

ZOOLOGISCHE MEDEDELINGEN

UITGEGEVEN DOOR HET

RIJKSMUSEUM VAN NATUURLIJKE HISTORIE TE LEIDEN

(MINISTERIE VAN CULTUUR, RECREATIE EN MAATSCHAPPELIJK WERK)

Deel 43 no. 8

25 september 1968

TWO NEW SPECIES OF *GYROCOTYLE* (MONOGENEA) FROM CHIMAERIDS (HOLOCEPHALI)

by

J. VAN DER LAND & H. DIENSKE

Rijksmuseum van Natuurlijke Historie, Leiden

With five text-figures and one plate

INTRODUCTION

Species of the genus *Gyrocotyle* are quite common intestinal parasites of chimaerids. As far as we now know, each parasite species is restricted to one host species. In each host species, however, a second and much rarer species of *Gyrocotyle* may occur besides the common one. The common species are systematically related to each other, and so are the rare ones. In the present paper two species of the group of rare species are described. Their existence has been known already for a long time, but, for different reasons, they have never been recognized as separate species.

DEFINITION OF SOME TERMS

1. Spines. — We recognize two types of spines in the genus *Gyrocotyle*, viz., the *urna*-type and the *confusa*-type. In spines of the *urna*-type the general shape is stubby, irregular and asymmetrical, and the distal portion is stout and blunt (fig. 5). In spines of the *confusa*-type, the general shape is elegant, regular and symmetrical, and the distal portion is slender, gradually tapering, and pointed (fig. 2-4). In spines of the *urna*-type the points that project beyond the skin are twice as wide as in spines of comparable dimensions of the *confusa*-type, which is even striking when specimens are studied under a low-power stereomicroscope.

2. Lateral ruffles. — All species of the subgenus *Amphiptyches* have lateral ruffles. A complicated type, with a great dorsoventral amplitude and

with a few to many secondary undulations, can be distinguished from a simple type, generally with a small dorsoventral amplitude and without secondary undulations.

