

ADDITIONAL NOTES ON FRESHWATER PLANARIANS FROM LAKE TAHOE IN THE SIERRA NEVADA MOUNTAINS IN NORTH AMERICA

by

MASAHARU KAWAKATSU

Several years ago I described two species of freshwater planarians that occur at the bottom of Lake Tahoe in the Sierra Nevada Mountains in California and Nevada, U. S. A. (KAWAKATSU 1968). These lake-dwelling species are: *Phagocata tahoena* KAWAKATSU, 1968 (olim *Phagocata nivea tahoena*), and *Dendrocoelopsis hymanae* KAWAKATSU, 1968. Only preserved specimens (fixed in 99 % isopropyl alcohol) were studied. When I studied the species in the spring of 1965, the material of *Phagocata tahoena* was sufficient for a histological study, but that of *Dendrocoelopsis hymanae* was only two dried specimens, one sexually mature and the other immature. They were softened in a fluid of glycelin-ethyl alcohol but did not permit a thorough histological analysis of the anatomy.

In September of 1967 and again in July of 1968, Dr. Roman KENK, of the Museum of Natural History, Smithsonian Institution, visited the Lake (near Al Tahoe, El Drado County, California, Emerald Bay of Lake Tahoe, El Drado County, California, and off Pope Beach, El Drado County, California) and collected a sufficient number of animals of *Phagocata tahoena*. The material of *Dendrocoelopsis hymanae* was not collected during his trips. KENK (1970) described some additional morphological, histological and anatomical features of *Phagocata tahoena* based upon his new material. He also corrected the taxonomic position of *Phagocata nivea tahoena* as *Phagocata tahoena*. I fully agree with Dr. KENK's opinion. Some ecological notes on the habitats of the Lake Tahoe planarians are found in the following literatures: KAWAKATSU (1965, 1968) and KENK (1970).

Films including many photomicrographs of the slides of the Lake Tahoe planarians taken by myself during the spring of 1965 are deposited in my laboratory. The purpose of this paper is a publication of some of these photomicrographs. These may be useful for the future taxonomic study of the Lake Tahoe planarians. I have also added two photographs showing the prospect of Lake Tahoe taken by Mr. Ted C. FRANTZ.

Phagocata tahoena KAWAKATSU, 1968

Pl. VII, Figs. A-H, Pl. VIII, Figs. A-D, Pl. IX, Figs. A-D.

Phagocata nivea tahoena (new subspecies, MS) in KAWAKATSU 1965. Jap. Jour. Limnol., 26: 106-112. Ecological notes (especially, comparison of the population density of lake-dwelling planarians both in Lake Tahoe and Lake Biwa-ko).

Phagocata nivea tahoena (new subspecies, MS) in KAWAKATSU 1966. Collect. & Breed., 28: 52 (Fig. 44-12 and 13). Photographs of a preserved specimen and a preserved cocoon.

Phagocata nivea KENK, new subspecies, in FRANTZ & CORDONE 1966. Biol. Soc. Nevada, Occ. Papers, No. 8: 3. Preliminary checklist of Invertebrates collected from Lake Tahoe, 1961-1964.

- Phagocata nivea tahoena* KAWAKATSU, 1968. Proc. U. S. Nat. Mus., 124 (3638): 6-11 (Figs. 2 and 3; Pl. 1). Original description. Some ecological and chorological notes are also described.
- Fonticola nivea tahoena* (KAWAKATSU, 1968) in BALL 1969. Canad. Jour. Zool., 47 (No. 1): 60. Taxonomic remarks.
- Phagocata tahoena* KAWAKATSU, 1968, in KENK 1970. Proc. Biol. Soc. Washington, 83 (2): 23-29 (Figs. 6-10). Redescription including some ecological notes.
- Phagocata tahoena* KAWAKATSU, 1968, in KAWAKATSU 1971. Bull. Fuji. Women's College, No. 9, Ser. II: 37. Taxonomic remarks.
- Phagocata tahoena* KAWAKATSU, 1968, in KENK 1972. Biota of Freshwater Ecosystems, Ident. Manual, No. 1: 38. Taxonomic synopsis with a sketch of a living specimen (after KENK 1970) and a semidiagrammatic figure of the copulatory apparatus (after KAWAKATSU 1968).
- Phagocata tahoena* KAWAKATSU, 1968, in GOURBAULT 1972. Mém. Mus. Nat. d'Hist. Natur., Nouv. Sér., Sér. A (Zool.), LXXIII: 28. Taxonomic remarks.

