя парами пламеневиных клеток. Формула экскреторной системы:  $2[(2+2)+(2+2)] = 16$ .

Литература: Martin, 1951, стр. 297—299.



PSYDIOPSONES