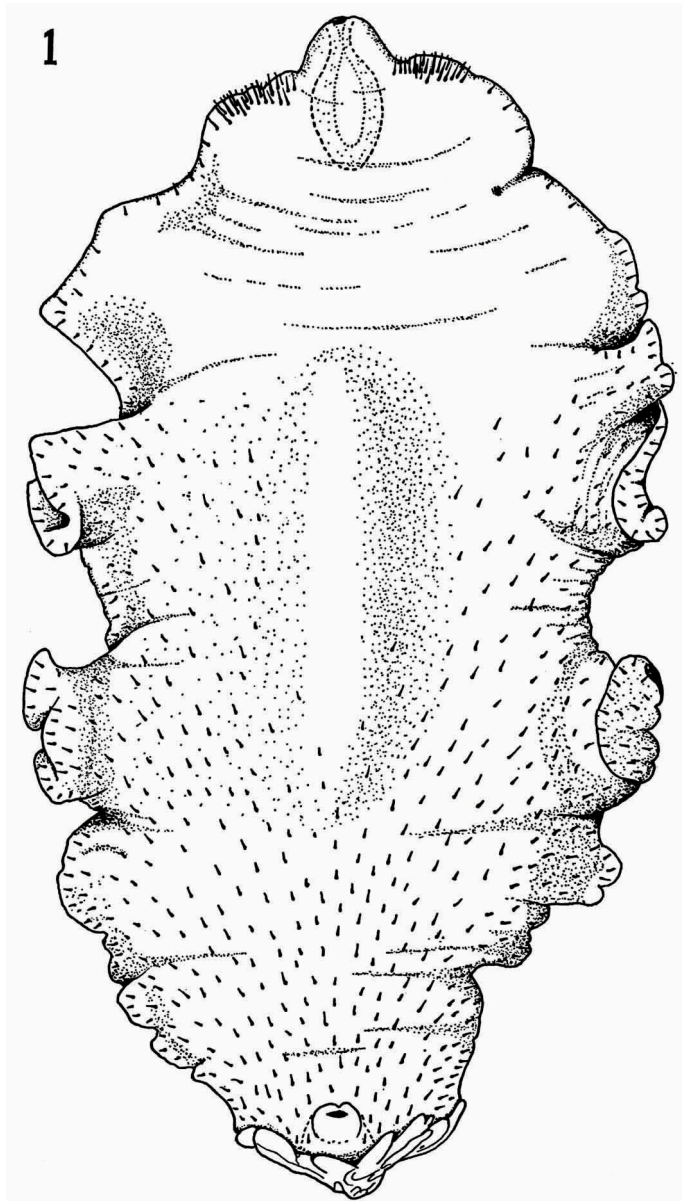


Fig. 1. *Gyrocotyle confusa* n. sp. Habitus, dorsal view (slightly contracted specimen; locality unknown).

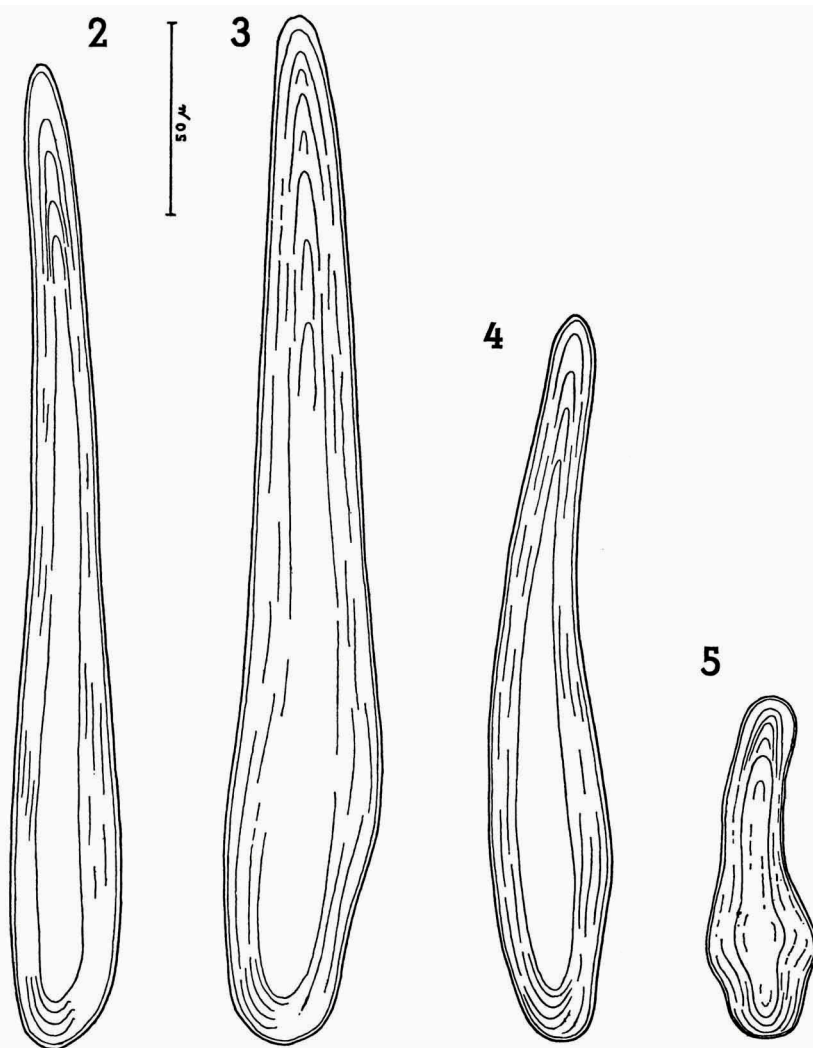


Fig. 2-4. *Gyrocotyle confusa* n. sp., spines. 2, acetabular spine (type specimen); 3, dorsal body spine (type specimen); 4, dorsal body spine (specimen from Herdla fjord). Fig. 5. *Gyrocotyle urna* (Wagener), ventral body spine (type specimen).

3. Rosette. — All species of the genus *Gyrocotyle* have a rosette, i.e. a plicated border of the funnel. We may distinguish between a complexly folded type, with many secondary and tertiary plications, and a simply folded type, with few and simple plications.