HOLOTYPE. --- One set of serial sagittal sections (KAWAKATSU's Specimen No. 458 a: 3 slides) is deposited in the U. S. Nat. Mus. (Museum of Natural History, Smithsonian Institution, Washington, D. C.). Several sets of serial sections and whole mounts are also deposited in the same Museum. Some of the paratypes retained in the author's collection (KAWAKATSU's laboratory in Sapporo.)

***Dendrocoelopsis hymanae* KAWAKATSU, 1968**

Pl. X, Figs. A-D, Pls. XI-XII, Figs. A-H

- Dendrocoelopsis hymanae* (new species, MS) in KAWAKATSU 1965. Jap. Jour. Limnol., 26: 106-112. Ecological notes (especially, comparison of the population density of lake-dwelling planarians both in Lake Tahoe and Lake Biwa-ko).
- Dendrocoelopsis hymanae* (new species, MS) in KAWAKATSU 1966. Collect. & Breed., 28: 89 (Fig. 45-26). Photographs of a preserved specimen (dorsal and ventral views).
- Dendrocoelopsis*, new species, in FRANTZ & CORDONE 1966. Biol. Soc. Nevada Occ. Papers, No. 8: 4. Preliminary checklist of Invertebrates collected from Lake Tahoe, 1961-1964.
- Dendrocoelopsis hymanae* KAWAKATSU, 1968. Proc. U. S. Nat. Mus., 124 (3638): 11-15 (Fig. 4; Pl. 2). Original description. Some ecological notes are also described.
- Dendrocoelopsis hymanae* KAWAKATSU, 1968, in BALL 1969. Canad. Jour. Zool., 47 (1): 62. Taxonomic remarks.
- Dendrocoelopsis hymanae* KAWAKATSU, 1968, in KENK 1972. Biota of Freshwater Ecosystems, Ident. Manual, No. 1: 61. Taxonomic synopsis with a semidiagrammatic figure of the copulatory apparatus (after KAWAKATSU 1968).
- Dendrocoelopsis hymanae* KAWAKATSU, 1968, in GOURBAULT 1972. Mém. Mus. Nat. d'Hist. Natur., Nouv. Sér., Sér. A (Zool.), LXXIII: 78. Taxonomic remarks.
- Dendrocoelopsis hymanae* KAWAKATSU, 1968, in KENK 1973. Smithsonian Contrib. Zool., No. 138: 9-10 (Fig. 7; after KAWAKATSU 1968).

HOLOTYPE. --- One set of serial sagittal sections (KAWAKATSU's Specimen No. 468 a: 11 slides) is deposited in the U. S. Nat. Mus.; also one whole mount of the head piece and one set of sagittal sections of the posterior piece of the same specimen (KAWAKATSU's Specimen No. 468 b; asexual worm).

Note. Although the following article is not a scientific paper, but some taxonomic discussions of the Lake Tahoe planarians between the late Dr. L. H. HYMAN and KAWAKATSU will be found in it. In Memoriam --- Libbie Henrietta HYMAN, 1888-1969. Jour. Biol. Psychol. / The Worm Runner's Digest, XII (1): 3-23. Oct., 1970. See pages 14-15 in that article.

REFERENCES

- BALL, I. R., 1969. An annotated checklist of the freshwater Tricladida of the Nearctic and Neotropical Regions. *Canad. Jour. Zool.*, 47 (1): 59-64.
- FRANTZ, T. C. & CORDONE, A. J., 1966. A preliminary checklist of Invertebrates collected from Lake Tahoe, 1961-1964. *Biol. Soc. Nevada Occ. Papers*, No. 8: 1-12.
- GOURBAULT, N., 1972. Recherches sur les Triclades Paludicoles hypogés. *Mém. Mus. Nat. d'Hist. Natur., Nouv. Sér., Sér. A (Zool.)*, LXXIII: 1-249 + Pls. I-III + 1 folder.
- KAWAKATSU, M., 1965. Some ecological notes on the freshwater planarians of Lake Tahoe in the Sierra Nevada Mountains in North America and Lake Biwa-ko in Middle Japan. *Jap. Jour. Limnol.*, 26: 106-112. 1966. Planaria scholars of world over, Nos. 18-19; *Collect. & Breed.*, 28: 50-53, 88-91. 1968. North American Triclad Turbellaria, 17: Freshwater planarians from Lake Tahoe. *Proc. U. S. Nat. Mus.*, 124: (3638): 1-21 + Pls. 1-2. 1971. A list of publications on Japanese Turbellarians (1970) --- Including titles of publications on foreign Turbellarians written by the Japanese authors ---. *Bull. Fuji Women's College*, No. 9, Ser., II: 29-40 + 1 folder.
- KENK, R., 1970. Freshwater Triclads (Turbellaria) of North America, II. New or little known species of *Phagocata*. *Proc. Biol. Soc. Washington*, 83 (2): 13-34. 1972. Freshwater planarians (Turbellaria) of North America. *Biota of Freshwater Ecosystems, Ident. Manual No. 1*: 1-81 Washington, D. C. 1973. Freshwater Triclads (Turbellaria) of North America, VI. The Genus *Dendrocoelopsis*. *Smithsonian Contib. Zool.*, No. 138: 1-16.

Address of the Author:

Dr. Masaharu KAWAKATSU, Professor of Biology, Biological Laboratory, Fuji Women's College, Kita-16, Nishi-2, Sapporo (Hokkaidô) 065, Japan.

EXPLANATION OF PLATES VI-XII

Plate VI

- Top. Crystal Bay of Lake Tahoe (facing south-west from Mt. Rose), Washoe County, Nevada. Crystal Bay is located at the northern part of the lake. Many specimens of *Phagocata tahoena* occurred. Photo: Mr. Ted C. FRANTZ, on March 1, 1965.
- Bottom. Lake Tahoe at Cave Rock landing, Douglas County, Nevada. Cave Rock is located at the south-eastern part of the lake. Many specimens of *Phagocata tahoena* occurred. Photo: Mr. Ted C. FRANTZ, on May 16, 1964.

Plate VII

- A and B. *Phagocata tahoena* KAWAKATSU, 1968. Photomicrographs showing the parts of the genital organs (sagittal sections). A: ovary and ovovitelline duct (Specimen No. 455 a: out from McKinney Bay — depth, 1255 feet). B: part of the ventral testes at the prepharyngeal region (Specimen No. 459 e: Off King's Beach — depth, 474 feet).
- C-H. *Phagocata tahoena* KAWAKATSU, 1968. A set of the photomicrographs showing the parts of the genital organs (transverse sections of the Specimen No. 459 a: Off King's Beach — depth, 474 feet).

The same magnifications. C: section at the level of ovaries. D: section at the level of the posterior part of pharynx. E: section at the level of copulatory bursa. F: section at the level of penis bulb. G: section at the level of penis papilla. H: section at the level of the genital pore. **bc**, bulbar cavity; **bs**, bursa stalk; **cb**, copulatory bursa; **e**, eye; **gp**, genital pore; **i**, intestine; **ia**, intestinal anastomosis; **nc**, nerve cord; **od**, ovovitelline duct; **ov**, ovary; **ph**, pharynx; **sd**, sperm duct; **t**, testis; **yg**, yolk gland.

Plate VIII

A-D. *Phagocata tahoena* KAWAKATSU, 1968. Photomicrographs showing the parts of the copulatory apparatus (sagittal sections). The same magnifications. A: Specimen No. 454 b: out from McKinney Bay — depth, 820 to 840 feet. B: Specimen No. 458 a: Off Tahoe Vista — depth, 270 to 330 feet (holotype). C: Specimen No. 459 d: Off King's Beach — depth, 474 feet. D: Specimen No. 459 e: Off King's Beach — depth, 474 feet.

bc, bulbar cavity; **bs**, bursa stalk; **cb**, copulatory bursa; **ed**, ejaculatory duct; **gp**, genital pore; **ma**, male antrum; **pb**, penis bulb; **sd**, sperm duct.