4. The ♂-mature and ♀-mature stages. — Gyrocotylids are protandrous, which is a common phenomenon among flatworms. Therefore we may

recognize a ♂-mature stage, which is defined as the stage in which the sperm production has started, as is evident from the presence of sperm in the vas deferens, and a ♀-mature stage, which is defined as the stage in which the egg production has started, as is evident from the presence of eggs in the uterus.

Gyrocotyle confusa n. sp. (text-figs. 1-4, pl. 1 fig. B)

Amphiptyches urna (p.p.) - Lönnberg, 1890: 23, 44; Lönnberg, 1891: 9-47, pl. 3 fig. 35.

Gyrocotyle urna (p.p.) - Haswell, 1902: 50-53; Watson, 1911: 361, 378, 382, 384, 385, 388, 391, 393, 398, 401, 403, 404, 407, 411, 415, pl. 33 fig. 1; Lynch, 1945: 436-438; Joyeux & Baer, 1951: 373, 377, 378; Manter, 1953: 49-51.

Gyrocotyle urna (non Wagener, 1852) - Poljanskij, 1955: 75, 109, 155, 157, tab. 22; Dogiel, et al., 1961: 105.

Amphiptyches urna (non Wagener, 1852) - Joyeux & Baer, 1961: fig. 257.

Material: Norway, Trondheimsfjord, off Rissen, 63° 33' N 9° 53' E, depth 560 m, 16 August 1967, excursion of students of Leiden University, Sta. 205 (holotype, coll. no. 6417, and 4 paratypes, coll. no. 6418, Museum Leiden; 1 paratype, Museum Trondheim); Norway, Herdlafjord, 1930-1940, leg. A. Brinkmann jr. (1 whole mount, Museum Bergen); Denmark, Kattegat, Gælehulen, Mariager, 16 March 1871 (1 specimen, Museum Copenhagen); locality unknown, leg H. Krøyer (1 specimen, Museum Copenhagen).

Description of ♀-mature specimens. — In slightly contracted, fixed specimens the length of the body is 17 to 28 mm, the approximate greatest width of the body 9 to 14 mm. The level of the genital notch is situated at about 13 % of the total length distant from the anterior end. The length of the acetabulum is about 2 mm. The lateral ruffles are of the simple type, numbering from 4 to 9, not reaching the level of the dorsal pore. The width of the rosette is 27 to 50% of the body width; it is of the simply folded type. In some strongly contracted specimens the rosette has completely disappeared. The spines are of the *confusa*-type. The number of acetabular spines is 30 to 40; the largest are 270 to 300 μ or 400 to 450 μ long (perhaps there are two forms, one with short and one with long acetabular spines), in most specimens they are shorter than the largest body spines. Dorsal, ventral, and lateral body spines are present. The dorsal body spines extend from the middle of the funnel region to the middle or anterior part of the uterus, including the region dorsal to the receptaculum seminis and the posterior half of the uterus. Ventral body spines are confined to the anterior half of the funnel region. Lateral body spines occur the entire length of the body. The greatest length of the body spines is 250 to 375 μ .

The male genital pore is situated only slightly to the right of the median line. The two fields of testis follicles extend from a level slightly posterior

to the acetabulum to a level across the uterus at a point at about $\frac{1}{3}$ of its total length from the uterine pore. The vaginal pore is located at about $\frac{2}{3}$ of the distance from the median line to the genital notch. The receptaculum seminis is situated at 60 to 65% of the body length from the anterior end. The length of the uterus is 40 to 45% of the body length; its width is up to 32% of the greatest width of the body. There is no clearly delimited uterine sac. The uterine pore is located at a distance of 14 to 25% of the body length from the anterior end. The vitellaria extend from the level of the posterior end of the acetabulum to a level slightly anterior to the dorsal pore. They are absent in a mid-ventral region ventral to the genital organs and in a small mid-dorsal region dorsal to the middle portion of the uterus.

Spontaneously deposited eggs have a length of 80 to 90 μ and a width of 51 to 63 μ . The length/width ratio is 1.43 to 1.65. The shell is about 2 μ thick. No larva is present.

Host: *Chimaera monstrosa* L. The parasite must be very rare. Not more than 15 specimens have been recorded until now, although hundreds of hosts have been examined by several investigators. We found six parasites in about 175 hosts (vide Dienske, in press).

Distribution: Barents Sea (Poljanskij, 1955); Trondheimsfjord; Herdla-fjord near Bergen; northern North Sea, off the island of Sartöro near Bergen (Lönnerberg, 1890); Oslofjord (Collett in Lönnerberg, 1891: p. 17, note 1); Kattegat.

Gyrocotyle parvispinosa Lynch, 1945, n. stat. (pl. 1 fig. A)

Gyrocotyle urna var.? - Watson, 1911: 365, 370-371, 381-418, pl. 34 fig. 13, pl. 36 fig. 24, pl. 48 fig. 83.

Gyrocotyle urna (p.p.) - Dollfus, 1923: 232, 233, 235, 236; Wardle, 1932: 223-243, fig.; Lynch, 1945: 418, 421-434, pl. 2 fig. 2, pl. 3 fig. 4, pl. 6 fig. 35, pl. 8 fig. 39; Joyeux & Baer, 1951: 373, 377, 378; Manter, 1951: 2-7; Wardle & McLeod, 1952: 659-662, fig. 417B, 418A; Manter, 1953: 49-51.

Gyrocotyle urna forma *parvispinosa* Lynch, 1945: 422-424, pl. 5 figs. 14-18.

Gyrocotyle urna forma *magnispinosa* Lynch, 1945: 422-424, 426, pl. 5 figs. 9-13.

Gyrocotyle urna var. *parvispinosa* - Yamaguti, 1959: 17.

Gyrocotyle urna var. *magnispinosa* - Yamaguti, 1959: 17, pl. 6 fig. 43.

Gyrocotyle urna (non Wagener, 1852) - Joyeux & Baer, 1950: 79.

Material: Puget Sound, Washington, U.S.A., 1939 to 1944, leg. J. E. Lynch (forma *typica*: lectotype, whole mount no. 5958; several paralectotypes in alcohol, coll. no. 6421; 3 paralectotypes, whole mounts, collection J. E. Simmons, Berkeley, Calif.; forma *magnispinosa*: whole mount no. 5959; ♂-mature specimen, whole mount no. 5961; some specimens in alcohol, coll. no. 6423). — MacArthur Bank, Juan de Fuca Strait, depth 48 to 52 fathoms, and Lopez Sound, San Juan Archipelago, Washington, U.S.A., depth 25 fathoms, 21 June to 26 August 1961, leg. J. S. Laurie (forma *typica*: 3 whole

mounts nos. 5968 to 5970; forma *magnispinosa*: 3 whole mounts nos. 5971 to 5973; a large mixed collection of both forms, including postlarvae, ♂-mature and ♀-mature specimens, coll. no. 6422 and in collection J. S. Laurie, Greenville, N.C.). All specimens are in the Leiden museum unless otherwise stated.

Description of ♀-mature specimens (for the greater part after Lynch, 1945). — In a normal state of extension the length of the body is 14 to 55 mm (average 36 mm). The level of the genital notch is situated at 7 to 14% (average 9.5%) of the total length from the anterior end. The acetabulum is 1.7 to 2.75 mm (average 2.6 mm) long and 0.93 to 1.45 mm (average 1.1 mm) wide. The lateral ruffles are of the simple type, numbering from 8 to 30 (average 15), not reaching the level of the dorsal pore. The width of the rosette is 35 to 60% (average 45%) of the body width; it is of the simply folded type. The spines are of the *confusa*-type, but aberrant forms with knob-like proximal extensions may occur (vide Lynch, 1945: figs. 9, 10, and 16). The number of acetabular spines is 17 to 25; in the forma *typica* the largest are 220 to 360 μ long, usually smaller than the largest body spines, in the forma *magnispinosa* the largest are 420 to 800 μ long, always larger than the body spines. Dorsal, ventral, and lateral body spines are present. The dorsal body spines extend from the middle of the funnel region to the region of the uterine sac, including the region dorsal to the receptaculum seminis and the posterior half of the uterus. Ventral body spines are confined to the anterior half of the funnel region and a small region just anterior to the level of the dorsal pore. Lateral body spines may occur the entire length of the body but usually are large, numerous and conspicuous only posterior to the level of the ovary. The greatest length of the body spines is 150 to 360 μ .