Plate IX

A-D. *Phagocata tahoena* KAWAKATSU, 1968. A set of the photomicrographs showing the parts of the copulatory apparatus (sagittal sections of the Specimen No. 455 a: out from McKinney Bay — depth, 1255 feet). The same magnifications. A: near mid-sagittal section. B: mid-sagittal section. C: mid-sagittal section. D: near mid-sagittal section.

bc, bulbar cavity; **bs**, bursa stalk; **cb**, copulatory bursa; **cod**, common ovovitelline duct; **ed**, ejaculatory duct; **gp**, genital pore; **ma**, male antrum; **pb**, penis bulb; **pp**, penis papilla; **v**, vagina.

Plate X

A-D. *Dendrocoelopsis hymanae* KAWAKATSU, 1968. A, B and C. Photomicrographs showing the adhesive organ and the ventral testes (sagittal sections of the Specimen No. 468 a: between Skunk Harbor and Tahoe City — depth, 1554 to 1623 feet; holotype). A: general view of the adhesive organ. B and C: enlarged photomicrographs of the parts of the adhesive organ. D: parts of the ventral testes at the prepharyngeal region.

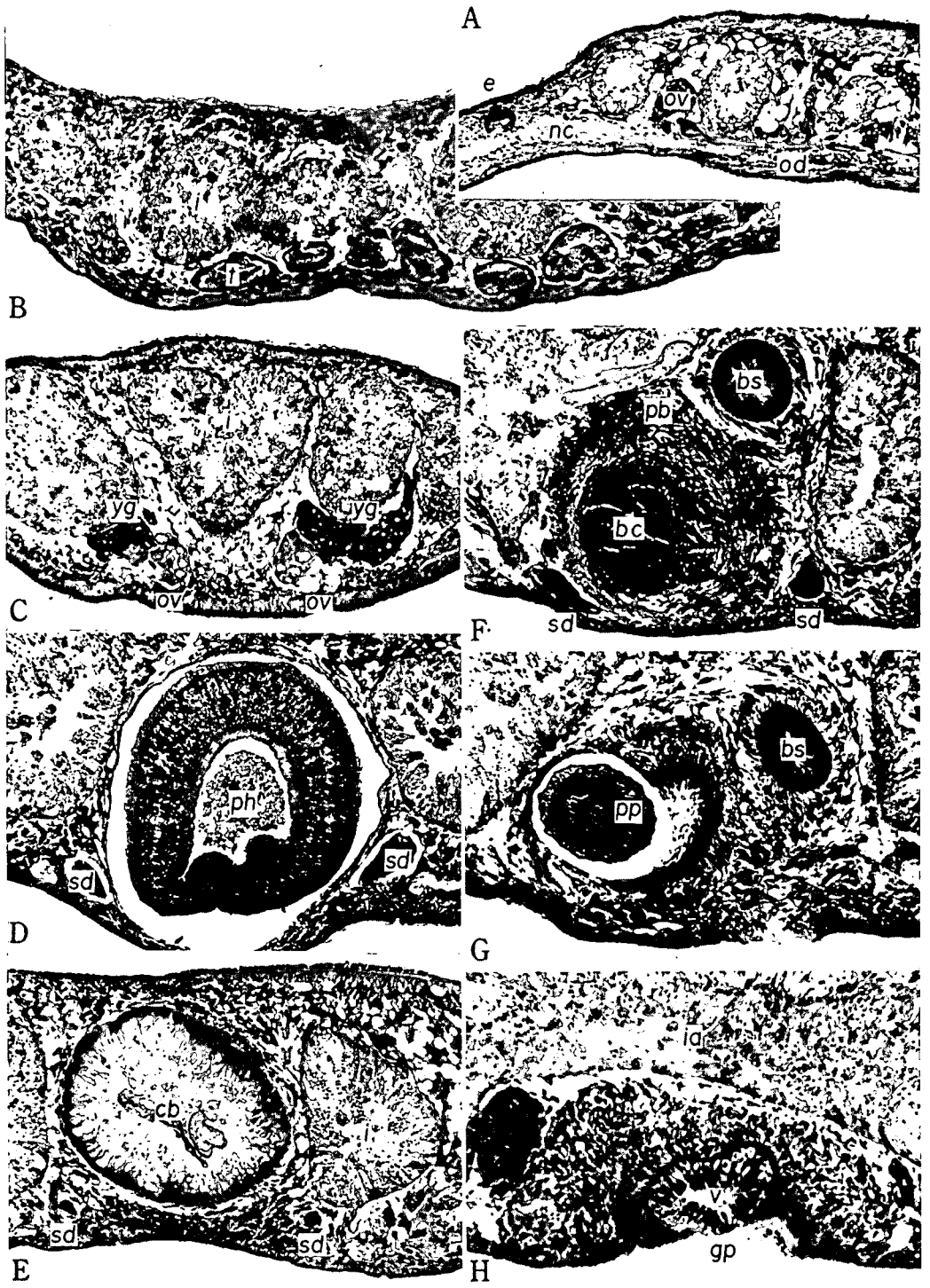
ao, adhesive organ; **i**, intestine; **t**, testis; **yg**, yolk gland.

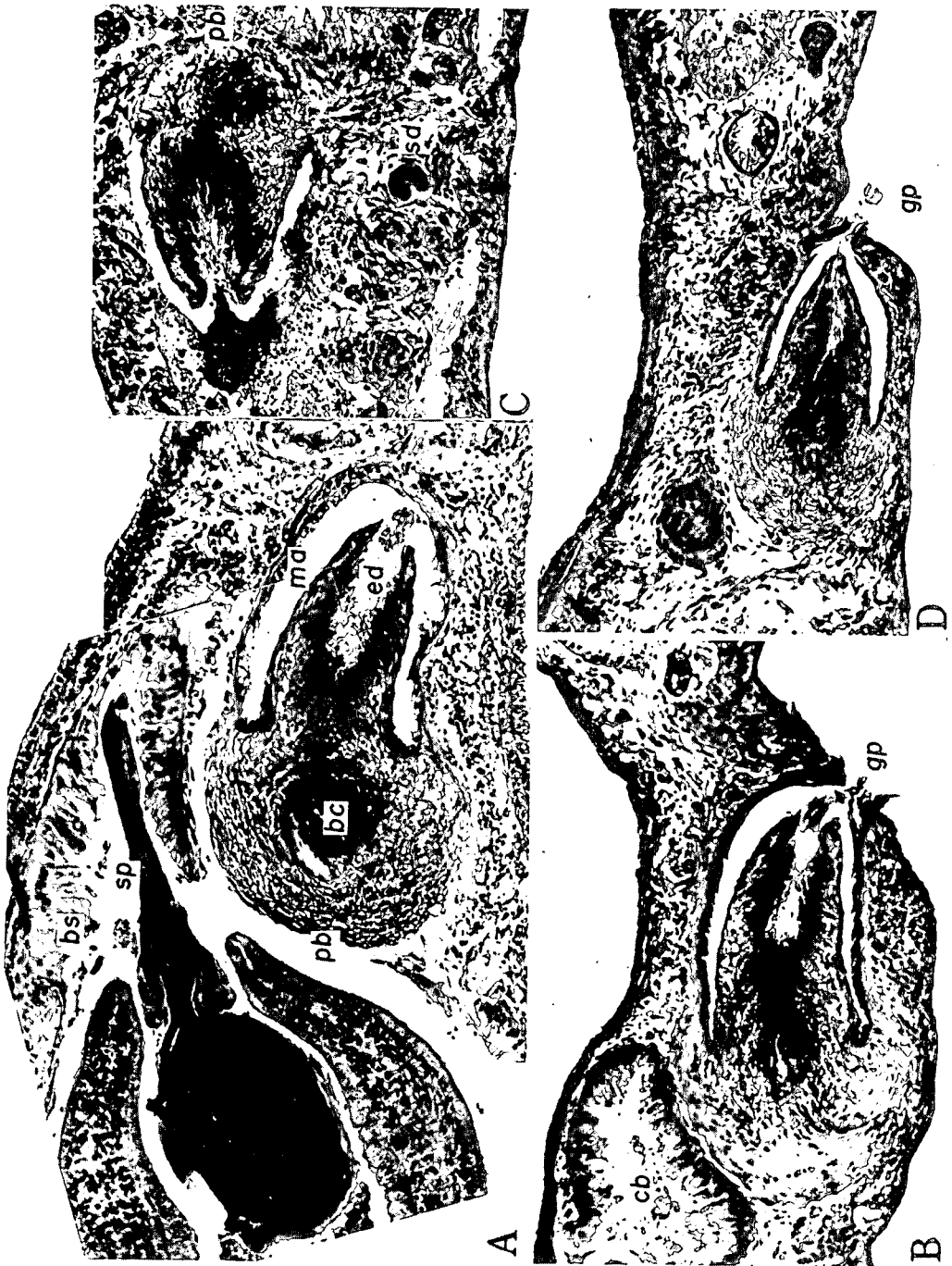
Plates XI and XII

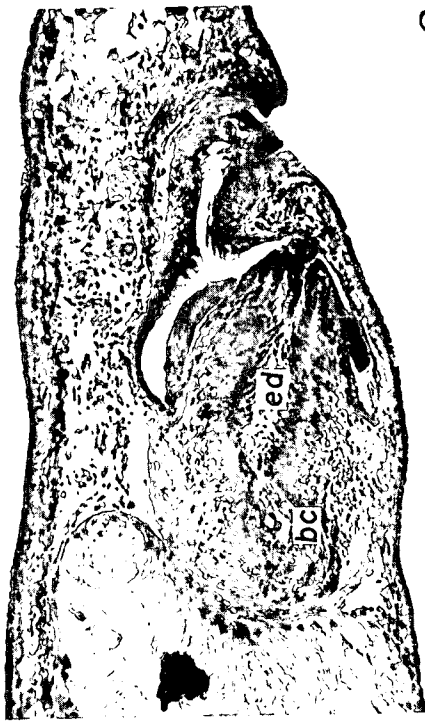
A-H. *Dendrocoelopsis hymanae* KAWAKATSU, 1968. A set of the photomicrographs showing the parts of the copulatory apparatus (sagittal sections of the Specimen No. 468 a: between Skunk Harbor and Tahoe City — depth, 1554 to 1623 feet; holotype). The same magnifications. Plate XI, A-D: near mid-sagittal sections. Plate XII, E-H: mid-sagittal sections.

bc, bulbar cavity; **bs**, bursa stalk; **cb**, copulatory bursa; **cod**, common ovovitelline duct; **gp**, genital pore; **ma**, male antrum; **pb**, penis bulb; **pp**, penis papilla; **sd**, sperm duct.

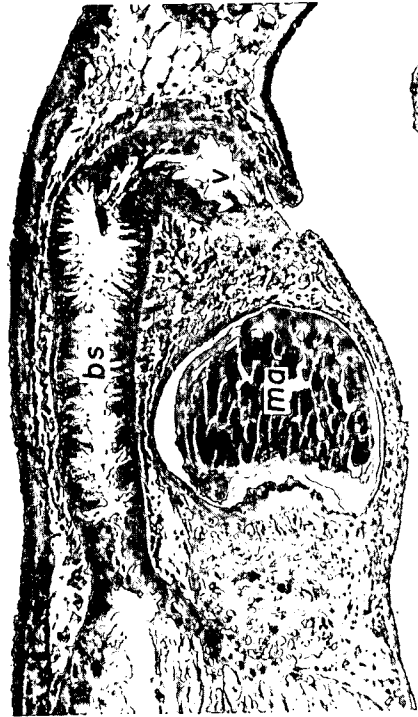




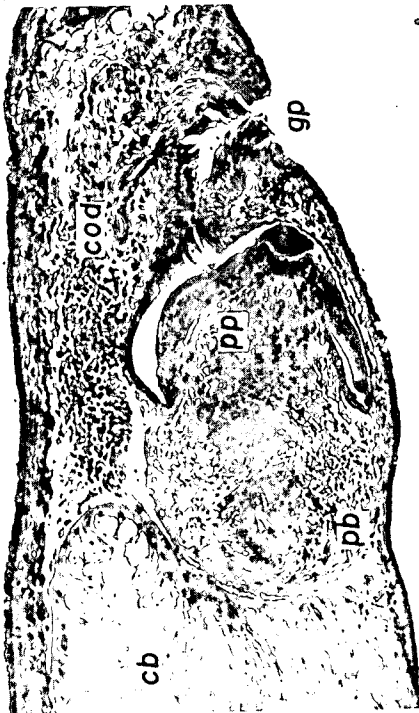




C



BD



A