The male genital pore is situated only slightly to the right of the median line. The two fields of testis follicles extend from about the level of the posterior fourth of the acetabulum to the level of the anterior border of the uterine sac, or rarely to the middle thereof. The vaginal pore is located at about $\frac{2}{3}$ of the distance from the median line to the genital notch. The receptaculum seminis is situated at a distance of 62 to 75 % of the body length from the anterior end. The length of the uterus is 30 to 47% of the body length; its width is up to 32% of the greatest width of the body. There is a clearly delimited uterine sac, which has a length of 11 to 17% of the body length. The uterine pore is located at a distance of 14 to 22% of the body length from the anterior end. The vitellaria extend from the level of the posterior end of the acetabulum to a level slightly anterior to the dorsal pore. They are absent in the mid-ventral and mid-dorsal regions from the acetabulum to the receptaculum seminis.

Spontaneously deposited eggs have a length of 81 to 111 μ (average 94 μ) and a width of 55 to 72 μ (average 65.5 μ). They are surrounded by a transparent jelly, 6 to 12 μ thick. No larva is present.

A more extensive description with several figures is given by Lynch (1945).

Host: *Hydrolagus colliei* (Lay & Bennett). According to Lynch (1945) 39 out of 167 host specimens harboured the parasite. However, Laurie (personal communication), who examined 1500 host specimens from the same region, found this parasite only in 2 to 3 % of the infected hosts (most host specimens are infected with *Gyrocotyle fimbriata* Watson).

Distribution: British Columbia (Wardle, 1932); Puget Sound, Washington (Lynch, 1945); California: Monterey Bay, Cabral's Banks off San Diego, and off La Jolla (Watson, 1911).

DISCUSSION

The subgenus *Amphiptyches* may be divided into two groups: (1) The *urna*-group, which is characterized by the possession of a complexly folded rosette, a usually great number of lateral ruffles of the complex type, and spines of the *urna*-type. All common species belong to this group. (2) The *confusa*-group, which is characterized by the possession of a simply folded rosette, a usually small number of lateral ruffles of the simple type, and spines of the *confusa*-type. The species of this group, including the two species described in the present paper, are rarer than the species of the first group from the same hosts. Until now four species of the *confusa*-group are known to exist:

1. *G. confusa* n. sp. from the eastern atlantic *Chimaera monstrosa* L. This species was first recorded by Lönnberg (1890 and 1891), who mentioned it as a *Ligula*-like form of *Gyrocotyle urna* (Wagener). He believed it to be just a different state of contraction, although Collett (in Lönnberg, 1891) had expressed the opinion that two different species were involved. Poljanskij (1955) followed Lynch (1945) in calling this species *G. urna* and the common European species *G. fimbriata*. However, there can be no doubt that the common species should be called *G. urna* because of the adequate original description. Moreover type material of *G. urna*, which we could study, is still present in the Berlin museum.

2. *G. parvispinosa* Lynch from the western pacific *Hydrolagus colliei* (Lay & Bennett). Material of this species was recorded for the first time by Watson (1911), but she considered it to belong to *G. urna*. She was followed by Lynch (1945) who also considered his material of this species to be identical with *G. urna*.

3. *G. spec.* from the western atlantic *Hydrolagus affinis* (Brito Capello). This species is to be described by Van der Land & Templeman (in press).

4. *G. spec.* from the southern atlantic *Callorhynchus callorhynchus* (L.). This species is mentioned by Mendivil-Herrera (1946), who stated that he intended to describe it later, but as far as we are aware he has not yet done so.

The two species described here are probably closely related, but they evidently differ in a number of characters. In general they clearly differ in their general habitus, but it is very difficult to describe this. *G. parvispinosa* is a slenderer species with more lateral undulations than *G. confusa*.

G. confusa has a greater number of acetabular spines, a greater number of dorsal and lateral body spines, a smaller number of ventral body spines; both the anterior and posterior borders of the fields of testis follicles have a more posterior position and the follicles are more numerous and crowded; there is no clearly delimited uterine sac; the dorsal vitellaria are absent only in a very small mid-dorsal region; the eggs do not have a thick transparent shell and they are ellipsoid with bluntly rounded ends while the ends are slightly more pointed in eggs of *G. parvispinosa*.

ACKNOWLEDGEMENTS

Thanks are due to the following persons for the donation and loan of material: Dr. John E. Simmons, University of California, Berkeley, Calif.; Dr. John S. Laurie, East Caroline College Station, Greenville, N. C.; Dr. A. Brinkmann, University of Bergen, Bergen; Dr. G. Hartwich, Institut für Spezielle Zoologie und Zoologisches Museum, Berlin; Dr. J. E. Lynch, University of Washington, Seattle, Wash.; Dr. J. B. Kirkegaard, Universitetets Zoologiske Museum, Copenhagen. We are also much indebted to Dr. E. Sivertsen, Norges Lærerhøgskole, Trondheim, who arranged our collecting trips in the Trondheimsfjord area.

REFERENCES

- DIENSKE, H., in press. A survey of the metazoan parasites of the rabbit-fish, *Chimaera monstrosa* L. (Holocephali). — Netherlands Journ. Sea Res., 4: 32-58.
- DOGIEL, V. A., et al. (eds.), 1961. Parasitology of fishes, (English edition): i-xi, 1-384.
- DOLLFUS, R. P., 1923. L'orientation morphologique des Gyrocotyle et des cestodes en général. — Bull. Soc. Zool. France, 48: 205-242.
- HASWELL, W. A., 1902. On a Gyrocotyle from *Chimaera ogilbyi*, and on Gyrocotyle in general. — Proc. Linn. Soc. New South Wales, 27: 48-54.
- JOYEUX, C. & J. G. BAER, 1950. Le genre Gyrocotyloides Fuhrmann, 1931 (Cestodaria). — Bull. Soc. Neuchatel. Sc. Nat., 73: 71-79.

- , 1951. Le genre *Gyrocotyle* Diesing, 1850 (Cestodaria). — *Rev. Suisse Zool.*, 58: 371-381.
- , 1961. Classe des Cestodaires. In: P. P. GRASSÉ, *Traité de Zoologie*, 4 (1): 327-346.
- LAND, J. VAN DER, & W. TEMPLEMAN, in press. Two new species of *Gyrocotyle* (Monogenea) from *Hydrolagus affinis* (Brito Capello) (Holocephali). — *Journ. Fish. Res. Bd Canada*.
- LÖNNBERG, E., 1890. Helminthologische Beobachtungen von der Westküste Norwegens. I. Cestoden. — *Bihang Kongl. Svenska Vetensk.-Akad. Handl.*, 16 (4, 5): 1-47.
- , 1891. Anatomische Studien über Skandinavische Cestoden. — *Kongl. Svenska Vetensk.-Akad. Handl.*, 24 (1, 6): 1-108.
- LYNCH, J. E., 1945. Redescription of the species of *Gyrocotyle* from the Ratfish, *Hydrolagus coliei* (Lay & Bennet), with notes on the morphology and taxonomy of the genus. — *Journ. Parasit.*, 31: 418-446.
- MANTER, H. W., 1951. Studies on *Gyrocotyle rugosa* Diesing, 1850, a cestodarian parasite of the Elephant Fish, *Callorhynchus milii*. — *Zool. Publ. Victoria Univ. Coll.*, 17: 1-11.
- , 1953. *Gyrocotyle*, a peculiar parasite of the Elephant Fish in New Zealand. — *Tuatara*, 5: 49-51.
- MENDÍVIL-HERRERA, J., 1946. *Gyrocotyle meandrica* n. sp., del intestino espiral del pez gallo, *Callorhynchus callorhynchus* (L.). — *Comun. Zool. Mus. Hist. Nat. Montevideo*, 2 (36): 1-12.
- POLJANSKIJ, Ju. I., 1955. Materialy po parazitologii ryb severnyh morej SSSR. Parazity ryb Barenцова morja. — *Trud. Zool. Inst. Akad. Nauk SSSR*, 19: 5-170.
- WAGENER, R. G., 1852. Ueber einen neuen in der *Chimaera monstrosa* gefundenen Eingeweide-Wurm, *Amphiptyches urna* Grube und Wagener. — *Arch. Anat. Phys. Wiss. Med.*, 1852: 543-554.
- WARDLE, R. A., 1932. The Cestoda of Canadian fishes. I. The Pacific coast region. — *Contr. Can. Biol. Fish.*, (n.s.) 7: 223-243.
- WARDLE, R. A., & J. A. McLEOD, 1952. The zoology of tapeworms: i-xiv, 1-780.
- WATSON, E. E., 1911. The genus *Gyrocotyle*, and its significance for problems of cestode structure and phylogeny. — *Univ. Calif. Publ. Zool.*, 6: 353-468.
- YAMAGUTI, S., 1959. The Cestodes of Vertebrates. *Systema Helminthum*, 2: 1-860.

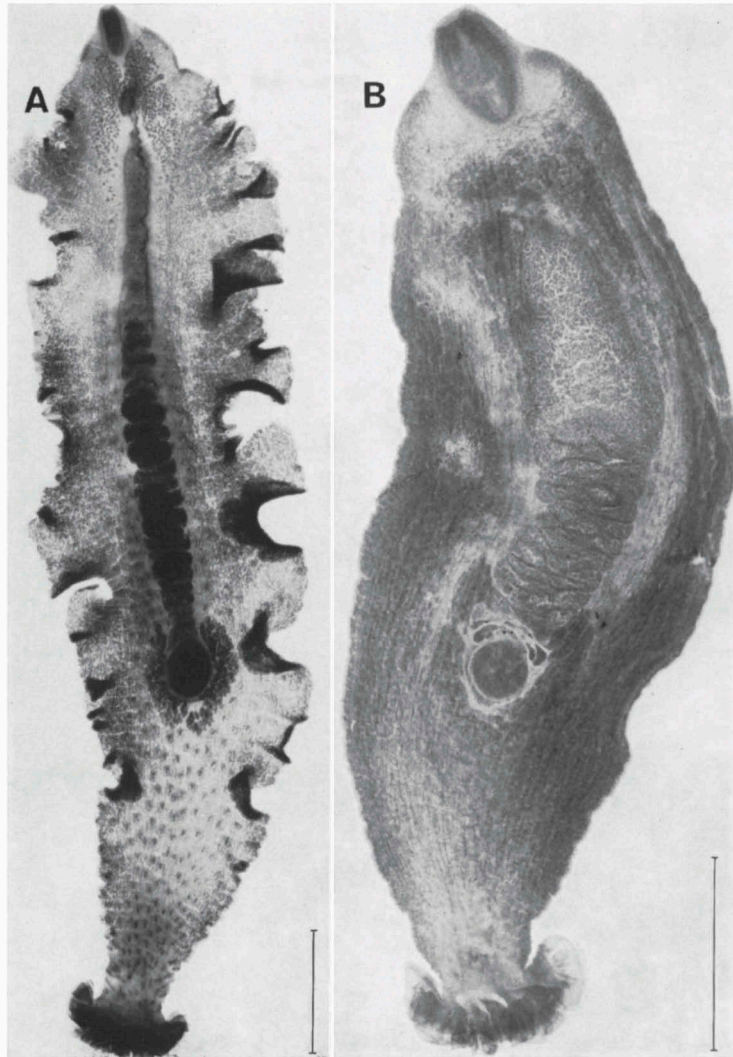


Fig. A. *Gyrocotyle parvispinosa* Lynch, dorsal view, after whole mount prepared by J. E. Lynch (lectotype). Fig. B. *Gyrocotyle confusa* n. sp., ventral view, after whole mount prepared by A. Brinkmann (specimen from Herdla fjord). The scales represent 0.5 cm.